To appear in: Duguine, M., S. Huidobro & N. Madariaga (eds.) 2010.
Argument Structure and Syntactic Relations from a Cross-Linguistic Perspective.
Amsterdam-Philadelphia: John Benjamins, pp. 261-282.

Applicative structure and Mandarin ditransitives*

AUGUST 2009

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We argue that applicative heads always appear above the lexical VP, regardless of the semantics of the construction. *Thematic Applicatives* select a nominal expression and a VP as argument, parallel to Pylkkänen's (2008) "high" applicatives. The applied argument is merged in Spec, ApplP and receives a role such as beneficiary. *Raising Applicatives* appear in the same position above the lexical VP, but do not select an underlying nominal argument. Instead, they attract a goal DP from within the ditransitive VP to their specifier. This pattern captures the properties of a theme-goal ditransitive construction (Pylkkänen's "low" applicative). We show that the Mandarin double object construction 'Verb gěi IO DO' instantiates a raising applicative, where *gěi* realizes $Appl^0$.

Key words: Applicative, thematic vs. raising; high vs. low; Double object construction; Mandarin Chinese; countercyclic agree

1. Introduction

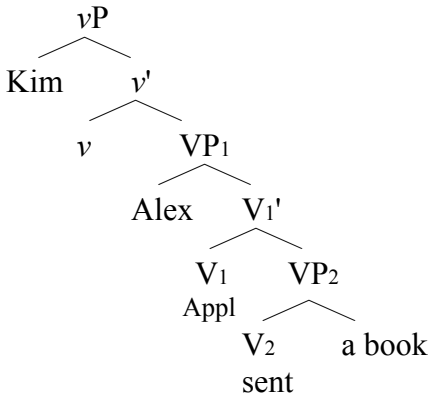
Marantz (1993) makes an influential proposal about the syntax of ditransitive constructions. According to what we will call the *Applicative Hypothesis*, applicative constructions like the Kinyarwanda benefactive pattern in (1) and ditransitive constructions like (2) both involve a structure like (3), where an Applicative light verb (V_1) selects the lexical VP (VP_2) as its complement.

(1) *Kinyarwanda* (Kimyeni 1980)
Umukoôbwa a -ra -som-er -a umuhuûngu igitabo.
girl she-PR-read-BEN-ASP boy book
'The girl is reading a book for the boy.'

(2) Kim sent Alex the book.

*We would like to thank the two anonymous reviewers for very detailed and insightful comments. We are also grateful to Victor Junnan Pan, Zhitang Yang-Drocourt, and Yuan Huahung for discussion of the Mandarin data.

(3)



This basic analysis has been applied to a variety of ditransitive constructions beyond the Bantu languages that inspired it, including Greek (Anagnostopoulou 2003), Japanese (Miyagawa & Tsujioka 2004), and Korean (Miyagawa & Jung 2004).

The objective of this paper is to apply the Applicative Hypothesis to ditransitive constructions like (4) in Mandarin Chinese.

(4) *Wǒ mài-gěi -le Mǎlì yī-ge shǒubiǎo*.[1]
1SG sell-GEI-PERF Mali 1-CL watch
'I sold Mali a watch.'

In the course of developing the analysis, we take up an important theoretical challenge for the Applicative Hypothesis. The hypothesis claims that ditransitive constructions involve extra structure *above* the lexical VP. This is potentially at odds with another tradition, which claims that ditransitive constructions involve additional structure *within* the lexical VP. Analyses of this type include Kayne's (1984) small clause analysis, and Pesetsky's (1995) zero morpheme analysis. The two traditions are combined by Pylkkänen (2002, 2008), who proposes that applicative patterns like (1), whose interpretation does not involve a goal argument, are to be associated with a "high" applicative projection above VP as in (3), while ditransitive constructions involving transfer of the theme to or from the goal as in (2) are to be associated with a "low" applicative projection inside the VP.

In this paper we identify Mandarin *gěi* in (4) as the head of an applicative projection taking the lexical VP as its complement, in exactly the configuration of (3). We show, however, that the ditransitive pattern associated with applicative *gěi* has all and only the properties of a "low" applicative, that is, of a theme-goal ditransitive construction. We argue that

[1] The following abbreviations are used in glossing examples: CL classifier; EXP experiential aspect; NEG negation; PART sentence-final particle; PASS passive; PERF perfective aspect; PL plural (e.g. 3PL = 3rd person plural); SG singular; SUB subordinator.

this is a general pattern across languages: light verb applicatives always appear above the lexical VP, whether they show the syntax and semantics of "high" or "low" applicatives. Nevertheless, the distinction between high and low applicatives is real: the two patterns involve different sets of thematic roles, and they satisfy different diagnostics.

To deal with this apparent paradox, we propose what we call the *Raising Applicative Hypothesis*.[2] This hypothesis claims that applicative light verbs, like other predicates, come in two familiar flavors. *Thematic Applicatives* select a nominal expression and a VP as argument. They correspond to Pylkkänen's High Applicative structure. The nominal argument is merged in Spec, ApplP and receives a role such as beneficiary. *Raising Applicatives* appear in the exact same position above the lexical VP, but unlike Thematic Applicatives, they do not select an underlying nominal argument. Instead, they attract a nominal argument from within the lexical VP to their specifier. The two structures are shown in (5-6).

(5) Thematic Applicative
$[_{\text{APPLP}}\ \text{DP}_{\text{Benefactive}}\ [_{\text{APPL'}}\ \text{Appl}\ [_{\text{VP}}\ \text{V NP}]]]$

(6) Raising Applicative
$[_{\text{APPLP}}\ \text{DP}_{\text{Goal}}\ [_{\text{APPL'}}\ \text{Appl}\ [_{\text{VP}}\ t_{\text{Goal}}\ [_{\text{V'}}\ \text{V}\ \text{DP}_{\text{Theme}}]]]$

The paper is organized as follows. Section 2 presents the basic facts of ditransitive constructions in Mandarin, focusing on patterns involving *gěi*, and demonstrates in detail that ditransitive *gěi* is a raising applicative. Section 3 discusses the technical implementation of the Raising Applicative Hypothesis for Mandarin. We see in this section that a widely attested constraint on A' extraction of indirect objects in double object constructions is attested in Mandarin as well, and show that the constraint falls out naturally from the Raising Applicative analysis in the Agree framework of Chomsky 2000. Section 4 briefly puts the Raising Applicative analysis in a crosslinguistic context, focusing on the fact that overt applicative morphemes in general appear to be suffixes.

2. The Mandarin V-*gěi* double object construction

2.1 Background

Mandarin *gěi* occurs as the independent lexical verb 'give'.[3] *Gěi* also appears in the three positions in (7) in combination with a lexical verb:

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[2] We owe the term *Raising Applicative* to Julie Legate (pc). It corresponds to the label *Expletive Applicative* used in Georgala, Paul & Whitman (2008), where the hypothesis is first presented.

[3] The verb *gěi* 'give' is illustrated below:

(i) *Wǒ gěi -le Mǎlì yī-ge shǒubiǎo*.

(7) a. Double Object: V-*gěi* IO DO
Wǒ mài-gěi -le Mǎlì yī-ge shǒubiǎo.
1SG sell-GEI-PERF Mali 1-CL watch
'I sold Mali a watch.'

b. P-dative: V DO [PP *gěi* IO]
Wǒ mài-le yī-ge shǒubiǎo [PP gěi Mǎlì].
1SG sell-PERF 1-CL watch for Mali
'I sold a watch to Mali.'

c. Benefactive: [PP *gěi* DP] V DO
Tā [PP gěi wǒ] dāng fānyì.
3SG for 1SG act interpreter
'He serves as an interpreter for me.'

A number of facts combine to show that dative and benefactive [*gěi* DP] in the P-dative and benefactive patterns (7b-c) is a PP. First, aspectual suffixes such as the perfective *-le* do not combine with dative and benefactive *gěi*.

(8) a. *Wǒ mài(-le) yī-ge shǒubiǎo [PP gěi (*-le) Mǎlì]*.
1SG sell-PERF 1-CL watch for -PERF Mali
'I sold a watch to Mali.'

b. *Tā [PP gěi (*-le) wǒ] dāng (-le) fānyì*.
3SG for -PERF1SG act -PERF interpreter
'He served as an interpreter for me.'

Second, the constituent [*gěi* DP] in the P-dative and benefactive patterns can be fronted, as shown in (9).[4]

(9) a. *[PP Gěi Mǎlì], wǒ mài-le yī-ge shǒubiǎo*.
for Mali 1SG sell-PERF 1-CL watch
'For Mali, I sold a watch.'

b. *[PP Gěi Mǎlì], wǒ mǎi-le yīdiǎn jiǔ*.
for Mali 1SG buy-PERF a.little wine
'For Mali, I bought a little wine.'

c. *[PP Gěi wǒ], tā dāng fānyì*.

1SG give-PERF Mali 1-CL watch
'I gave Mali a watch.'

The preposition *gěi* and the applicative head *gěi* are both historically derived from the verb *gěi* 'give'. Modern Mandarin has numerous other instances of co-existing source and derivatives such as verb *zài* 'be at', preposition *zài* 'at', preverbal durative aspect marker *zài*; verb *gēn* 'follow', preposition *gēn* 'with', conjunction *gēn* 'and' (cf. Djamouri & Paul 2009 for further discussion).

[4] Besides PPs, DPs, QPs, adverbs, and clauses may also occupy the sentence-initial topic position. By way of contrast, only VPs selected as a complement by an auxiliary can be topicalized (cf. Tang 1990: 203, footnote 22).

for 1SG 3SG act interpreter
'For me, he serves as an interpreter.'

Note that (9a) can only mean 'I sold the watch for Mali's benefit'; with the fronted PP, the transfer of possession implication characteristic of the DOC pattern in (7a) disappears.

Except for the prepositional status of preverbal *gěi*, there is no consensus in the literature concerning these different patterns, as the brief review of previous analyses below shows.

Li (1990: 110) analyses both instances of postverbal *gěi* as verbs. In the DOC 'V-*gěi* IO DO', V-*gěi* is considered a compound verb to which the IO adjoins, thus forming a complex verb capable of assigning case to the DO. The dative construction 'V DO [*gěi* IO]', by contrast, is claimed to instantiate a serial verb construction.

Tang (1990: 268) discusses only the dative pattern'V DO [*gěi* IO]' and proposes a structure where the *gěi* PP is the complement of a lower PredP (cf. Bowers 1993), which itself is complement of the ditransitive verb. The DO in the specifier of this VP controls PRO in Spec, PredP:

(10) $[_{\text{PREDP}}$ V $[_{\text{VP}}$ DO_i $[_{\text{V'}}[_{\text{PREDP}}$ PRO_i $[_{\text{PRED'}}$ Pred° $[_{\text{PP}}$ *gěi* IO]]] t_V]]]

In a similar vein, Cheng et al. (1999) claim that '*gěi* DP' in the dative pattern underlyingly involves a secondary predication on the DO, akin to purposive clauses such as *I brought 30 dollars to give (to) him*.[5]

(11) DP V $[_{\text{VP2}}$ DO $[_{\text{V2'}}$ $[_{\text{Vcause}}$ *gěi*] OP_i $[_{\text{VP3}}$ IO $[_{\text{V3'}}$ HAVE t_i]]]]]

Gěi 'give' heading VP2 results from incorporating the abstract verb of possession 'have' to 'cause'; whether this happens in the lexicon or in syntax is left open. The same incorporation is postulated for *gěi* in the DOC 'V-*gěi* IO DO', where *gěi* in turn incorporates to the lexical verb, resulting in a compound $[_{\text{V°}}$ V- *gěi*]. Importantly, *gěi* here originates in a position *below* the lexical verb, the exact opposite of our proposal. We show in section 2.4 that the sequence 'V-*gěi*' in the DOC is syntactically derived.

*2.2. 'V-*gěi *IO DO' DOC pattern displays low applicative properties*

The DOC pattern has the expected valence for a "low" or VP-internal applicative construction: it involves a goal (IO) and theme (DO) argument. It also satisfies the two diagnostics for a low applicative construction proposed by Pylkkänen (2002, 2008). First, low applicatives are unacceptable with intransitives of any kind, because their semantics stipulate the presence of a theme argument. Second, they are incompatible with static predicates such as 'hold' or 'watch', the type of event denoted by

[5] If taken literally, Tang and Cheng et al.'s secondary predication analyses run afoul of the fact that in Mandarin, PPs in general can function neither as primary nor as secondary predicates (Djamouri & Paul 2009). However both analyses of dative *gěi* as heading a PP concur with the analysis adopted in this paper, while the structures proposed by Tang and Cheng et al. are readily translated into a Larsonian VP shell structure.

static predicates being inconsistent with the theme undergoing a change of possession. The English DOC satisfies these diagnostics, as (12-13) show:

(12) a. I danced for Kim.
b.*I danced Kim.

(13) a. I watched the bag for Kim.
b.*I watched Kim the bag.

The 'V-*gěi*' DOC pattern behaves the same way:

(14) a. *Nǐ gěi wǒ xiǎoxīn yīdiǎnr!*
2SG GEI 1SG be:careful a.little
'Do me the favor of being a bit more careful!'
b. *****Nǐ xiǎoxīn -gěi wǒ!*
2SG be:careful-GEI 1SG

(15) a. *Wǒ gěi Mǎlì kān -zhe bāo ne, bù néng líkāi.*
1SG GEI Mali watch-DUR bag PART NEG can leave
'I'm watching the bag for Mary, I cannot leave.'
b. **Wǒ kān -gěi -zhe Mǎlì bāo.*
1SG watch-GEI-DUR Mali bag

We see in (14) that the intransitive predicate *xiǎoxīn* 'be careful' allows a preverbal benefactive PP, but disallows the DOC pattern. Similarly, stative *kān-zhe bāo* 'hold the bag' allows the benefactive PP pattern but not the DOC pattern. Thus the DOC pattern satisfies both of Pylkkänen's tests for a low applicative construction.

For some speakers, there is also a salient contrast between the DOC pattern in (7a) and the P-dative pattern in (7b) with respect to the strength of the implication of successful transfer of possession .

(16) a. *Zhāngsān qiā-gěi -le Lǐsì yīdiǎnr cōng*,
Zhangsan nip-GEI-PERF Lisi a.little scallion
(*# kěshì Lǐsì méiyǒu jīezhù)*.
but Lisi NEG get
'Zhangsan nipped off Lisi a bit of scallion,
but Lisi didn't get it.' (Zhu 1979: 82)
b. *Zhāngsān qiā yīdiǎnr cōng gěi Lǐsì*,
Zhangsan nip a.little scallion for Lisi
(*kěshì Lǐsì méiyǒu jīezhù*).
but Lisi NEG get
'Zhangsan nipped off a bit of scallion for Lisi,
but Lisi didn't get it.'

The datum in question is often claimed (e.g. Stowell 1982) to distinguish the DOC and P-dative patterns in English as well:

(17) a. I cut Alex a flower (# and gave it to Robin).
b. I cut a flower for Alex (and gave it to Robin).

These facts provide further support for the view that, in English and Mandarin, the DOC pattern is not directly derivable from the P-dative construction.

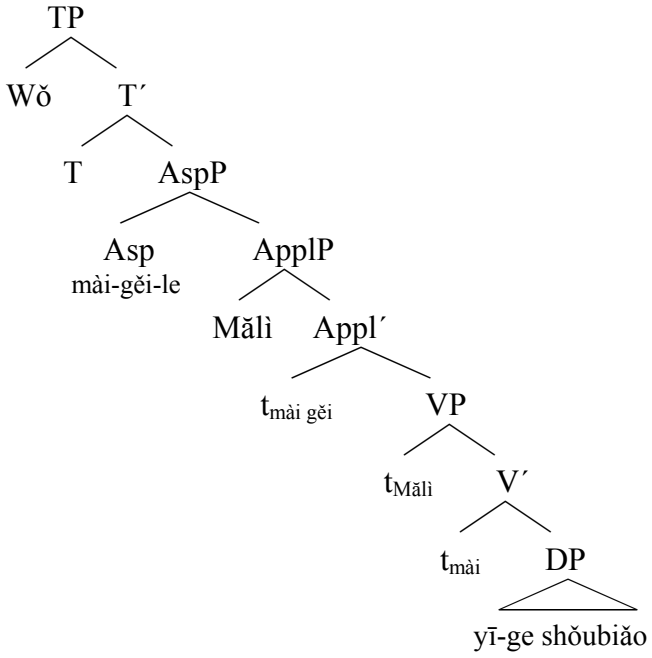
Summing up, the DOC pattern 'V-*gěi* IO DO' in (7a) passes the tests for a low applicative construction, and shows clear differences from the P-dative construction 'V DO [*gěi* IO]'. In the next section, however, we show in detail that *gěi*, the head of the DOC, originates *above* VP.

2.3. The high applicative position of gěi *in the DOC*

Consider, now, the surface configuration of the *gěi* DOC: [V-*gěi*-Aspect IO DO]. This configuration is straightforwardly derivable by head movement of V to APPL to Aspect (cf. Lin 2001 for V-to-Aspect raising in Chinese), if *gěi* is assigned a position *above* the VP, in other words, the structural position of a high applicative. This configuration is shown in (18b).

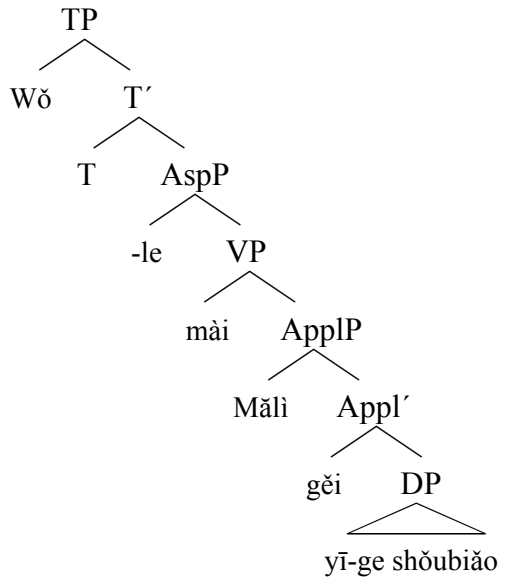
(18) a. *Wǒ mài-gěi -le Mǎlì yī-ge shǒubiǎo*.
1SG sell-GEI-PERF Mali 1-CL watch
'I sold Mali a watch.' (= (7a))

b.



If, however, *gěi* heads a low applicative projection in an underlying structure like (19), it is simply not clear how it assumes its surface position. The same difficulty applies to an analysis where *gěi* is incorporated from PP (as in Soh (1998: 174)):

(19)



If *gěi* originates inside VP as in (19), it must raise and *right*-adjoin to the lexical verb, before both raise and left-adjoin to Aspect. Such a derivation runs counter to the widespread consensus that head adjunction is always to the left (Kayne 1994, Baker 1996); it would also violate the generalization that head adjunction is consistently to the left in Chinese (Lin 2001).

Alternatively, if *gěi* were to raise and left-adjoin to the lexical verb, the result would be the ungrammatical order in (20):

(20) **Wǒ* [$_{ASPP}$ *gěi -mài-le* [$_{VP}$ $t_{gěi\text{-}mài}$ [$_{APPLP}$ *Mǎlì* [$_{APPL'}$ $t_{gěi}$ *[shǒu.]]*.
1SG GEI-sell-PERF Mali watch

These facts also argue against an analysis such as Cheng et al. (1999), where it is *gěi* that incorporates into the lexical verb, thus requiring right-adjunction. Note that assuming the underlying order of heads 'Aspect - V', composition of the verb and *gěi* cannot be derived by a non-syntactic operation such as morphological merger, because V-*gěi* must be able to raise as a unit to Aspect.

Several additional facts argue against a P-incorporation analysis of the V-*gěi* DOC, even one which takes place in the syntax. First, postverbal PPs headed by *gěi* are restricted to the order 'V DO [$_{PP}$ *gěi* IO]' in (7b). A P-incorporation account must explain why P-incorporation is accompanied by a change in the word order of IO and DO. Second, as we saw in (16), the *gěi* DOC and P dative constructions are semantically distinct. This fact must be

explained if the former is derived from the latter by P-incorporation. Finally, we see evidence in 2.5 that the IO is moved out of VP altogether in the *gěi* DOC. This would be completely unexplained under a P-incorporation account, as P-incorporation is usually considered to case-license the complement of P in situ (Baker 1986).

*2.4 Evidence that 'V-*gěi*' is syntactically derived*

Evidence that the surface order of the *gěi* DOC 'V-*gěi* IO DO' is derived by a syntactic operation comes from the contrasting behavior of V-V compounds. At first glance, the combination 'V-*gěi*' in the DOC (21) seems to pattern with V-V compounds like *jiǎn-chá* 'inspect-examine' = 'examine' (22): in both cases aspectual suffixes must follow the entire sequence:

(21) *Wǒ sòng (*-le) -gěi -le Akiū yī-ge shǒubiǎo*
1SG offer -PERF-GEI-PERF Akiu 1-CL watch
'I gave Akiu a watch as a present.'

(22) *Tāmen [$_{V^\circ}$ jiǎn (*-le) -chá]-le wǒ -de hùzhào*
3PL inspect-PERF-examine-PERF 1SG-SUB passport
'They examined my passport.'

However, data from verb copying show that V-*gěi* in the DOC and V-V compounds have different derivations, and that the derivation of V-*gěi* is syntactic. (For detailed discussion of verb copying, cf. a.o. Huang 1982; Paul 1988, 2002 and references therein).

(23) *Wǒ sòng gěi tā qián*
1SG offer GEI 3SG money
[$_{vP}$ yǐjīng sòng (-gěi)-le hǎojǐ -cì] le*
already offer -GEI-PERF many-time PART
'I have given him money as a present several times already.'

(24) *Tāmen jiǎn -chá hùzhào*
3PL inspect-examine passport
*[$_{vP}$ jiǎn *(-chá) -le bàntiān]*
inspect-examine-PERF long.time
'They examined the passports for a long time.'

Verb copying must copy both members of a V-V compound (24), but it cannot copy V-*gěi* (23). The most straightforward explanation of this contrast is that verb copying takes place before V-*gěi* is composed by verb raising in the syntax. By contrast V-V compounds are formed in the lexicon, and are thus available for verb copying as soon as they enter the syntactic derivation.

The so-called A-not-A question pattern (cf. Huang 1982) provides further support for differentiating V-*gěi* from V-V compounds built in the lexicon. This pattern may optionally treat both members of a V-V compound as a unit, placing both together as a unit before negation (25a):

(25) a. *Tā [$_{V^\circ}$ xǐ-huān] bù [$_{V^\circ}$ xǐ-huān] shùxué ?*
3SG like NEG like mathematics
b. *Tā xǐ- bù xǐ-huān shùxué ?*
3SG like NEG like mathematics
c. *Tā [$_{V^\circ}$ xǐ-huān] shùxué bù [$_{V^\circ}$ xǐ-huān] shùxué ?*
3SG like math. NEG like mathematics
'Does he like mathematics?'

However V-*gěi* cannot be treated as a unit, as we see in (26a).

(26) a. **Ta huán -gěi bu huán -gěi nǐ qián?*
3SG return-GEI NEG return-GEI 2SG money
b. *Ta huán bu huán -gěi ni qián ?*
3SG return NEG return-GEI 2SG money
'Will he return the money to you?'
(slightly modified example from Peyraube 1980: 227)[6]

Once again, this difference between 'V-*gěi*' and lexical V-V compounds is straightforwardly explained if V-*gěi* is combined in the syntax. [7]

2.5. Evidence that the IO moves out of VP in the DOC

We have provided evidence that *gěi* in the DOC originates above the lexical VP, in the position of a high applicative, and that 'V-*gěi*' must be syntactically combined, in contrast to lexical V-V compounds. We now examine the position of the indirect object. Consider the contrast in (27) :

(27) a. *Wǒ mài-gěi -le [$_{APPLP}$ tāmen [$_{APPL'}$ t_{gei}*
1SG sell-GEI-PERF 3PL
[$_{VP}$ [sān cì] [$_{VP}$ t_{tamen} [$_{V'}$ t_V shǒubiǎo]]]].
3 time watch

[6] Peyraube (1980: 226) considers these data as evidence for the prepositional status of *gěi* and adopts the traditional analysis of DOCs in Chinese linguistics: V [$_{PP}$ gěi IO] DO. Needless to say, this analysis has difficulty explaining how *gěi* can be separated from the IO by an aspect marker: 'V-*gěi*-Asp IO DO' (cf. (18), (21) above).

[7] Even in a framework such as Distributed Morphology where compounding is reduced to syntactic operations, these differences between compounds such as *jiǎn-chá* 'examine', *xǐ-huān* 'like' and the 'V-*gěi*' sequences will need to be somehow captured, perhaps, as a reviewer suggests, by distinguishing higher functional heads such as Appl from compounds composed of purely lexical heads.

'I have sold them three times watches.'

b. *****_Wǒ mài-le [VP shǒubiǎo_
1SG sell-PERF watch
[V' [sān cì] [V' tV [PP gěi tāmen].
3 time to 3PL
'I have sold watches three times to them.'

c. _Wǒ mài-le [VP [sān cì]_
1SG sell-PERF 3 time
[VP shǒubiǎo tV [PP gěi tāmen]]] le.[8]
watch to 3PL PART
'I have sold watches three times to them.'

In (27a), the frequency adverb *sān cì* 'three times' can intervene between the IO *tāmen* 'them' and the DO *shǒubiǎo* 'watch' in the DOC, but it cannot intervene between the DO *shǒubiǎo* 'watch' and the PP [PP *gěi tāmen*] 'to them' in the corresponding dative pattern in (27b).

Instead, frequency adverbs must precede the DO in the dative pattern as in (27c). Assuming that the frequency adverb is positioned on the left edge of VP,[9] (27a) is exactly the order predicted by the Raising Applicative analysis in (18b): the IO moves over the adverb into [Spec, ApplP]. (27c) shows that the DO in the P-dative construction does not undergo similar displacement. The unacceptability of (27b) is due to the fact that adverbs occupy a position left-adjacent to VP and cannot be attached at the V' level.

Strictly speaking, these adverb placement facts only indicate that the surface position of IO in the Mandarin DOC is outside the lexical VP; we have yet to show that this is a derived position, resulting from movement of the IO. An alternative position would be one close to Marantz's original applicative analysis in (3), where the IO originates in the specifier of ApplP. Facts from the distribution of quantifiers show that this alternative is untenable.

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[8] We assume a Larsonian shell structure for dative VPs 'V-DO-PP' (cf. (27c)). In the underlying structure [VP DO [V' V PP]] the DO originates in Spec, VP and the surface order is derived by raising V to *v*. The alternative, that the DO originates in the complement of V and the PP is right-adjoined to VP, is also consistent with our account of raising applicatives. But it is counterindicated by the relative scope of the DO and PP:

(i) _Wǒ mài-le [VP [ji ge shǒubiǎo] tV [PP gěi liǎng ge rén]]] le._
1SG sell-PERF several CL watch to 2 CL person PART
'I sold several watches to two persons.'

In (i), *liǎng ge rén* 'two people' cannot take scope over *jǐ -ge shǒubiǎo* 'several watches'; that is, (i) cannot mean that for two people I gave each of them a different set of multiple watches. This is unexpected if 'several watches' does not c-command 'two people'.

[9] This assumption is consistent either with the view that frequency adverbs are adjoined to VP, or that they occupy a functional projection immediately above VP (cf. Cinque 1999).

In Mandarin, distributive adverbial quantifiers such as *měirén* 'every(one)' and *yīrén* 'each ' can occur to the right of the IO in the DOC.[10]

(28) a. *Wǒ sòng-gěi háizimen*
1SG give-GEI children
[měi-rén /yī-ren] [yībǎi kuài qián]
every(one)/each 100 CL money
'I gave the children each 100 dollars.'

b. *Xiàozhǎng fēn -gěi wǒmen*
principal allot-GEI 1PL
[měi-rén /yī-ren] [shí-ge dàxuéshēng]
every(one)/each 10 CL student
'The principal allotted us each 10 students.'

Unlike frequency adverbs, however, the distributive adverbial quantifiers need to be able to scope over the IO. In terms of the classification proposed by Fitzpatrick (2006) *měi-rén* 'every(one)' and *yi-rén* 'each' are adverbial quantifiers. Fitzpatrick argues that adverbial quantifier patterns such as these are derived by A-movement of the associated NP over the adverbial quantifier, precisely as required by our raising applicative analysis where the IO raises out of the VP to Spec, ApplP:

(29) *Wǒ sòng-gěi* [$_{\text{APPLP}}$ *háizimen* [$_{\text{VP}}$ *měi-rén* [$_{\text{VP}}$ t_{haizimen}
1SG give-GEI children every(one)
[*yībǎi kuài qián*]]]
100 -CL money
'I gave the children each 100 dollars.'

Sentences (28a-b) cannot be derived by quantifier stranding. The order of distributive adverbial quantifiers and frequency adverbs is fixed:

(30) a. *Wǒ sòng-gěi háizi-men měi-rén sān ci qián.*
1SG give-GEI child-PL every(one) 3 time money
'I gave every child money three times.'

b. * *Wǒ sòng-gěi háizimen sān ci měi-rén qián*

[10] The observation that a distributive quantifier may intervene between the IO and the DO in the DOC goes back to Kung (1993: 182) and is taken up by Soh (2005). Note, however, that for many native speakers, the adverb *gè* 'each' used by Kung (1993) and Soh (2005) is unacceptable or only marginally acceptable in the position between the IO and DO. Instead, *měiren* 'every(one)' or *yi rén* 'each' must be used here.
Kung (1993) considers the distribution of *gè* 'each' as supporting a small clause analysis of the DOC where *gè* 'each' adjoins to a null verb heading PredP (cf. Bowers 1993):

(i) [$_{\text{VP}}$ V [$_{\text{PredP}}$ IO [$_{\text{Pred'}}$ *gè*-Pred° DO]]]

But Kung's structure fails to explain how 'each' scopes over the IO. This is directly explained by our hypothesis that the IO moves from its base position to a position left of the quantifer. Note that Kung does not take into account the 'V-gěi' DOC.

1SG give-GEI child-PL 3 time every(one) money

Following the assumption that frequency adverbs mark the left edge of VP, if *měi-rén* was stranded inside VP, we would expect (30b) to be acceptable.

Second, these quantifiers never form a constituent with the associated NP, in either order of quantifier and NP:

(31) a. * *Wǒ sòng-gěi* [*měi-(ge) rén háizi-men*]
1SG give-GEI every(one) child-PL
yībǎi kuài qián
100 -CL money

b. **Xiaozhang fen-gěi [yī (-ge) rén wǒmen]*
principal allot-GEI each 1PL
shí-ge dàxuéshēng
10 CL student

(32) a. * *Wǒ mà -le [háizi-men měi-rén]*.
1SG scold-PERF child-PL every(one)
('*I scolded the children everyone.')

b. **Wǒ mà -le [háizi-men yī -rén]*.
1SG scold-PERF child-PL each
(*'I scolded the children each.')[11]

Third, in the case of *yi-rén* 'each', there are no corresponding constituents formed from *yi-rén* plus NP:

(33) a. * *Xiàozhǎng fēn -gěi* [*yī -rén wǒmen*]
principal allot-GEI each 1PL
shí-ge dàxuéshēng
10 CL student

b. *Xiàozhǎng fēn -gěi [yī -ge lǎoshī]*
principal allot-GEI 1 -CL teacher
shí-ge dàxuéshēng

---

[11] Distributive adverbial quantifiers are thus clearly different from quantifiers within a DP which in combination with a classifier precede the head noun:

(i) *Wǒ sòng-gěi* [$_{DP}$ *měi -ge háizi (*men*)] *yībǎi kuài qián*
1SG give-GEI every-CL child PL 100 -CL money
'I gave every child 100 dollars.'

In contrast to (28a), *haizi* in (i) must be singular and excludes the presence of the collective plural suffix *-men*, another clear difference between the quantified DP and the structure involving the distributive quantifier adverbs.

In the P-dative construction, the only way to quantify the IO is via a DP-internal quantifier phrase (cf. (34) below):

(ii) *Wǒ sòng-le yībǎi kuài qián* [$_{PP}$ *gěi měi -ge háizi]*
1SG give -PERF 100 CL money to every-CL child
'I gave 100 dollars to every child.'

10 CL student
'The principal allotted ten students to a teacher.'

While (33a) is simply unacceptable, (33b) has only a nondistributive meaning distinct from (28b).

Last, but not least, distributive quantifiers are impossible to the right of the IO in the P-dative construction (34), or to the right of direct objects (35) in monotransitive clauses, or to the right of the DO in the P-dative construction (36):

(34) * *Wǒ sòng -le yībǎi kuài qián*
1SG give-PERF 100 CL money
[PP *gěi háizi-men] měi-rén /yī-rén.*
to child -PL every(one)/each
(?? 'I gave 100 dollars each to the children.')

(35) **Wǒ pèngdào-le xuéshēng-men měi-rén /yī-rén*.
1SG meet -PERF student -PL every(one)/each
('*I met the students each.')

(36) **Xiàozhǎng fēn -le shí-ge dàxuéshēng měi-rén*
principal allot-PERF 10 -CL student everybody
[PP gěi women].
to 1PL
(*'The principal allotted 10 students each to us.')

The contrast between (29) and (34-36) is explained straightforwardly by the hypothesis that (29) involves A-movement out of the VP, as predicted by the Raising Applicative analysis, but (34-36) do not. No A movement is involved in the derivation of (34-36), so no distributive quantifier is licensed.

2.6. Wrap-up

In this section we have provided further evidence that $Appl^0$, lexicalized as *gěi*, originates *above* the VP headed by the donatory verb. Based on Lin's (2001) derivation of aspectual suffixes via syntactic movement of V to Aspect and drawing on data from verb copying and A-not-A questions, we have shown that the combination 'V-*gěi*' in the DOC is distinct from V-V compounds formed in the lexicon, and that the pattern is most straightforwardly derived by raising the lexical verb and left-adjoining it to *gěi*. Furthermore, the position of distributive quantifiers provides evidence for movement of the IO from its base position within VP to Spec, ApplP.

3. The licensing role of applicative heads and the A' restriction on IOs

3.1 Countercyclic Agree

Above we argued that the Chinese DOC in (7a) is a raising applicative, and should be assigned the structure and derivation in (18b), repeated in (37):

(37) *[$_{TP}$ Wǒ [$_{ASPP}$ mài-gěi-le*
1SG sell-GEI-ASP
[$_{APPLP}$ Mǎlì [$_{APPL'}$ $t_{mài\text{-}gěi}$ [$_{VP}$ $t_{Mǎlì}$ [$_{V'}$ $t_{mài}$ yī-ge shǒubiǎo]]]]]].
Mali 1 -CL watch
'I sold Mali a watch.'

Let us now consider in detail how the DO and IO are licensed in this construction. We adopt the basic definition of Agree in Chomsky (2000)

(38) Agree (Chomsky 2000: 122)
The probe P agrees with the closest Matching goal in D.
a. Matching is feature identity.
b. D is the sister of P. [D= c-command Domain of P].
c. Locality reduces to closest c-command.

Based on the evidence discussed in the previous section showing that the IO raises out of VP, we assume that Appl bears an EPP/OCC feature that attracts the IO to Spec, ApplP.[12] Under this approach, the DO 'watch' and verb 'sell' are first merged in V'; then the IO 'Mali' is merged in Spec, VP. Both the DO and IO bear case features which must be checked. Next Appl is merged with VP. As Appl also bears a case feature, it enters into an Agree relation with the closest DP, the IO, and checks off its case feature, and the EPP/OCC feature on Appl attracts the IO to its Spec. Next *v* is merged with ApplP; *v* also bears a case feature, so it seeks the closest DP with an unchecked case feature. This is the DO. An Agree relation is established between *v* and DO, and the case feature of the latter is checked off.

Although the building of the structure in (37) by external and internal Merge is perfectly cyclic, the application of Agree is countercyclic: Agree applies first between Appl and the IO in Spec, VP, then between v and the DO lower in the tree, in V'. The inherently countercyclic nature of Agree has been noted by other researchers (cf. Alexiadou & Anagnostopoulou 2007): since Agree applies between a head higher in the structure and a goal it c-commands, it moves 'down the tree', while normal external and internal Merge build the tree in cyclic fashion from bottom to

[12] A reviewer points out that EPP/OCC features are typically associated with functional heads, while Appl might be taken to be a lexical (verbal) head in the original conception of Marantz (1993). This simply reflects the development of the Applicative Hypothesis; other researchers analyzing Appl as a case checking (and therefore functional) head include a.o. Anagnostopoulou (2003), Miyagawa & Tsujioka (2004), and Miyagawa & Jung (2004).

top. In most A-licensing applications of Agree, the inherently countercyclic nature of this operation is masked by the fact that there is at most one licensing head per cyclic domain: thus only *v* triggers Agree in monotransitive *v*Ps, and only T does so in the next cyclic domain (i.e. phase), CP. Applicative structures however render transparent the inherent countercylic nature of Agree, because they introduce a second Agreeing head, Appl, within a single cyclic domain, *v*P.

3.2. *The A' movement restriction on shifted IOs*

A notable fact about the V-*gěi* IO DO DOC pattern in Chinese is that the IO is ineligible for A' movement (Tang 1977), as shown by (39a-b).

(39) a. **[Akiū mài-gěi* t_{ren} *chēzi] de nèi -ge rén*
Akiu sell-GEI car SUB that-CL person
hěn yǒuqián.
very rich

b. **Nèi-ge rén, Akiū mài-gěi* t_{ren} *chēzi.*
that-CL person Akiu sell-GEI car

This is a property shared by applicative constructions in a wide variety of languages, as pointed out by Emonds & Whitney (2006: 93-99). The restriction was originally observed for English DOCs by Fillmore (1965):

(40) a. ??The person who Akiu sold a car was very rich.
b. ??Who did Akiu sell a car?

Let us call this long-noted constraint the *A' Restriction on Shifted IOs* (ARSIO).[13] Surveying 40 years of literature, Emonds & Whitney note that it applies to many languages with 'dative shift'-like constructions, including languages with overt applicative morphemes. They (p. 95) cite the following Chichewa data from Baker (1988: 291-292):

(41) a. *Atsikana a-na -perek-er -a mfumu chisteko.*
girl SP-PAST-hand-APPL-ASP chief door
'The girl handed the chief the door.'

b. **Iyi ndi mfumu imene ndi-na -nen-a*
this is chief which 1SS-PAST-say-ASP
kuti atsikana a -na -perek-er -a chisteko.
that girl SP-PAST-hand-APPL-ASP door
('??This is the chief which I said that the girl handed the door.')

[13] Emonds & Whitney (2006) note that there is considerable crosslinguistic and cross-idiolectal variation in the strength of the ARSIO. They cite Den Dikken (1995) who observes that the ARSIO is violable in English with short A' extraction for some speakers. According to Tang (1977: 82, example (53b)) the ARSIO appears violable with short Topicalization in a Chinese DOC with no overt applicative *gěi*.

Emonds & Whitney observe that the ARSIO is sufficiently widespread to provide support for the view that IOs in DOCs are not simply base generated objects, and endorse the basic raising or 'dative shift' analysis of the IO in DOCs adopted in this paper. However as they point out, there is no consensus as to the exact structural implementation of the ARSIO.

3.3. Raising Applicative Structure and the A' Restriction

We propose that the restriction on A' extraction on IOs in DOCs is a product of the structure where ApplP is embedded under *v*P. As we pointed out in 3.1, the derivation of a *v*P selecting an applicative projection proceeds in normal cyclic fashion, with VP and ApplP constructed from bottom up, and movement of the IO to Spec, ApplP taking place as soon as Appl is introduced in the derivation. We propose that items whose features have been checked by Agree within a cyclic domain are unavailable for operations beyond that cyclic domain, This falls out naturally from Chomsky's (2001) version of the Phase Impenetrability Condition:

(42) Phase Impenetrability Condition
The domain of a strong phase head is not accessible to operations at ZP (the next strong phase); only H and its edge are accessible to such operations.

The PIC insures that operations involving Agree in a higher cyclic domain can reach no further than the edge of the next cyclic domain (strong phase) down. Items may escape the PIC by being moved to the edge of the lower cyclic domain. But in the case of an IO that enters into an Agree relation with Appl, both its case and EPP/OCC features have already been checked. The unavailability of the latter feature in particular makes it impossible for the IO to be attracted to the edge of *v*P.[14] Thus while a category checked under Agree by *v* and attracted to its Spec can be available for operations in the next cyclic domain (specifically A' movement in the CP domain), categories checked earlier in the derivation of *v*P, such as a DP checked by Appl, will not.

[14] One could imagine a less restrictive version of the PIC (either the 2001 version cited above or Chomsky's 1999 version) that specifies as inaccessible for operations in a higher cyclic domain only categories which have entered into an Agree relation in a lower cyclic domain, and do not occupy its edge. This would have the effect of making Appl-licensed IOs inaccessible to A' movement in the case at hand, but allowing, for example, PPs to undergo wh-movement out of *v*P without having first to move to the phase edge. The alternative seems attractive, but we do not pursue it further here.

3.4. A movement in Mandarin DOCs

Mandarin *gěi* DOCs exhibit another property which is widespread but not universal among DOCs: the IO is unavailable not only for A', but for A movement. Thus the IO in the *gěi* DOC construction is ineligible for passivization (43a) or fronting with *bǎ* (43b):

(43) a. **Akiū bèi pěngyǒu mài- gěi chēzi le*
Akiu PASS friend sell-GEI car PART
('Akiu was sold a car by a friend.')
b. **Pěngyǒu ba Akiū mài- gěi chēzi le*
friend BA Akiu sell-GEI car PART

Chinese patterns with languages such as Greek (Anagnostopoulou 2003, Georgala, Paul & Whitman 2008, Georgala & Whitman 2009), which disallow passive of the IO in DOCs. This falls out straightforwardly from the account in 3.1. Since IO is licensed by Appl and DO by *v*, only the latter is affected by the failure of defective ([-transitive]) *v* to check case features in a passive. As predicted by this account, the DO in a passive DOC may passivize, in Chinese (44a) and Greek (45).[15] *Ba*-extraction of the DO (44b) is also possible in Chinese.

(44) a. *Chēzi bèi pěngyǒu mài- gěi Akiū le*
car PASS friend sell-GEI Akiu PART
'The car was sold by a friend to Akiu.'
b. *Pěngyǒu ba chēzi mài- gěi Akiū le*
friend BA car sell-GEI Akiu PART
'The friend sold a car to Akiu.'

(45) *Ena ivlio *(tis) dhothike*
a.NOM book. NOM 3SG.CLITIC was.given.3SG
(tis Lenas).
the.GEN Lena.GEN
'A book was given her/Lena.'

4. Morphological exponence and the Raising Applicative Hypothesis

Georgala et al. (2008) point out that the Raising Applicative Hypothesis predicts that overt applicative affixes are realized uniformly as verbal

[15] A reviewer points out the apparent Shortest Move/Minimality violation incurred by A movement of the DO over the IO in (44-45). We assume that checking of the case and EPP/OCC features of the IO by Appl prior to passivization eliminates the IO as a possible intervener.

suffixes.[16] In contrast, if we were to find an overt head in Pylkkänen's low applicative structure (46), it should be realized as a verbal prefix (assuming that we do not have head adjunction to the right), or as a particle in VP.

(46) $[_{\text{VOICEP}}$ Voice° $[_{\text{VP}}$ V $[_{\text{APPLP}}$ DP_{goal} $[_{\text{APPL'}}$ Appl° $\text{DP}_{\text{theme}}]]]]$
(Pylkkänen 2002; annotated to indicate thematic roles)

In fact there are clear cases of applicative constructions associated with prefixal morphology, including e.g. Ainu and Abaza.

(47) Ainu instrumental applicative (Shibatani 1990: 69)
Tam -kurpoki a -*ko* -tam -etaye.
sword-underneath 1SG-APPL-sword-draw
'I drew the sword underneath the sword.'

(48) Abaza locative applicative (O'Herin 2001: 481)
d-/a- [ðə-*dzqa*] -yə-r-gəl-t'.
a3SG.h-dir[1PL-beside]-c3SG.m-CAUSE-stand-dyn
'He caused him/her to stand next to us.'

What is interesting about (47-48) is that they have the semantics of high rather than low applicatives in Pylkkänen's (2002, 2008) terms. Neither expresses transfer of possession; the Ainu applicative is an instrumental, while the Abaza example is a locative. The applicative affix in both of these patterns is analyzed as an incorporated P (Baker 1996 for Ainu, O'Herin 2001 for Abaza). We are unaware of clear examples of a prefixal applicative restricted to a low applicative (transfer of possession) function.

It is equally difficult to identify exponents of a low applicative head in the shape of a VP-internal particle or verb-like element. A possible candidate is serial verb constructions where the second verb is a transfer-of-posession predicate such as *give*:

(49) Haitian (Lefebvre 1998: 291)
Mí mandá biífi *dá* hen.
1SG send letter give her
'I have sent letters to her.'

However in such constructions the order of IO and DO is uniformly reversed from the pattern predicted by the low applicative structure (46): the IO precedes the second verb, and the DO follows it. Crosslinguistically, it appears thus that there are no clear candidates for an overt low applicative head, either incorporated or in situ.

[16] On the assumption that the lexical verb raises uniformly to *v*. Whitney and Emonds (2006: 106) also point out that applicative affixes are generally suffixes.

5. Conclusion

This article has argued for a distinction between *thematic* and *raising* applicatives. The former introduces an additional argument above the root VP, while the latter functions as a case-licensing head, introducing no additional argument, but attracting the IO from its base position in the VP. The Raising Applicative Hypothesis preserves the original structural insight of the Applicative Hypothesis for ditransitives and other "extra object" constructions. This insight is supported by the typical crosslinguistic realization of applicative morphemes as suffixes, and by the behavior of the Chinese V-*gěi* double object construction that we have examined in detail. At the same time, Pylkkänen, (2002, 2008) gives ample evidence for two distinct types of extra objects, one originating outside the core VP, another inside it. The Raising Applicative hypothesis allows both types to be licensed with a single position for the licensing head.

References

Alexiadou, Artemis, and Elena Anagnostopoulou. 2007. The subject in situ generalization revisited. In *Interfaces and Recursion*, H.-M. Gaertner & U. Sauerland (eds.), 31-60. Berlin/New York: Mouton de Gruyter.

Anagnostopoulou, Elena. 2003. *The Syntax of Ditransitives: Evidence from Clitics*. Berlin/New York: Mouton de Gruyter.

Baker, Mark. 1988. *Incorporation: A Theory of Grammatical Function Changing*. Chicago: University of Chicago Press.

Baker, Mark. 1996. *The Polysynthesis Parameter*. Chicago: University of Chicago Press.

Bowers, John. 1993. The syntax of predication. *Linguistic Inquiry* 24(4): 591-656.

Cheng, Lisa Lai-Shen et al. 1999. *Hoo, hoo, hoo*: Syntax of the causative, dative, and passive constructions in Taiwanese. In *Contemporary studies on Min dialects* [Journal of Chinese Linguistics Monograph series, vol. 14.], Pang-Hsing Ting (ed.), 146-203.

Chomsky, Noam. 1999. Derivation by phase. *MIT Occasional Papers in Linguistics* 18.

Chomsky, Noam. 2000. Minimalist inquiries: The framework. In *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*, Roger Martin, David Michaels & Juan Uriagereka (eds), 89-155. Cambridge, Mass.: MIT Press.

Chomsky, Noam. 2001. Beyond Explanatory Adequacy. *MIT Occasional Papers in Linguistics* 20.

Chomsky, Noam. 2006. On phases. In *Foundational Issues in Linguistic Theory*, Essays in Honor of Jean-Roger Vergnaud, Robert Freidin, Carlos P.Otero, and Maria-Luisa Zubizaretta (eds.), 133-166. Cambridge, MA: MIT Press,

Cinque, Guglielmo. 1999. *Adverbs and functional heads. A cross-linguistic perspective.* Oxford: Oxford University Press.

Djamouri, Redouane & Paul, Waltraud. 2009. Verb-to-preposition reanalysis in Chinese. In *Historical syntax and linguistic theory*, P. Crisma & G. Longobardi (eds.), 194 - 211. Oxford: Oxford University Press.

Emonds, Joseph, & Whitney, Rosemarie. 2006. Double object constructions. In *The Blackwell Companion to Syntax*, Martin Everaert & Henk van Riemsdijk (eds.), vol. 2, 71-144. Malden, MA: Blackwell.

Fillmore, Charles. 1965. *Indirect object constructions in English and the ordering of transformations*. The Hague: Mouton.

Fitzpatrick, Justin. 2006. The Syntactic and Semantic Roots of Floating Quantification. Ph.D. dissertation, Masachusetts Institute of Technology.

Georgala, Effi, and John Whitman. 2009. Ditransitives and Applicative Structure in Greek. *Proceedings of the* of *the 43rd Annual Meeting of the Chicago Linguistic Society* (CLS 43). Chicago, IL

Georgala, Effi, Waltraud Paul, and John Whitman. 2008. Expletive and Thematic Applicatives. In *Proceedings of the 26th West Coast Conference on Formal Linguistics* (WCCFL 26), C. B. Chang & H. J. Haynie (eds), 181-189. Somerville, MA: Cascadilla Proceedings Project.

Huang, C.-T. James. 1982. Logical relations in Chinese and the theory of grammar. PhD dissertation, Massachusetts Institute of Technology.

Kayne, Richard. 1984. *Connectedness and Binary Branching*. Dordrecht: Foris.

Kayne, Richard. 1994. *The Antisymmetry of Syntax*. Cambridge, Mass.: MIT Press.

Kimenyi, Alexandre. 1980. *A Relational Grammar of Kinyarwanda.* Berkeley: University of California Press.

Kung, Hui I. 1993. The mapping hypothesis and postverbal structures in Mandarin Chinese. PhD dissertation, University of Wisconsin-Madison.

Lefebvre, Claire. 1998. *Creole Genesis and the Acquisition of Grammar: The Case of Haitian Creole*. Cambridge: Cambridge University Press.
Li, Yen-Hui Audrey. 1990. *Order and Constituency in Mandarin Chinese*. Dordrecht: Kluwer.
Lin, Tzong-Hong Jonah. 2001. Light Verb Syntax and the Theory of Phrase Structure. PhD dissertation, University of California at Irvine.
Marantz, Alec. 1993. Implications of asymmetries in double object constructions. In *Theoretical Aspects of Bantu Grammar*, Sam Mchombo (ed.), 113–151. Stanford: CSLI Publications.
Miyagawa, Shigeru & Takae Tsujioka. 2004. Argument structure and ditransitive verbs in Japanese. *Journal of East Asian Linguistics* 13(1):1-38.
Miyagawa, Shigeru & Yeun-Jin Jung. 2004. Decomposing ditransitive verbs. *Proceedings of the Seoul International Conference on Generative Grammar,* Summer 2004: 101-120.
O'Herin, Brian. 2001. Abaza applicatives. *Language* 77: 477-493.
Paul, Waltraud. 1988. *The Syntax of Verb-Object Phrases in Chinese: Constraints and Reanalysis*. Paris: Editions Langages Croisés.
Paul, Waltraud. 2002. Proxy Categories in Phrase Structure Theory and the Chinese VP. *Cahiers de Linguistique – Asie Orientale* vol. 31(2): 137 - 174.
Pesetsky, David. 1995. *Zero Syntax: Experiencers and Cascades.* Cambridge, Mass.: MIT Press.
Peyraube, Alain. 1980. *Les constructions locatives en chinois moderne*. Paris: Editions Langages Croisés.
Pylkkänen, Liina. 2002. *Introducing Arguments.* Doctoral dissertation, MIT.
Pylkkänen, Liina. 2008. *Introducing Arguments*. [Linguistic Inquiry Monographs Series 49]. Cambridge, Mass.: MIT Press.
Shibatani, Masayoshi. 1990. *The Languages of Japan*. Cambridge: Cambridge University Press.
Soh, Hooi Ling. 2005. Mandarin distributive quantifier *ge* 'each', the structure of double complement constructions and the verb-preposition distinction. *Journal of East Asian Linguistics* 14(2): 155-173.
Stowell, Timothy. 1982. The Origins of Phrase Structure. PhD dissertation, Massachusetts Institute of Technology.
Tang, C.-C. Jane. 1990. *Chinese Phrase Structure and the extended X-bar Theory*. PhD dissertation, Cornell University.
Tang, Ting-chi. 1977. Double object constructions in Chinese. In *Proceedings of the symposium on Chinese linguistics, 1977 Linguistic Institute of the Linguistic Society of America*, Robert L. Cheng, Ying-che Li and Ting-chi Tang (eds.), 67-96. Taipei: Student Book Co.
Zhu, Dexi. 1979. Yŭ dòngcí *gei* xiāngguān de jùfă wèntí [Sentences containing the verb *gei*]. *Fangyan* 1979, n°2: 81-87.