

## On the Semantics of the NP-Internal Word Order: Chinese vs Serbo-Croatian\*

Željko Bošković and I-Ta Chris Hsieh

University of Connecticut and Tsinghua University

**Abstract:** The paper examines word order within the NP domain focusing on two broad differences: Word order in this domain is freer in languages without articles than in languages with articles but there are also differences in the flexibility of word order in this domain among the languages in the former group, as a comparison of Chinese and Serbo-Croatian reveals. The paper argues for a syntactic account of the first difference and a semantic account of the second difference, which leads us to address the more general issue of the limits of crosslinguistic variation in the semantics. An account of certain aspects of the distribution of *-dè* and classifiers in Chinese is also provided.

### 1. Introduction

This paper examines word order of demonstratives, adjectives, and possessives in the traditional Noun Phrase (TNP).<sup>1</sup> Our starting point will be the claim made in Bošković (2009a, 2012) that languages without articles have freer word order within TNP than languages with articles, which Bošković attributes to the lack of DP in the former. We will develop this argument, also exploring its semantic consequences by focusing on certain differences in the TNP word order among article-less languages, comparing Chinese (i.e. Mandarin) and Serbo-Croatian (SC). This comparison will in fact be the main focus of the paper. The conclusions we reach will have consequences for the issue of the limits of crosslinguistic variation in the semantics. Under the NP analysis of article-less languages, where restrictions on the order of demonstratives, adjectives, and possessives in such languages should come from the semantics, the TNP of languages like Chinese and SC is a perfect testing ground for exploring the limits of crosslinguistic semantic variation as well as the semantics of the elements in question, which we will attempt to take advantage of. We will also provide an account of *-dè* and some aspects of the placement of classifiers in Chinese.

### 2. The NP/DP analysis

It is often assumed that article-less languages have a null D, the only difference between (1) and (2) being PF-based, with D phonologically null in Chinese and SC.

- (1) The stone broke the window.  
 (2) a. Shítóu zá-pòu lè chūanghù.  
       stone pound-break PERF window  
       b. Kamen razbi prozor.  
       stone broke window

However, Bošković (2008, 2012) argues based on a number of generalizations where many syntactic/semantic phenomena correlate with the presence/absence of articles that languages without articles lack DP, and Chierchia (1998) makes the same claim based on very different considerations regarding the semantics of TNPs. Bošković's generalization are given in (3).<sup>2</sup>

- (3) 1. Only languages without articles may allow left-branch extraction out of TNPs.  
       2. Only languages without articles may allow adjunct extraction from TNPs.  
       3. Only languages without articles may allow scrambling.

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<sup>1</sup>TNP is a neutral term that does not take a stand on the potential presence of functional projections in this domain.

<sup>2</sup>See Bošković (2012) for the illustrations/definitions of the phenomena from (3) (e.g. what is meant by scrambling in 3.3 is Japanese-style long-distance scrambling from finite clauses. Note that what matters here is definite articles since Slovenian, which has only indefinite articles, patterns with article-less languages (Bošković 2009b)).

4. Multiple-*wh* fronting languages without articles do not show superiority effects.
5. Only languages with articles may allow clitic doubling.
6. Languages without articles do not allow transitive nominals with two genitives.
7. Head-internal relatives display island sensitivity in languages without articles, but not in languages with articles.
8. Polysynthetic languages do not have articles.
9. Only languages with articles allow the majority reading of MOST.
10. Languages without articles disallow negative raising (i.e. strict clause-mate NPI licensing under negative raising).
11. Negative constituents must be marked for focus in article-less languages.
12. The negative concord reading may be absent with multiple complex negative constituents only in negative concord languages with articles.
13. Radical pro-drop may be possible only in languages without articles.
14. Number morphology may not be obligatory only in TNPs of languages without articles.
15. Elements undergoing focus movement are subject to a V-adjacency requirement only in languages with articles.
16. Possessors may induce an exhaustivity presupposition only in languages with articles.
17. Inverse scope for S-O is unavailable in languages without articles.
18. Sequence of Tense is found only in languages with articles.
19. Second position clitic systems are found only in languages without articles.
20. Obligatory numeral classifier systems are found only in languages without articles.
21. Only languages without articles may allow subject reflexives.

These generalizations indicate that there is a fundamental difference in the TNP of languages with/without articles that cannot be reduced to phonology (overt vs. null articles). Furthermore, Bošković (2008, 2012) and Bošković & Gajewski (2011) show that (3) can be deduced if article-less languages lack DP, the NP/DP analysis providing a uniform account of all the generalizations in (3) where a single difference between the two language types is responsible for all of them.<sup>3</sup>

The NP languages considered in this paper are SC and Chinese. Bošković (2012), Bošković & Hsieh (2013), Cheng (2013) show SC and Chinese pattern with other article-less languages regarding the generalizations in (3) (those that can be tested). Furthermore, Cheng (2013) shows arguments for DP in Chinese offered in the literature do not go through (for relevant discussion of Chinese, see also Chierchia 1998, Cheng & Sybesma 1999, 2012, Jiang 2012, among others) and Bošković (2009a) and Despić (2011) do this for SC (for relevant discussion of SC, see also Marelj 2011, Runić 2014, Talić 2013, among others). In light of the above discussion we will assume that Chinese and SC lack DP.

### 3. Word order in Chinese/SC TNP

Turning to TNP word order, Bošković (2009a) notes TNP-internal word order is freer in NP than in DP languages. The reason for this is syntactic: the richer structural configuration of DP languages imposes syntactic restrictions on the TNP word order that are not found in NP languages due to the lack of the syntactic structure in question. E.g., in English demonstratives and possessives precede adjectives because they are located in DP, which is higher than the projection where adjectives are located. Bošković argues that due to the lack of DP all these elements are NP adjuncts in NP languages.<sup>4</sup> As a

<sup>3</sup>The NP/DP analysis raises a number of interesting issues that we cannot go into here since the main concern of this paper is not a comparison of NP and DP languages, but a comparison of Chinese and SC.

<sup>4</sup>The analysis below would not change if the elements in question are treated as multiple Specs (but see Bošković & Şener 2014). What favors the adjunct analysis is the binding properties of possessors (Bošković 2012, Bošković & Hsieh 2013,

result, syntax does not impose any restrictions on their order: the only restrictions come from the semantics.<sup>5</sup> Bošković (2009a) focuses on SC, which, as discussed below, involves interfering factors. Because of them, Chinese provides a much stronger confirmation of this approach. In contrast to English, any order of adjectives, demonstratives, and possessives is allowed in Chinese, which follows if they are all NP adjoined (Japanese and Korean pattern with Chinese).

- (4) a. Zhāngsān-dè hóng-dè chènshān    b. hóng-dè Zhāngsān-dè chènshān  
 Zhangsan's red shirt                    red Zhangsan's shirt  
 (5) a. nà-bù hóng-dè pǎochē            b. hóng-dè nà-bù pǎochē  
 that-CL red sport-car                  red that-CL sport-car  
 c. nà-bù Zhāngsān-de pǎochē        d. Zhāngsān-dè nà-bù pǎochē

Turning to SC, Bošković (2009a) shows TNP word order in SC transparently reflects semantic composition, i.e. it follows from the semantics of the elements in question. Adjectives and possessors are freely ordered in SC.

- (6) a. Jovanova skupa slika                    b. skupa Jovanova slika  
 John's expensive picture                  expensive John's picture

The most plausible semantics for possessives is modificational (e.g. Partee & Borschev 1998:

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Cheng 2013, Despić 2011). Thus, Despić (2011) notes SC (ii) contrasts with (i) in that the pronoun and the name cannot corefer. Given that the possessor is NP-adjoined and that SC lacks DP, the possessor c-commands out of the TNP, causing a Condition C violation in (ii). Chinese patterns with SC (iii). (The full paradigm is more complicated and requires controlling for potentially interfering factors like focus and animacy. Relational nouns raise further complications, see Takahashi 2011. We refer the reader to the cited works for a detailed discussion of these facts, as well as other binding conditions.)

- (i) His<sub>i</sub> latest movie really disappointed Tarantino<sub>i</sub>.  
 (ii) \*<sub>[NP Njegovi<sub>i</sub> [NP najnoviji film]]</sub> je zaista razočarao Kusturicu<sub>i</sub>.  
 his latest movie is really disappointed Kusturica  
 (iii) \*<sub>[NP Tā<sub>i</sub>-dè [NP zùixīndè diányǐng]]</sub> cǐjī lè Lǐ-Ān<sub>i</sub>  
 his newest movie provoke PERF Li-An

Demonstratives and adjectives do not confine the Poss c-command domain, which follows if they are also NP-adjoined.

- (iv) a. \*<sub>[NP zǎoqídè [NP tā<sub>i</sub>-dè [NP diányǐng]]]</sub> cǐjī lè Lǐ-Ān<sub>i</sub>  
 early-time his movie provoke PERF Li-An  
 'Early movies of his provoked Li-An.'  
 b. \*<sub>[NP Zhè-bù [NP tā<sub>i</sub>-dè [NP diányǐng]]]</sub> cǐjī lè Lǐ-Ān<sub>i</sub>.  
 this-CL his movie provoke PERF Li-An  
 'This movie of his provoked Li-An.'  
 (v) a. \*<sub>[NP Brojni [NP njegov<sub>i</sub> [NP filmovi ]]]</sub> su razočarali Kusturicu<sub>i</sub>  
 numerous his movies are disappointed Kusturica  
 b. \*<sub>[NP Ovaj [NP njegov<sub>i</sub> [NP najnoviji film]]]</sub> je zaista razočarao Kusturicu<sub>i</sub>.  
 this his latest movie is really disappointed Kusturica

The authors in question also show SC and Chinese do not completely lack functional structure in the TNP. The binding tests show a functional projection is present above NP in numeral constructions, hence the lack of binding violations in (vi).

- (vi) a. You sān-bù tā<sub>i</sub>-dè jìnrí-dè diányǐng cǐjī lè Lǐ-Ān<sub>i</sub>  
 have 3-CL his recent-DE movie provoke PERF Li-An  
 'Three recent movies of his provoked Li-An.'  
 b. Pet njegovih<sub>i</sub> filmova je proslavilo Kusturicu<sub>i</sub>.  
 5 his movies is made.famous Kusturica  
 'Five of his movies made Kusturica famous.'

Note that Chinese numerals do, and SC numerals do not, occur with a classifier. As a result, Bošković & Hsieh (2013) argue that the classifier in numeral and demonstrative constructions should be treated differently.

<sup>5</sup>A clarification is in order. What is meant here by semantic restrictions on word order is a situation where a word order that is well-formed in syntax is filtered out in semantics because it induces a problem for semantic composition.

[[Mary's]]= $\lambda x.[R_i(\text{Mary})(x)]$  ( $R_i$  is a free variable)). Given the standard assumption that adjectives and possessors are of type  $\langle e, t \rangle$ , compositional semantics does not impose any restrictions on the order in which they are composed. This also holds of English. However, in English possessors must precede adjectives for syntactic reasons: they are located in DP, which is higher than the projection where adjectives are located. Since SC does not have DP, syntax does not impose any ordering restrictions on possessors and adjectives, hence we see here pure semantics at work: as a result, the two can occur in either order. As noted above, adjectives and possessors can also occur in either order in Chinese, which can be captured in the same way.<sup>6</sup>

Although Chinese and SC behave alike regarding word order among nominal modifiers, they differ in the flexibility of word order between modifiers and demonstratives. In SC, demonstratives must precede possessors and adjectives.

- (7) a. ova skupa kola            b. ?\*skupa ova kola  
       this expensive car            expensive this car

<sup>6</sup>Prenominal modifiers in Chinese are sometimes followed by *-de*. *-De* also occurs with relative clauses.

- (i) Zhāngsān qùnián pāi dè diànyǐng  
 Zhāngsān last-year shoot DE movie  
 'the movie that Zhangsan made last year'

This has led some researchers (e.g. Sproat & Shih 1988; Duanmu 1988; cf. den Dikken & Singhapreecha 2004) to claim that *dè*-marked adjectives are reduced relative clauses. However, Aoun & Li (2003), Cheung (2005), Paul (2005), Sio (2006) show this analysis cannot account for the fact that non-predicative adjectives with *-de* may also occur as nominal modifiers (*zhǔyào* and *wéiyī* in fact require *-de*; see also Del Gobbo 2004 for arguments against deriving non-restrictive adjectives in Chinese from non-restrictive relative clauses).

- (ii) a. yuánlái-dè bǎnběn  
       original-DE version  
       'original version'  
       b. \*Zhè-gè bǎnběn (shì) yuánlái  
           this-CL version be original  
           'This version is original.'
- (iii) a. zhǔyào-dè dàolù  
        main-DE road  
        'the main road'  
        b. \*dàolù hěn/ bù zhǔyào  
           road HEN NEG main  
           Intended: 'The road is very/not main.'
- (iv) a. wéiyī-dè dàolù  
        only-DE road  
        'the only road'  
        b. \*dàolù wéiyī  
           road only  
           Intended: 'the road is only.'

In addition to the arguments from the literature, we provide another argument here. In out-of-the-blue contexts, the degree intensifier *hěn* must occur with a predicative gradable adjective in the absence of other degree intensifiers (v). An analysis where adjectival modifiers with *-de* involve relativization then predicts bare adjectives with *-de* to be ungrammatical, since bare adjectives are disallowed in the predicative position. However, when gradable adjectives occur as nominal modifiers *hěn* is optional (vi), which provides another challenge to the relative clause treatment of adjectives with *-de*.

- (v) Zhè-gè xúeshēng \*(hěn) cōngmíng  
 this-CL student HEN smart  
 'This student is smart.'

- (vi) (hěn) cōngmíng-dè xúeshēng  
 HEN smart-DE student  
 'smart students'

Note, however, that since non-restrictive relatives and adjectives have the same semantic type, nothing in the analyses below would change if some adjectival modifiers with *-de* are treated as reduced relatives.

- c. ova Jovanova slika      d. ?\*Jovanova ova slika  
 this Jovan's picture      Jovan's this picture

Bošković (2009a, 2012) shows this is expected under the semantic account of the SC TNP word order. Kaplan (1989) argues demonstratives pick out an individual of type  $e$ . The individual is picked out as a function of its predicate complement: demonstrative *that* is a function of type  $\langle\langle e,t\rangle, e\rangle$ . Once it maps a nominal element to an individual, further modification by predicates of type  $\langle e,t\rangle$  is impossible. Semantics thus requires adjectives and possessors to be composed before demonstratives: while possessors and adjectives can be composed in either order, demonstratives must be composed after both adjectives and possessors.<sup>7</sup> This perfectly matches the actual order in SC.

Recall, however, that while Chinese allows possessors/adjectives to occur in either order, they can precede demonstratives in Chinese. Note that the adjective/possessor that precedes the demonstrative in (5) has not moved outside its TNP. Left-branch extractions like (8) are in fact unacceptable in Chinese. This indicates that all the orders in (5) are base-generated.<sup>8</sup>

- (8)\*hóng-dè, Zhāngsān hěn xǐhuān nà-bù pǎochē  
 red Zhāngsān very like that-CL sport-car  
 (9) cf. hóng-dè nà-bù pǎochē/nà-bù hóng-dè pǎochē, Zhāngsān hěn xǐhuān  
 'That red car, Zhāngsān likes a lot.'

The free order TNP-internally provides a strong confirmation of the no-DP analysis of Chinese, where the elements in question are NP-adjoined. A question, however, still arises regarding how to interpret examples like (5), where a possessor/adjective precedes a demonstrative, and how the Chinese/SC difference in this respect can be accounted for. The issue here is how to interpret a restrictive modifier that is syntactically realized outside of a demonstrative in Chinese. We will present an account of these facts based on Chierchia (1998), where Chinese and SC NP are treated differently semantically, and explore its consequences for the semantics of the relevant elements and the more general issue of the limits of crosslinguistic variation in the semantics (for alternative accounts, see the appendix).

#### 4. Assumptions

We will adopt here Heim & Kratzer's (1998) Predicate Modification rule.

- (10) For any branching node  $\alpha$  whose daughters are  $\beta$  and  $\gamma$ , if both  $\beta$  and  $\gamma$  are of type  $\langle\sigma, t\rangle$ , then  
 $\llbracket \alpha \rrbracket = [\lambda x_{\sigma}. \llbracket \beta \rrbracket(x) \text{ and } \llbracket \gamma \rrbracket(x)]$ , where  $\sigma$  is any type.

We suggest the source of the different behavior of Chinese and SC regarding TNP word order concerns the semantic type of nouns. Chierchia (1998) argues that in Chinese, a language with the parameter setting [+argumental,-predicative] for bare nouns, bare nouns are kind-denoting and of type  $e$ . Hence, in a numeral construction in Chinese, classifiers are required to turn the denotation of a bare noun, which denotes a kind individual, into a set that contains countable individuals. In this analysis, various interpretations of Chinese bare nouns are derived via covert type-shifting operations without postulating a phonologically null article in the lexicon/syntax. However, although, like Chinese, SC does not have articles it has the setting [+argumental,+predicative]. As a result, bare nouns are of type

<sup>7</sup>This also holds for e.g. *former*, which is of type  $\langle\langle e,t\rangle, \langle e,t\rangle\rangle$ . As Bošković (2012) notes, the account extends to non-restrictive adjectives under Morzycki (2008), where non-restrictive adjectives are also interpreted inside determiners.

<sup>8</sup>Even SC, which otherwise allows adjective extraction, disallows it here for reasons noted in Bošković (in press).

<e,t> in SC. Since, like Chinese, SC lacks articles, in Chierchia's system SC still has access to covert type-shifting operations to derive various interpretations of bare nouns.

Since Chinese bare nouns are of type e, Chinese needs to employ type shifting when nouns are used predicatively. In particular, a type shifting operation that type-shifts type e to type <e,t> is clearly required in Chinese, or nouns could not be used predicatively. We propose then that the type shift in question is only allowed in Chinese-type languages, not in languages where bare nouns are of type <e,t>. Before demonstrating how this proposal captures the different behavior of Chinese and SC regarding TNP word order we need to discuss *-dè*, since adjectives that precede demonstratives must be *dè*-marked. We will follow Kuo (2009) and treat *-dè* as a contextual Case marker, just like *-no* in Japanese (see Saito et al 2008). More precisely, we assume (11).<sup>9</sup>

(11) A non-classifier marked element merged with a non-minimal projection of N must be *dè*-marked.

In a sense then, *-dè* marks the boundary of the minimal nominal projection in the Chinese TNP (cf. Paul 2005). As in other contextual marker accounts, we assume that the contextual marker *-dè* is semantically vacuous. We will, however, remain vague regarding the issue where *-dè* is inserted, in the syntax or PF (nothing hinges on the choice between the two).

## 5. Analysis

With the above assumptions, the Chinese/SC word order difference follows from the Chinese/SC difference in the semantic type of bare nouns and the above proposal regarding the availability of e-to-<e,t> type shift. Here is the outline of the account of the crucial contrast where an adjective precedes a demonstrative. Since the demonstrative-NP sequence can be type-shifted to <e,t> in Chinese but not in SC, it can be composed with an adjective of type <e,t> only in Chinese. Before spelling out the account we will first discuss the distribution of *-dè*.

Consider (12)-(14). *-Dè* is optional when the noun immediately follows the adjective ((12)-(13)); when the noun is separated from it, *-dè* must be inserted (14).<sup>10</sup>

- (12) cōngmíng(-dè) xúeshēng  
 smart-DE student  
 'smart students'
- (13) nà-gè cōmíng(-dè) xúeshēng  
 that-CL smart-DE student  
 'that smart student'
- (14) cōmíng\*(-dè) nà-gè xúeshēng  
 smart-DE that-CL student

Once an adjectival modifier is separated from the noun, *-dè* is obligatory. Following Sadler & Arnold (1994), Feng (2001), Paul (2005), we suggest to capture this by assigning different structures to the

<sup>9</sup>(11) concerns only elements that are not classifier-marked; otherwise, demonstratives, which occur with classifiers, would also be *dè*-marked.

(i) zhè-gè-(\*dè) xúeshēng  
 this-CL-DE student

<sup>10</sup>Cheng & Sybesma (2009) give (i) as acceptable without *-dè*. Our informants, however, do not share this judgment; the same holds for Huang (2006), who reports the same judgments as we do.

(i) Zhāngsān(-dè)/hěn zāng(-dè) nà-jìan yīfú  
 Zhāngsān-DE very dirty-DE that-CL clothes  
 'that piece of Zhāngsān's clothes/that dirty piece of clothes'

two types of adjectival modifiers. We suggest the *-dè*-less adjective is an  $X^0$  which adjoins to the noun it modifies. Since the adjective here merges with a minimal projection,  $N^0$ , *-dè* is not inserted.

- (15) [<sub>NP</sub>[<sub>N'</sub>[<sub>N<sup>0</sup></sub>[<sub>A<sup>0</sup></sub> cōngmíng] [<sub>N<sup>0</sup></sub> xúeshēng]]]]  
           smart                  student

An adjectival modifier may also adjoin to NP (it then has the status of AP rather than  $A^0$ ). Since the adjective then merges with a non-minimal projection, the contextual marker *-dè* must be inserted.<sup>11</sup>

- (16) [<sub>NP</sub>[<sub>AP</sub> cōngmíng-dè][<sub>NP</sub> xúeshēng]]  
           smart-DE                  student

The difference in the syntactic structure of the two types of adjectival modification has no impact on the semantic composition. Since *-dè* is semantically vacuous, in both cases the modified nominal expression is interpreted via (10) (see (26)).

The claim that in *-dè*-less adjectival modification the adjective adjoins to  $N^0$  is supported by the fact that an adjective without *-dè* cannot precede an adjective with *-dè*.

- (17) yōxiù\*(-dè)      cōngmíng-dè xúeshēng  
       distinguished-DE smart-DE      student

Under our analysis, (17) is unacceptable due to the impossibility of adjoining a head to a non-minimal projection. The presence of *-dè* on ‘smart’ indicates that this adjective is NP-adjoined. Since ‘smart student’ is not a minimal projection (a complex  $N^0$ ), ‘distinguished’ must also be NP-adjoined, which, given (11), means it must be *dè*-marked.<sup>12</sup>

- (18) [<sub>NP</sub>[<sub>AP</sub> yōxiù-dè]          [<sub>NP</sub>[<sub>AP</sub> cōngmíng-dè] [<sub>NP</sub> xúeshēng]]]  
           distinguished-DE          smart-DE          student

The fact that prenominal adjectives modified by adverbs cannot occur without *-dè* (Paul 2005, Huang 2006, among others) is also captured.<sup>13</sup>

<sup>11</sup>Maintaining the distinction between (15) and (16) in bare phrase structure is admittedly not trivial, though still doable with certain additional assumptions which we will not go into to avoid distraction from the main points of the paper.

<sup>12</sup>Since the second adjective in (i) is not *de*-marked, it can adjoin to the noun, and the same then holds for the first adjective; i.e. both adjectives here can be  $N^0$ -adjoined.

(i) dà bái pánzi  
     big white plate

<sup>13</sup>Paul (2005) claims superlative modifiers do not require *-dè* based on (i)-(ii).

(i) zuì dī/gāo qìwēn  
     -est low/high temperature  
     ‘the lowest/highest temperature’

(ii) zuì xīn chǎnpǐn  
     -est new product  
     ‘the newest product/achievement’

We believe these examples are not representative. We suggest (i)-(ii) are treated as fixed expressions; this is supported by (iii)-(iv), where the same adjectives require *-dè*. We take this as another argument for our implementation of the incorporation analysis, where *-dè* is required when an adjective is modified (note the incorporation analysis does not require compound formation, which means Paul’s 2005 discussion of the compounding analysis does not extend to it; see also Schäfer 2009).

(iii) zuì gāo/dī \*(dè) jiànzhúwù  
       -est high/low DE building

- (19) a. yī-gè cōngmíng(-dè) rén  
 one-CL smart-DE person  
 b. yī-gè fēicháng cōngmíng\*(-dè) rén  
 one-CL extremely smart-DE person  
 ‘an extremely smart person’
- (20) a. yī-gè xiǎo(-dè) cháběi  
 one-CL small-DE teacup  
 b. yī-gè hěn xiǎo\*(-dè) cháběi  
 one-CL HEN small-DE teacup  
 ‘a very small teacup’

Assuming the adverb and the adjective here form a phrase where the adverb adjoins to AP, as Talić (in press), Bošković (2014b) argue,<sup>14</sup> (19)-(20) also follow from the impossibility of adjoining a phrase to a head. Since a modified adjective cannot be an  $X^0$ , it can only adjoin to NP, hence *-dè* is obligatory.

- (21) [NP[AP[<sub>DEGP</sub> very] [AP smart]][NP person]]

Reduplicated prenominal adjectives also require *-dè* (22). Reduplication expresses an intensified meaning of the adjective (Liu 2013). It is then reasonable to assume that it involves a syntactically complex constituent. The ungrammaticality caused by the absence of *-dè* then results from the reduplicated adjective being adjoined to NP, not  $N^0$ , which requires *-dè* insertion.

- (22) yī-gè gāo-gāo\*(-dè) xúeshēng (Paul 2005)  
 one-cl tall-tall-de student  
 ‘a tall student’
- (23) [NP[AP tall-tall] [NP student]]

Consider finally (13)-(14). In (13), where the adjective follows the demonstrative, the adjective may adjoin to the head noun ((24)a), or to the NP ((24)b). With the structure in (24)b, *-dè* is inserted.

- (24) a. [NP this [NP[N<sup>0</sup>[A<sup>0</sup> smart] [N<sup>0</sup> student]]]]  
 b. [NP this [NP[AP smart] [NP student]]]]

However, since the demonstrative in Chinese adjoins to NP, the adjective in (14) may only adjoin to NP (25). *-Dè* is then required.

- (25) [NP[AP smart] [NP this [NP student]]]]

Having discussed the distribution of *-dè*, we return to the interpretation of the constructions under consideration. Recall that our goal is to account for the fact that modifiers can precede demonstratives in Chinese, but not SC. We will first discuss Chinese.

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‘the highest/lowest building’  
 (iv) zuì xīn \*(de) shū  
 -est new DE book  
 ‘the newest book’

<sup>14</sup>Talić shows the analysis accounts for crosslinguistic variation regarding the possibility of extracting such adverbs.



The interpretation of (13)-(14) can be derived as follows (assuming Chierchia's semantics for Chinese nouns). In (13), the type-shifting operation  $\cup$  first shifts the type of the denotation of *xúeshēng* 'student' from  $e$  to  $\langle e, t \rangle$ ; the conjunction of the denotation of *cōngmíng* 'smart' and *xúeshēng* 'student' then gives us a set of individuals that are smart and students (see (26)a). The function (of type  $\langle \langle e, t \rangle, e \rangle$ ) denoted by the demonstrative then applies to the denotation of the conjunction of *cōngmíng* 'smart' and *xúeshēng* 'student' (see (26)b-c).

- (26) a.  $\llbracket \text{cōngmíng(-dè) xúeshēng} \rrbracket = \lambda x_e. \llbracket \text{cōngmíng} \rrbracket(x) \text{ and } \cup \llbracket \text{xúeshēng} \rrbracket(x)$   
 $= \llbracket \lambda x. x \text{ is smart and } x \text{ is a student} \rrbracket$
- b.  $\llbracket \text{nà-gè} \rrbracket = \lambda P_{\langle e, t \rangle}. \text{ THAT } x \text{ such that } P(x)$
- c.  $\llbracket \llbracket \text{NP nà-gè} \llbracket \text{NP cōngmíng(-dè) xúeshēng} \rrbracket \rrbracket = \llbracket \text{nà-gè} \rrbracket(\llbracket \lambda x. x \text{ is smart and } x \text{ is a student} \rrbracket)$   
 $= \text{THAT } x \text{ such that } x \text{ is smart and } x \text{ is a student}$

In (14), the demonstrative first combines with the noun; since the demonstrative takes a function of type  $\langle e, t \rangle$  as its argument, the type-shifting operation  $\cup$  first applies on the denotation of *xúeshēng* 'student', turning it to a function of type  $\langle e, t \rangle$ . As before, the function (of type  $\langle \langle e, t \rangle, e \rangle$ ) denoted by the demonstrative then applies to the denotation of *xúeshēng*. Since Chinese allows type shift from type  $e$  to type  $\langle e, t \rangle$ , the type-shifting operation ID (i.e.  $\lambda x_e. \lambda y_e. y=x$ ) applies on the denotation of the demonstrative-N sequence. Conjoining the denotations of the adjective and the demonstrative-N sequence after type shifting results in a singleton set that contains one individual that is smart and is a student that is picked up by the denotation of the demonstrative in the discourse context. The iota-operator  $\iota$  then applies on this singleton set and yields the unique individual that is smart and is a student picked up by the demonstrative.

- (27) a.  $\llbracket \llbracket \text{NP nà-gè} \llbracket \text{NP xúeshēng} \rrbracket \rrbracket = \llbracket \text{nà-gè} \rrbracket(\cup(\llbracket \text{xúeshēng} \rrbracket))$   
 $= \llbracket \text{nà-gè} \rrbracket(\llbracket \lambda x. x \text{ is a student} \rrbracket)$   
 $= \text{THAT } x \text{ s.t. } x \text{ is a student}$
- b.  $\llbracket \llbracket \text{NP}_{\text{AP}} \text{cōngmíng-dè} \llbracket \text{NP nà-gè} \llbracket \text{NP xúeshēng} \rrbracket \rrbracket \rrbracket$   
 $= \iota(\llbracket \text{cōngmíng} \rrbracket) \cap \text{ID}(\llbracket \text{nà-gè xúeshēng} \rrbracket)$   
 $= \iota(\lambda x. x \text{ is smart and } x = \text{THAT } y \text{ s.t. } y \text{ is a student})$   
 $= \text{the unique } x \text{ such that } x \text{ is smart and } x = \text{THAT } y \text{ s.t. } y \text{ is a student}$

Recall that in SC modifiers cannot precede a demonstrative.

- (28) ?\*skupa ova kola  
 expensive this car

Under the current analysis, the Chinese/SC difference in this respect follows from the Chinese/SC difference in the availability of  $e$ -to- $\langle e, t \rangle$  type shift, which we have tied above to the difference in the semantic type of bare nouns between Chinese and SC proposed by Chierchia. Nouns and adjectives in SC are of type  $\langle e, t \rangle$ . Consider what happens when an adjective precedes a demonstrative: while the adjective is of type  $\langle e, t \rangle$ , the demonstrative-N sequence is of type  $e$ . The two cannot be composed by the Predicate Modification rule. Moreover, type shifting the demonstrative-N sequence is not an option in SC, in contrast to Chinese, for reasons discussed above. This is then the cause of the impossibility of adjectives preceding demonstratives in SC.

Before concluding, we will address an issue that arises with numerals.<sup>15</sup> The demonstrative must be adjacent to the numeral-classifier sequence in Chinese.

- (29) \*nà Zhāngsān-dè sān-běn shū  
 that Zhangsan-DE 3-CL book  
 (30) Zhāngsān-dè nà sān-běn shū

Both the demonstrative and the numeral co-occur with a classifier, and must be adjacent to it. In (30), one classifier functions as the classifier for both the demonstrative and the numeral. We assume this is the reason for the demonstrative-numeral adjacency requirement, leaving its exact implementation open, offering only some speculations to this effect. One possibility is that the demonstrative has a feature to check with the classifier, and that an intervening element blocks this checking relation. An intervening numeral is not a problem: given that a numeral also has such a feature to check against a classifier, the numeral and the demonstrative can undergo feature sharing as in Frampton & Gutmann (2000) and Pesetsky & Torrego (2007), with the shared feature undergoing feature checking with the classifier. Alternatively, we may simply be dealing here with a PF adjacency requirement.

That we are dealing with a more surfacy effect regarding classifiers rather than a deeper semantic incompatibility concerning semantic composition of demonstratives, possessives, and numerals is confirmed by the fact that (29) is acceptable in SC, where the classifier issue obviously does not arise.

- (31) ovih njegovih pet kola  
 those his five cars

Note finally the contrast in (32) (it is not possible to have two classifiers here).

- (32) a. nà sān-běn shū  
 that 3-CL book  
 ‘those three books’  
 b. \*nà-běn sān shū  
 that-cl 3 book

We leave open why only one classifier can surface here. For the sake of discussion, we assume this is a low level, PF effect. The issue we would like to address is why the classifier that surfaces in (32) must be the classifier that co-occurs with the numeral.

Bošković & Hsieh (2013) argue that in numeral constructions, the classifier projects a phrase (CIP, see fn 4), with the numeral located in its Spec. This is not the case with the classifier that co-occurs with the demonstrative (compare (iv) and (vi) in fn 4), which is simply merged with the demonstrative (i.e. it is a different kind of element), with the demonstrative projecting and the whole demonstrative-classifier sequence functioning as a TNP adjunct.<sup>16</sup> Under this analysis, Classifier Phrase provides the structural position for the numeral: without a CIP the numeral couldn’t occur. This is not the case with the demonstrative, which is not located in a structural position whose existence is due to the presence

<sup>15</sup>There are certain restrictions on adjectives that immediately precede a numeral which we address in work in progress. To avoid the issue we use possessive modifiers here (in all other relevant respects they behave like adjectival modifiers and can be treated in the same way).

<sup>16</sup>As discussed in Bošković & Hsieh (2013), demonstratives/modifiers that precede a numeral are adjoined to CIP.

of the classifier. It is then not surprising that, if one classifier needs to be dropped (whatever the reason for that is), it is the classifier that occurs with the demonstrative.<sup>17</sup>

Note also that Japanese and Korean, which behave like Chinese regarding all the most important data discussed here, require a classifier with numerals, but do not even allow it with demonstratives. This may be interpreted as indicating that there is a deep reason why numerals in languages like Japanese, Korean, and Chinese, which do not have traditional number marking, must occur with classifiers (see Chierchia 1998), while there is no such deep reason when it comes to demonstratives.

## 6. Conclusion

The analysis of the different behavior of Chinese and SC regarding TNP word order proposed here relies on the possibility that there is crosslinguistic variation regarding the availability of particular type-shifting operations. In particular, we have argued that the e-to-<e, t> type shift is available only in languages where bare nouns are of type e. The analysis thus ties the difference in word order between Chinese and SC regarding the possibility of modifiers preceding demonstratives to the Chinese/SC difference in the semantic type of bare nouns from Chierchia (1998). The Chinese/SC word order difference then ultimately follows from the Chinese/SC difference in the type of bare nouns. We have also proposed an account of the distribution of *-dè* which treats *-dè* as a semantically vacuous contextual marker, with *dè*-less adjectives incorporated into the head noun, as well as an account of certain ordering restrictions in demonstrative+numeral constructions in Chinese.

### Appendix: Alternatives

An alternative account of the Chinese/SC TNP word order difference was proposed in Bošković & Hsieh (2013). Assuming that the adjective is of type <e,t> and that *that student* of type e in (5), we suggested that there is a contextual pronominal variable of type <e,t> in the denotation of demonstratives in Chinese (see also Williams 2002) but not SC, this being the reason why restrictive modifiers outside the scope of the demonstrative can be interpreted inside of its scope in Chinese but not SC. We also suggested that the classifier is the realization of the contextual variable, which led us to conjecture that restrictive modification may occur outside the scope of a demonstrative only in classifier languages (there would then be a null classifier with a demonstrative in Japanese/Korean, which also allow examples like (5) and are classifier languages). One issue with this analysis is that demonstratives in general are context-sensitive; in fact they otherwise do not seem more context sensitive in Chinese than in SC.

Another alternative was proposed in Bošković (2014a). Building on Chierchia (1998) and his property theory (Chierchia 1984, Chierchia & Turner 1988), Huang (2006) suggests that like bare nouns, bare adjectives in Chinese are of type e. Following Chierchia (1998) and Huang (2006), Bošković (2014a) assumes that bare nouns and bare adjectives are of type e in Chinese and that pronominal modification (in all languages), follows (33).

(33) Type matching constraint on nominal modification:

A nominal element and its modifier must be of the same type.

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<sup>17</sup>A demonstrative cannot follow a numeral. The reason for this may be semantic. A num-cl-N sequence in Mandarin must be interpreted as type <e,t>. We assume this is the reason why the iota operator  $\iota$  cannot apply to the num-cl-dem-N sequence, which is of type <e,t> (the dem-N sequence can be type shifted to type <e,t>, as discussed above.)

(i) a. \*sān běn nà shū                      b. \*sān nà-běn shū  
       3 CL that book

(33) is satisfied when an adjective precedes a demonstrative in Chinese since both the demonstrative NP and the adjective are of type  $e$ . This is not the case in SC, since the adjective is of type  $\langle e, t \rangle$ . When the semantic details are spelled out (which was not done in Bošković 2014a) this analysis is similar to the one proposed here though somewhat more complicated semantically (the analysis also assumes that *-dè* is a contextual marker).

This analysis requires something like (34),<sup>18</sup> where nominalizer  $OP_{NOM}$  may be the operator  $\hat{\cdot}$ , which maps a predicate of type  $\langle e, t \rangle$  to a kind individual, or the iota-operator  $\iota$ , which maps a predicate of type  $\langle e, t \rangle$  to a unique individual; predicativizer  $OP_{PRED}$  may be the operator  $\cup$ , which turns a plural individual into a set of individuals, or the identity function ID (see Chierchia 1998, Dayal 2004 on these two operators).

- (34) Generalized Modification Rule: For any branching node  $\alpha$  whose daughters are  $\beta$  and  $\gamma$ ,
- i) if both  $\beta$  and  $\gamma$  are of type  $\langle \sigma, t \rangle$ , then  $\llbracket \alpha \rrbracket = [\lambda x_{\sigma}. \llbracket \beta \rrbracket(x) \text{ and } \llbracket \gamma \rrbracket(x)]$ , where  $\sigma$  is any type (cf. (10))
  - ii) if both  $\beta$  and  $\gamma$  are of type  $e$ ,  $\llbracket \alpha \rrbracket = OP_{NOM}(\lambda x. OP_{PRED}(\llbracket \beta \rrbracket)(x) \text{ and } OP_{PRED}(\llbracket \gamma \rrbracket)(x))$ , where  $OP_{NOM} = \hat{\cdot}$  or  $\iota$  and  $OP_{PRED} = \cup$  or an ID function ( $\lambda x. \lambda y. y=x$ )

(13)-(14) can then be derived via (34). (13) is derived as before, the only difference being that  $\cup$  now shifts the type of the denotation of both *xúeshēng* ‘student’ and *cōngmíng* ‘smart’ from  $e$  to  $\langle e, t \rangle$ . The composition then proceeds as discussed above.

- (35) a.  $\llbracket [cōngmíng(-dè) xúeshēng] \rrbracket = [\lambda x_e. \cup(\llbracket cōngmíng \rrbracket)(x) \text{ and } \cup(\llbracket xúeshēng \rrbracket)(x)]$   
 $= [\lambda x_e. x \text{ is smart and } x \text{ is a student}]$
- b.  $\llbracket [nà-gè] \rrbracket = \lambda P_{\langle e, t \rangle}. \text{ THAT } x \text{ s.t. } P(x)$
- c.  $\llbracket [_{NP} nà-gè [_{NP} cōngmíng(-dè) xúeshēng] ] \rrbracket = \llbracket [nà-gè] \rrbracket([\lambda x. x \text{ is smart and } x \text{ is a student}])$   
 $= \text{THAT } x \text{ s.t. } x \text{ is smart and } x \text{ is a student}$

As for (14), the demonstrative combines with *xúeshēng* ‘student’.  $\cup$  first applies on the denotation of *xúeshēng*, turning it to a function of type  $\langle e, t \rangle$  (see (36)a). The conjunction of the adjective *cōngmíng* ‘smart’ and the demonstrative-N sequence is interpreted via (34)ii. As (36)b shows,  $\cup$  applies to turn the denotation of *cōngmíng* into a function of type  $\langle e, t \rangle$ , and ID applies on the denotation of the demonstrative-N sequence. Conjoining the denotations of the adjective and the demonstrative-N sequence after type shifting results in a singleton set that contains one individual that is smart and is a student that is picked up by the denotation of the demonstrative in the discourse context. The iota-operator  $\iota$  applies on this singleton set, yielding the unique individual that is smart and is a student picked up by the demonstrative.

- (36) a.  $\llbracket [_{NP} nà-gè [_{NP} xúeshēng] ] \rrbracket = \llbracket [nà-gè] \rrbracket(\cup(\llbracket xúeshēng \rrbracket))$   
 $= \llbracket [nà-gè] \rrbracket([\lambda x. x \text{ is a student}])$   
 $= \text{THAT } x \text{ s.t. } x \text{ is a student}$
- b.  $\llbracket [_{NP[AP} cōngmíng(-dè) [_{NP} nà-gè [_{NP} xúeshēng] ] ] \rrbracket$   
 $= \iota(\cup(\llbracket cōngmíng \rrbracket) \cap \text{ID}(\llbracket [nà-gè xúeshēng] \rrbracket))$   
 $= \iota(\lambda x. x \text{ is smart and } x = \text{THAT } y \text{ s.t. } y \text{ is a student})$   
 $= \text{the unique } x \text{ such that } x \text{ is smart and } x = \text{THAT } y \text{ s.t. } y \text{ is a student}$

<sup>18</sup>This is a slight adaption of Huang (2006), who does not specify the exact type-shifting operations.

As for SC, when an adjective precedes a demonstrative, as in (28), (33) is violated: while the adjective is of type <e,t> in SC the demonstrative-N sequence is of type e.

The analysis is similar to the one argued for above; it achieves the same result but in a more complicated way. It requires additional type shifting of adjectives in Chinese, with type-shifting also required in the contexts where adjectives function as predicates.

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