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APPARENT SUBJECT-OBJECT INVERSION IN CHINESE*

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ABSTRACT. This paper is concerned with the problem of argument-function mismatch observed in the apparent subject-object inversion in Chinese consumption verbs, e.g., *chi* 'eat' and *he* 'drink', and accommodation verbs, e.g., *zhu* 'live' and *shui* 'sleep'. These verbs seem to allow the linking of <*agent*-SUBJ *theme*-OBJ> as well as <*agent*-OBJ *theme*-SUBJ>, but only when the agent is also the semantic role denoting the measure or extent of the action. The account offered is formulated within LFG's lexical mapping theory. Under the simplest and also the strictest interpretation of the argument-function mapping principle (or the *θ*-criterion), a composite role such as *ag-ext* receives syntactic assignment via one composing role only; the second composing role must be suppressed. Subject-object inversion is due to the competition between the two composing roles for syntactic assignment. This LMT account also facilitates a natural explanation of markedness among the competing syntactic structures.

Keywords inversion, argument-function mismatch, mapping, linking, argument realization, LMT, suppression, *θ*-criterion, extent

1. INTRODUCTION: THE LINKING PROBLEM

Despite the view of autonomous syntax which characterizes syntactic theories within the tradition of generative grammar (Newmeyer 1991), various mechanisms and principles have been proposed by generative grammarians to account for the general correspondences between semantic roles and syntactic arguments, for example agents to subjects and patients to objects[1]. Such correspondences are known as 'linking', 'mapping', and also 'argument realization'. Unsatisfied with the earlier rule-based stipulations[2], more recent attempts to account for the linking between lexical semantics and syntax put forward more principled constraints. Among such universal constraints, the following three stand out and have had the greatest influences: Chomsky's (1981) *θ*-criterion, Perlmutter and Postal's (1984) Universal Alignment Hypothesis (UAH), and Baker's (1988) Uniformity of Theta Assignment Hypothesis (UTAH).

(1) *θ*-Criterion (Chomsky 1981: 36)
Each argument bears one and only one *θ*-role, and each *θ*-role is assigned to one and only one argument.

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[1] This may or may not apply to all languages, esp. ergative languages, which is an issue of great debate but will not be discussed here.

[2] In LFG, for example Bresnan (1982a), before the lexical mapping theory, linking of thematic roles to grammatical functions was largely stipulated.

(2) Universal Alignment Hypothesis (UAH) (Perlmutter and Postal 1984: 97)
There exist principles of UG which predict the initial relation borne by each nominal in a given clause from the meaning of the clause.

(3) Uniformity of Theta Assignment Hypothesis (Baker 1988: 46)
Identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-structure.

The θ-Criterion, originally proposed within the Government and Binding framework, states that the mapping between thematic roles and syntactic arguments is strictly one-to-one, bidirectionally; thus, linking is mandatory as well as monogamous, metaphorically speaking. The UAH, first formulated in the framework of Relational Grammar (RG), predicts that the connection between lexical semantics and syntax is constrained by general principles (but leaves these principles unspecified) and thus implies that semantic roles represent equivalence classes of predicate arguments which the mapping process refers to. The UTAH maintains that the mapping between thematic and structural relationships is consistent in that syntactic arguments fulfilling a particular thematic role of a given predicate must all be generated in the same initial underlying syntactic position.

All three hypotheses function as constraints over the syntax-semantics interface and assume a fundamental connection between the event structure and some level of syntactic representation. Within the mainstream derivational tradition, this linking relationship holds between a thematic role and the initial pre-movement entry position in the structural configuration.[3] However, within non-derivational frameworks which recognize grammatical relations, also known as grammatical functions, such as subject and object, as primary notions, linking holds between the thematic structure and the relational structure of syntactic functions. RG and LFG, or Lexical-Functional Grammar, are two prime examples.

However, none of the hypotheses mentioned thus far accounts for the central mechanism by which the thematic structure and the syntactic structure are linked; for example, specifically how agents are assigned to the syntactic subject and patients to object in typical transitive verbs. One of the most significant hypotheses put forward to avoid the traditional stipulations on linking individual semantic roles[4] is the notion of thematic hierarchy (TH), which maintains that semantic roles are ranked hierarchically and universally according

[3] In the Government and Binding framework it is thus the D(eep)-structure, and in the Minimalist framework, it is where the item initially merges with its head.

[4] An example of such stipulations is found in Fillmore (1968: 33), where it is stated that if an Agent is present, it is the subject; otherwise, if an Instrument is present, it is the subject; otherwise, the Objective (= Theme or Patient) is the subject.

to prominence and that more prominent roles are mapped to more prominent syntactic arguments, and vice versa. This consequence of the TH with regard to argument realization is formally stated in Larson (1988) as the Relativized UTAH.

(4) Relativized UTAH (Larson 1988: 382)
If a verb α determines theta roles θ_1, θ_2,…, θ_n, then the lowest role on the Thematic Hierarchy is assigned to the lowest argument in constituent structure, the next lowest role to the next lowest argument, and so on.

The TH can thus be viewed as a concrete example of the kind of universal principles that the UAH refers to, and one that supplements the UTAH. In the derivational framework, the syntactic prominence that aligns with the semantic prominence in the TH is defined by a command relation. Between two syntactic argument positions, the one c-commanding the other is more prominent. Thus, given that agent outranks theme/patient in prominence and that the subject position c-commands, and thus outranks, the object position in a clause, the linking of agent to subject and patient to object is obtained. However, within non-derivational frameworks such as RG and LFG the prominence of syntactic arguments is not determined structurally; rather, a syntactic prominence scale is considered among syntactic relations such as subject and object, which are deemed primary notions independent of constituent structures. While the subject is universally viewed as the most prominent grammatical function, there is a lack of agreement as to the precise prominence scale across the relation-based frameworks. Likewise, attractive the notion of TH may be, there is surprisingly little agreement as to the precise inventory of such roles or the exact ranking of such roles, except that agent is the most prominent (Newmeyer 2002: 65)[5].

This paper deals with a construction in Chinese which allows agent to be linked to object and patient linked to subject, a linking pattern that has often been considered to be ill-formed cross-linguistically. For example, Lasnik and Uriagereka (2005: 6) state:

> ..as far as is known there is no hypothetical verb in any language whose subject is a patient and whose direct object is agent.

The paper is organized into six sections. Based on the introduction to linking in this section, a theory on linking, formulated within LFG (Kaplan and Bresnan 1982, Bresnan 2001) and known as the lexical mapping theory (LMT), will be presented in section 2. Section 3 then discusses the core problem to be dealt with in the paper: the apparent subject-object inversion observed in consumption verbs and accommodation verbs in Chinese.[6] An example follows.

[5] Newmeyer (2002) is in fact critical of the TH and even doubts its very existence; however, see Levin (2005) for what I consider a much more balanced and insightful view on this issue.

[6] Inversion often also involves a change in the discourse packaging, which will not be discussed in the paper. Refer to Birner (1994) for an excellent discussion on this topic.

(5) a. Tamen si ge ren zuo zhe zhang zuozi.
they four CL person sit this CL table
'Those four people sit at this table.'

b. Zhe zhang zuozi zuo tamen si ge ren.
this CL table sit they four CL person
'This table sits them four people.'

The apparently inversed linking of <*agent*-OBJ, *theme*-SUBJ> in (5b) poses a challenge to current linking theories. In section 4, an account will be offered within the mapping theory developed in section 2, after a review of an LMT account of a similar problem in Chinese resultative compound verbs. It will be demonstrated that the strict one-to-one mapping forces the suppression of a composing role in a composite role, which is formed morpholexically by merging two distinct roles and that the competition for syntactic assignment between the two composing roles creates the apparent subject-object inversion. Section 5 consists of a discussion of the LMT account offered and its implications on the theory of markedness. Section 6 concludes the paper.

2. LEXICAL MAPPING THEORY

As a non-derivational generative framework, LFG takes seriously the insight that some generalizations regarding the mapping between the predicate argument structure and the syntactic structure must be stated at an independent level of predicate valence (Levin 1987, Rosen 1989, Bresnan and Kanerva 1989, Bresnan and Zaenen 1990, Grimshaw 1990, Jackendoff 1990, Alsina 1993, 1996, Mohanan 1994, Neeleman 1994, Butt 1995, Butt and King 2000, among others), and thus poses an argument structure (a-structure), which links the lexical semantic structure and the syntactic structure of a predicator (e.g., Bresnan and Kanerva 1989, Bresnan and Zaenen 1990). The particular conception of the a-structure assumed here is based on Baker (1983) and Bresnan (1996, 2001).

(6)
lexical semantics	(e.g., beat <*beater beatee*>)
↓	
a-structure	(e.g., beat <*agent theme*>)
↓	
syntactic structure	(e.g., beat <(↑SUBJ) (↑OBJ)>)

Furthermore, to capture the RG concept of grammatical relations, LFG posits two parallel planes of syntactic representation: constituent structure (c-structure) and functional structure (f-structure) (Kaplan and Bresnan 1982). The c-structure encodes the categorical hierarchies, usually represented as tree configurations. The f-structure, formally a feature structure, is the central locus

of grammatical information, such as grammatical functions (e.g., SUBJ and OBJ), tense, aspect, polarity, case, person, number, gender, etc. These parallel structures are linked by correspondence principles and together provide the complete syntactic description. The lexical mapping theory (LMT) is the UG component that constrains the linking between a-structure roles and f-structure functions.

LMT also assumes a universal hierarchical organization of a-structure arguments, thus a thematic hierarchy, as shown in (7) (Bresnan and Kanerva 1989, l992), which might also be derived from Dowtyan proto-role properties (Dowty 1991, Bresnan 2001: 321fn). And, by convention, roles in the a-structure are listed in a descending order accordingly, for example <*ag th*>. The most prominent role in the a-structure, or the logical subject, is known as $\hat{\theta}$, pronounced 'theta-hat'.

(7) Thematic Hierarchy:
ag > *ben* > *go*/*exp* > *inst* > *pt*/*th* > *loc*

Grammatical functions (GFs) that are subcategorized for, also known as argument functions (AFs), including SUBJ, OBJ, OBL_θ (oblique functions), and OBJ_θ, (secondary objects), are likewise ranked for syntactic prominence. This syntactic hierarchy is formally due to a classification of AFs with two binary features: [$\pm r$] (whether an AF is restricted to having a thematic role) and [$\pm o$] (whether an AF is objective, and thus a complement of a transitive predicate). SUBJ has minus, and thus unmarked, values on both and OBJ_θ has plus values. SUBJ is thus the least marked with two minus values, while OBJ_θ is at the opposite end of the scale. OBJ and OBL_θ are equal in prominence.

(8) Markedness Hierarchy of Argument Functions:
$\text{SUBJ}(-r\,-o) \;>\; \text{OBJ}(-r\,+o)/\text{OBL}_\theta(+r\,-o) \;>\; \text{OBJ}_\theta(+r\,+o)$

Recall that in the derivational framework a theta role of a predicate is consistently assigned to an argument's initial syntactic position, i.e., before any movement takes place, as stated in UTAH. However, LFG maintains the spirit of UTAH by posing a universal scheme of morphosyntactic classification of a-structure roles, as in (9) and (10) (Bresnan and Kanerva 1989) and a unified mapping principle (UMP) (Her 1999, 2003).

(9) Intrinsic Morphosyntactic Classification of Argument Roles (IC):
$\theta, \quad \theta = pat/th$
$[-r]$

(10) Default Morphosyntactic Classification of Argument Roles (DC):
$\theta, \quad \theta \neq \hat{\theta}$
$[+r]$

(11) Unified Mapping Principle (UMP):
Map each role in a-structure with no higher role available* onto the highest AF that is both available and compatible.[7]
*A role is available if it is not linked to an AF, and conversely.
+A role and an AF are compatible if they contain no conflicting feature.

The generalization in (9) can be viewed as an implementation of the unaccusative hypothesis, initially proposed by Perlmutter (1978), that cross-linguistically *pt/th* is encoded as an unrestricted function, i.e., SUBJ or OBJ (Bresnan and Kanerva 1989, Bresnan and Zaenen 1990, Zaenen 1993).[8] The elsewhere condition in (10) captures the generalization that a non-logical subject, non-patientlike role is typically assigned a thematically restricted oblique function. The UMP reflects two generalizations. First, a more prominent role favors a more prominent AF; second, each role *consistently* favors the most prominent AF possible. Finally, note that the UMP also incorporates the θ-Criterion in that a one-to-one linking is strictly required.

Lexical mapping of three different types of verbs is illustrated below: the unaccusative verb *melt* in (12), the unergative verb *bark* in (13), and the transitive verb *break* in (14).

(12) The ice melted.

	melt < *x* >	(*x* = *pt/th*)
IC:	[-*r*]	
DC:		

	S/O	
UMP:	S	

(13) The dog barked.

	bark < *x* >	(*x* = *ag*)
IC:		
DC:		

	S/O/…	
UMP:	S	

[7] Mapping is thus strictly declarative. Conceptually, however, mapping proceeds from left to right; in other words, mapping starts from the most prominent role (Her to appear: 9).
[8] The Unaccusative Hypothesis was first proposed in RG: "Certain intransitive clauses have an initial 2 but no initial 1" (Perlmutter 1978: 160). Initial 2 is the object, and initial 1 the subject.

(14) The girl broke the window.

	break < *x*	*y* >	(*x* = *ag*, *y* = *pt/th*)
IC:		[-*r*]	
DC:			
	---	---	
	S/O/…	S/O	
UMP:	S	O	

The mapping in (12) and (13) is straightforward. In (14), the role *x*, being an agent role, receives no IC, and being the logical subject, receives no DC. It is thus compatible with all four AFs in (8), while the role *y*, a patient/theme role, receives IC [-*r*] and thus no DC[9]. It is compatible with SUBJ and OBJ. The UMP requires the mapping of the more prominent *x* onto the most prominent AF available, and thus SUBJ; hence, the less prominent *y* must be mapped to the only function that remains available to it, OBJ.

While the mapping above is accounted for by the universal component of LMT, there are language-specific morphological operations that may affect the a-structure and/or linking. While all morphological operations may affect the predicate, only morpholexical operations may alter the 'lexical stock' of the a-structure by adding, suppressing, or binding argument roles (e.g., Bresnan 2001: 310, Markantonatou 1995, Ackerman and Moore 2001). The morpholexical operation of passivization, which suppresses, or 'absorbs' as it is known in the derivational framework, the logical subject, is an example; see (15-16).

(15) Passivization: $<\theta\ldots>$ → ∅

(16) The window was broken.

	broken < ~~*x*~~	*y* >	(*x* = *ag*, *y* = *pt/th*)
IC:		[-*r*]	
DC:			

		S/O	
UMP:		S	

In section 3, to account for the subject-object inversion verbs, we will propose a morpholexical operation that involves both the addition and binding of a thematic role. Morphosyntactic operations, on the other hand, affect only the syntactic classification of a-structure roles, by adding syntactic features [±*r*] and [±*o*] (Ackerman 1992). Locative inversion, in languages such as English and

[9] The DC assigns [+*r*] as a default condition; thus, it does not apply if it contradicts the [-*r*] already assigned.

Chinese, is such an example (Bresnan and Kanerva 1989, Huang and Her 1998).[10]

(17) a. Zhangsan zuo zai tai-shang.
John sit at stage-top
'John is sitting on the stage.'

zuo/sit <	*x*		*y*	> (*x* = *th*, *y* = *loc*)
IC:	[-*r*]			
DC:			[+*r*]	
	S/O		OBL_θ/OBJ_θ	
UMP:	S		OBL_θ	

b. Tai-shang zuo zhe Zhangsan.
Stage-top sit-ASP John
'On the stage is sitting John.'

zuo/sit <	*x*		*y*	> (*x* = *th*, *y* = *loc*)
IC:	[-*r*]			
Loc-Inv:	[+*o*]		[-*r*]	
DC:				
	O		S/O	
UMP:	O		S	

3. APPARENT SUBJECT-OBJECT INVERSION

The non-isomorphy problem, of which both passivization and locative inversion are examples, is the most essential issue in linking. In the derivational framework, the operation of syntactic movement provides some flexibility needed for resolving such syntax-semantics mismatches.[11] In the monostratal framework of LFG, however, such non-isomorphy is often accounted for morpholexically or morphosyntactically, as demonstrated in section 2. The core problem that this paper aims to solve involves an apparent subject-object inversion observed in consumption verbs, e.g., *chi* 'eat', *he* 'drink', and *chou* 'smoke', and accommodation verbs, e.g., *zhu* 'live', *zuo* 'sit', and *shui* 'sleep', in Chinese.

[10] The particular formulation of locative inversion adopted here is from Huang and Her (1998), which is similar in spirit with that of Bresnan and Kanerva (1989) but differs in its details.

[11] For example, Chomsky (1981) accounts for passives in languages like English by NP-movement. In Coopmans' (1989) treatment of locative inversion, the locative PP is topicalized and the theme subject moved and VP-adjoined.

3.1 Consumption Verbs

The verb *chi* 'eat' will be used as an example of consumption verbs. Its canonical transitive construction is shown in (18a), where the linking of <*ag*-SUBJ *th*-OBJ> and the SVO word order are as expected, and the inverted linking of <*ag*-OBJ *th*-SUBJ> in (18b) is ill-formed, also as expected. This is still true when the theme object is a quantifier phrase (QP) and thus also denotes measure or extent of the eating, as in (19).

(18) a. Lisi chi rou.
Lee eat meat
'Lee eats meat.'

b.*Rou chi Lisi.

(19) a. Lisi chi (zhe) yi guo rou.
Lee eat this one pot meat
'Lee eats (this) one pot of meat.'

b.*Zhe yi guo rou chi Lisi.
c.*Yi guo rou chi Lisi.

However, it has been observed that if the agent is a QP, subject-object inversion can occur, as in (20a-b). The inverted linking in (20b) thus appears to violate the thematic hierarchy and presents a non-isomorphy problem. Note that this inversion is irrespective of the theme being a QP or NP, as in (21).

(20) a. Liang ge ren chi yi bang rou.
two CL person eat one pound meat
i. 'Two people eat one pound of meat.'
ii. 'One pound of meat feeds/serves two people.'

b. Yi bang rou chi liang ge ren.
one pound meat eat two CL person
'One pound of meat feeds/serves two people.'

(21) a. Liang ge ren chi zhe wan rou.
two CL person eat this bowl meat
i. 'Two people eat this bowl of meat.'
ii. 'This bowl of meat feeds/serves two people.'

b. Zhe wan rou chi liang ge ren.
one bowl meat eat two CL person
'This bowl of meat feeds/serves two people.'

As further noted in Her (2003), the inverted sentences of (20b) and (21b) now take on an additional meaning beyond 'eating', which is subtle but

distinctive, in that the inverted object not only is the agent of eating but also denotes the measure or the extent of it. As argued by Y. A. Li (1998, 1999), the interpretation of an indefinite nominal like *liang ge ren* 'two people' in (20-21) indeed concerns quantity. The meaning of (20b) is thus along the line of 'one pound of meat accommodates the eating by, and to the extent of, two people'. The canonical (20a) and (21a), however, are ambiguous with two readings. The first reading involves simple agent and theme, while the second reading is identical to that of (20b). Therefore, in an appropriate discourse context, (20a) and (20b) are equally acceptable and denote the same meaning.

(22) Q: Women mai yi bang rou gou-bu-gou?
we buy one pound meat enough-not-enough
'Is it enough if we buy one pound of meat?'

A: Wo xiang bu gou. *Liang ge ren chi yi bang* (20a)/
I think not enough two CL person eat one pound
Yi bang chi liang ge ren (20b). Women you si ge ren,
one pound eat two CL person we have four CL person
dei mai liang bang.
must buy two pound
'Not enough. One pound feeds/serves two people, and there are four of us, so we must buy two pounds.'

It is thus clear that the verb *chi* in (20a) and (20b) takes on an additional semantic role of 'measure' or 'extent', besides agent and theme. This is precisely the possible role of 'extent' Dowty (1991: 554) refers to, and is similar to the role of 'range' discussed in Teng (1975: 95) and the role of 'domain' proposed in Huang (1993: 372-374) and Her (2003). The more widely used term of 'extent' will be adopted here. Dowty (1991: 554) illustrates this role with the following set of examples:

(23) a. I walked a mile.
I swam 30 meters.
I slept twelve hours.
b. This weighs five pounds.
The piano measures 6'5''.
It took me an hour to grade the papers.
The book cost me $5.
c. I paid $5 (this amount) (?this $5-bill) for the book.
The book cost me $5 (?this amount) (#this $5-bill).
I bought the book for $5 (this amount) (#this $5-bill).
d. I paid for the book with ?$5 (#this amount) (this $5-bill).
I bought the book with ? $5 (#this amount) (this $5-bill).
e. I'll trade this record for the book.

Dowty (1991) points out the difficulty in the distinction between adjuncts and arguments. The measure or extent phrases in the (a) examples are usually considered adjuncts,[12] and as such do not receive a theta role from the verb. However, the extent phrases in (b) are subcategorized for, and thus assigned the extent role, by the verb.[13] Sentences in (c) and (d) illustrate how extent is distinguished from theme: *$5* or *this amount* refers to an abstract value and should be recognized as extent, but *$5-bill* refers to the concrete object and should be assigned a theme role, on a par with *this record* in (e). However, in English, like in Chinese (shown in (18), whether the object is a theme or an extent, it does not invert with the agent subject.

(24) a. *6'5'' measures the piano.
b. *$5 paid me for the book.
c. *This record traded me for the book.

While Dowty (1991) cautioned about the distinction between extent and theme, the interesting point revealed in the Chinese data is that subject-object inversion occurs only when the agent of the action takes on the extent role. (25b) is ill-formed because the agent denoted by the pronoun or the full NP cannot afford a measure or extent reading. With the addition of a QP (two people), the extent reading is available and subject-object inversion allowed.

(25) a. Tamen/Zhangsan han Lisi chi zhe guo rou.
They / John and Lee eat this pot meat
'They/John and Lee eat this pot of meat.'

b. *Zhe guo rou chi tamen/Zhangsan han Lisi.

(26) a. Tamen/Zhangsan han Lisi liang ge ren chi zhe guo rou.
They / John and Lee two CL person eat this pot meat
'They/John and Lee two people eat this pot of meat.'

b. Zhe guo rou chi tamen/Zhangsan han Lisi liang ge ren.
this pot meat eat they / John and Lee two CL person
'This pot of meat feeds/serves them/John and Lee two people.'

[12] This is debatable, I believe, even for English and is certainly not true for every other language. For example, Sybesma (1999) argues that in Chinese all postverbal bare nominals, including frequentatives and durations, are complements. I agree.

[13] The distinction between adjuncts and arguments is syntactic in nature, and thus two phrases that are similar semantically may indeed receive different treatment. For example, the NP agent in an active sentence is an argument, but the *by*-PP agent phrase in passives is an adjunct. Also, the locative phrase in (ia) is an adjunct and the one in (ib) is an argument

(i)a. On the stage, my aunt Mary sat.
b. On the stage sat my aunt Mary.

Note that the object in the inversed (26b) still denotes the actor of the action *chi*, thus the eater, despite the addition of the extent reading. Given this change of semantic content of the verb *chi* in the inverted sentences, it is reasonable to postulate a morpholexical operation for this verb class. However, as we shall see in 3.2, this morpholexical change is also applicable to accommodation verbs.

3.2 Accommodation Verbs

The particular sense which the term 'accommodation verbs' refers to in this paper is the provision of space or time needed for a certain activity, for example sleeping, sitting, standing, or dancing. The verb *shui* 'sleep' will be used as the example because of the exact English translation of the inverted sentence, as in (27).

(27) a. Si ge ren shui zhe jian xiaowu.
four CL person sleep this CL cabin
i. 'Four people use this cabin for sleeping.'
ii. 'This cabin sleeps four people.'

b. Zhe jian xiaowu shui si ge ren.
this CL cabin sleep four CL person
'This cabin sleeps four people.'

However, note that *shui* 'sleep' is also a locative inversion verb, as in (28), which should not be confused with the subject-object inversion in (27). Unlike the subject-object inversion verb, the locative inversion verb does not require the inverted subject to be a measure or extent. Thus, the well-formed inversion in (29), where the inverted subject does not have the extent reading, is due to locative inversion, not subject-object inversion.[14]

(28) a. Si ge ren shui zai zhe jian xiaowu-li.
four CL person sleep at this CL cabin-inside
'Four people are sleeping in the cabin.'

b. Zhe jian xiaowu-li shui si ge ren.
this CL cabin-inside sleep four CL person
'In the cabin sleeps four people.'

(29) a. Zhangsan han Lisi shui zai zhe jian xiaowu-li.
John and Lee sleep at this CL cabin-inside
'John and Lee are sleeping in the cabin.'

b. Zhe jian xiaowu-li shui-zhe Zhangsan han Lisi.

[14] As noted in Bresnan (1994) and Huang and Her (1998), due to the information structure and the shift of focus to the inverted subject, locative inversion does not normally occur with an inverted pronominal.

this CL cabin-inside sleep-ASP John and Lee
'In the cabin is sleeping John and Lee.'

What this demonstrates is that, while the locative inversion verb requires an a-structure of precisely <*th loc*>[15] (e.g., Bresnan 1994, Her 2006), the accommodation verb in subject-object inversion, like consumption verbs, requires an a-structure of <*ag th*>. Her (2006) suggests that the latter is derived morpholexically from the former, a process he terms 'transitivization'. Like consumption verbs, the transitivized locative verb allows subject-object inversion only when the agent subject is also a measure or extent; thus, inversion in (30b) is ill-formed, but quite acceptable in (31b).

(30) a. Zhangsan han Lisi shui zhe zhang tatami.
John and Lee sleep this CL straw-mat
'John and Lee use this straw mat for sleeping.'

b.*Zhe zhang tatami shui Zhangsan han Lisi.
this CL straw-mat sleep John and Lee

(31) a. Zhangsan han Lisi liang ge ren shui zhe zhang tatami.
John and Lee two CL person sleep this CL straw-mat
'John and Lee those two use this straw mat for sleeping.'

b. Zhe zhang tatami shui Zhangsan han Lisi liang ge ren.
this CL straw-mat sleep John and Lee two CL person
'This straw mat sleeps two, John and Lee.'

3.3 Unifying Subject-Object Inversion Verbs

If the locative verb in the subject-object inversion construction is indeed a transitivized verb, then accommodation verbs and consumption verbs can be unified under the same a-structure <*ag th*>. Syntactic tests with the *ba* construction (32a), the *bei* construction (32b), the *hao* 'good' middle construction (32c), relativization (32d), and topicalization (32e) all confirm it.

(32) a. Zhangsan ba zhe zhang tatami shui-le.
John BA this CL straw-mat sleep-ASP
'John has used this straw mat for sleeping.'

b. Zhe zhang tatami bei (Zhangsan) shui-le.
this CL straw-mat BEI John sleep-ASP
'This straw mat has been slept on (by John).'

c. Zhe zhang tatami hen hao-shui.
this CL straw-mat very good-sleep

[15] To be specific, locative inversion involves a morphosyntactic change from <*th*-SUBJ *loc*-OBL> to <*th*-OBJ *loc*-SUBJ>.

'This straw mat is very comfortable to sleep on.'

d. Wo xihuan ta shui de zhe zhang tatami.
I like he sleep DE this CL straw-mat
'I like the straw mat that he uses for sleeping.'

e. Zhe zhang tatami, ni shui.
this CL straw-mat you sleep
'This straw mat, you use it for sleeping.'

The NP following *ba* is generally considered the theme object of the verb, whether in the more traditional analyses, e.g., Li (1974), or in the more recent generative grammar, e.g., Li (1990).[16] Likewise, the NP preceding *bei*, especially in the agentless *bei*-construction, is widely accepted as the theme subject of the verb.[17, 18] Furthermore, the well-formed middle construction, relativization, and topicalization all indicate that the 'displaced' NP *zhe zhang tatami* 'this straw-mat' fills a theme object gap, not an oblique locative.

The same distinction can be made more easily in English. In (33a-b), for example, the subject is a theme role; in (33a'-b'), however, as clearly marked by the locative preposition, it has the locative role.

(33) a. The cabin slept four adults.
a' In the cabin slept four adults.
b. The car sits five people.
b' In the car sits five people.

With the consumption verbs and accommodation verbs now consolidated under the a-structure of <*ag th*>, the morpholexical change that derives subject-object inversion verbs thus can apply in a uniform fashion. However, the problem is not all <*ag th*> verbs undergo inversion. Verbs allowed this construction are far more restricted. We will return to this in 3.6.

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[16] Bender (2000), however, presents a dissenting view and argues that *ba* is a three-place verb instead. Under this view, the NP following *ba* is still an object, but an object of the verb *ba*, not of the verb following this NP.

[17] Ting (1998) argues that *bei* in the long passive, i.e., with an expressed agent NP, is a verb, and Her (1991) claims that *bei* is always a verb. Under both accounts, the subject of *bei* is still a theme.

[18] The following type of examples is often cited as evidence that post-*ba* NP and pre-*bei* NP can be a locative. It is a misconception, as the window is the entity which undergoes the action of digging and is thus still a theme.

(i) Wo ba chuanghu wa-le yi ge dong.
I BA window dig-ASP one CL hole
'I took the window and dug a hole in it.'

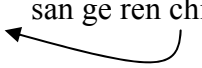
(ii) Chuanghu bei wo wa-le yi ge dong.
window BEI I dig-ASP one CL hole
'A hole was dug out in the window by me.'

3.4 Analogy to the *Gou* 'enough' Construction?

One may notice that the subject-object inversion under discussion seems to be analogous to the *gou* 'enough' construction, as in (34). Based on this observation, Helen Charters (p.c.)[19] suggested that that the following hypothesis should be tested: the inversion construction is headed by a silent counterpart of *gou* 'enough', and the verb in the embedded clause undergoes verb movement to adjoin to the matrix verb, if it is further stipulated that this empty verb is a bound morpheme. Given the similarity in meaning between the two constructions, this derivational analysis, shown in (35), indeed deserves some attention.

(34) Zhe guo rou gou san ge ren chi.
this pot meat enough three CL person eat
'This pot of meat is enough for three people to eat.'

(35) Zhe guo rou *e* san ge ren chi.



However, as the following examples amply demonstrate, there is little support for this analogous analysis.

(36) a. Zhe guo rou gou *tamen* chi.
this pot meat enough they eat
'This pot of meat is enough for them to eat.'

b.*Zhe guo rou chi *tamen*.

(37) a. Zhe guo rou gou *Zhangsan han Lisi* chi.
this pot meat enough John and Lee eat
'This pot of meat is enough for John and Lee to eat.'

b.*Zhe guo rou chi *Zhangsan han Lisi*.

(38) a. Zhe guo rou gou tamen san ge ren chi *liang tian*.
this pot meat enough they three CL person eat two day
'This pot of meat is enough for them three people to eat for two days.'

b.*Zhe guo rou chi tamen san ge ren *liang tian*.

[19] Charters suggested this possibility in an off-the-cuff comment at [name of conference to be filled in later], where a previous version of the paper was presented. I thank her for this and other comments.

(39) a. Zhe guo rou gou tamen san ge ren *jinqing-de* chi.
this pot meat enough they three CL person whole-heartedly eat
'The pot of meat is enough for them three people to eat wholeheartedly.'

b.*Zhe guo rou chi tamen san ge ren *jinqing-de*.

(40) a. Zhe guo rou *bu gou* tamen san ge ren chi.
this pot meat not enough they three CL person eat
'This pot of meat is not enough for them three people to eat.'

b.* Zhe guo rou *bu chi* tamen san ge ren.

(41) a. Zhe guo rou *gou-bu-gou* tamen san ge ren chi?
this pot meat enough-not-enough they three CL person eat
'Is this pot of meat enough or not enough for them three people to eat?'

b. *Zhe guo rou *chi-bu-chi* tamen san ge ren?

Compared to the wide range of syntactic structures allowed by the *gou* 'enough' construction, the subject-object inversion construction is extremely restricted: it does not allow any of the following: bare pronoun objects (36b), non-QP full NP objects (37b), post-object time expressions (38b) or manner adverbs (39b), negation (40b), and A-not-A question form (41b). Furthermore, the class of verbs allowed in the inversion construction is far more restricted.

(42) a. Zhe guo rou gou tamen san ge ren *xiangyong*.
this pot meat enough they three CL person enjoy
'The pot of meat is enough for them three people to enjoy.'

b.*Zhe guo rou *xiangyong* tamen san ge ren.

Many other verbs are allowed by *gou* in (42a) but are disallowed in (42b), e.g., *zhu* 'cook', *qie* 'cut', *xi* 'wash', *wan* 'play', *xinshang* 'appreciate', etc. But perhaps the final straw is the fact that the verb in *gou*'s embedded clause is allowed to have an overt full object (43a) and even double objects (44a).

(43) a. Zhe guo rou gou tamen san ge ren *bao shuijiao*.
this pot meat enough they three CL person wrap dumpling
'This pot of meat is enough for them three people to make dumplings.'

b.*Zhe guo rou *bao* tamen san ge ren *shuijiao*.

(44) a. Zhe guo rou gou tamen san ge ren *song laoshi liwu*.
this pot meat enough they three CL person give teacher gift
'The pot of meat is enough for them three people to use as gifts to give to their teachers.'

b.*Zhe guo rou *song* tamen san ge ren *laoshi liwu*.

We can thus quite confidently conclude that the inversion construction is not parallel to the *gou* 'enough' construction.

3.5 Analogy to a *Gei* 'give' Construction?

Ren (2005) gives quite an extensive description and informal analyses of various non-patient objects in Mandarin, including agentive objects. The core to her account of the subject-object inversion construction is that it is a variant of the *gei* 'give' construction, where the object is no longer an agent; rather it is now a beneficiary and also the terminus point of the entity that is transferred, which is now the subject. She offers examples like the ones in (45-47) to demonstrate the analogous structures between *gei* and the inversion verb.

(45) a. Zhe zhang shafa gei tamen wu ge ren zuo.
this CL sofa give they five CL person sit
'This sofa provides sitting for them five people.'

b.Zhe zhang shafa zuo tamen wu ge ren.
this CL sofa sit they five CL person
'This sofa sits them five people.'

(46) a. Zhe guo fan gei tamen shi ge ren chi.
this pot rice give they ten CL person eat
'This pot of rice provides eating for them ten people.'

b. Zhe guo fan chi tamen shi ge ren.
this pot rice eat they ten CL person
'This pot of rice feeds them ten people.'

(47) a. Zhe pen shui gei tamen liang ge ren xi.
this pan water give they two CL person wash
'This pan of water provides washing for them two people.'

b. Zhe pen shui xi tamen liang ge ren.
this pan water wash they two CL person
'This pan of water washes them two people.'

The same syntactic tests used in the previous section for the *gou* 'enough' analysis will be repeated here. If (45a-47a) are indeed derivationally related to (45b-47b) respectively as the two are variants of the same construction, as Ren (2005: 22-23) claims, then it is to be expected that the two share the same range of syntactic behavior. They do not.

(48) a. Zhe guo rou gei *tamen* chi.
this pot meat give they eat
'This pot of meat provides eating for them.'

b.*Zhe guo rou chi *tamen*.

(49) a. Zhe guo rou gei *Zhangsan han Lisi* chi.
this pot meat give John and Lee eat
'This pot of meat provides eating for John and Lee.'

b.*Zhe guo rou chi *Zhangsan han Lisi*.

(50) a. Zhe guo rou gei san ge ren chi *liang tian*.
this pot meat give three CL person eat two day
'This pot of meat provides for three people's eating for two days.'

b.*Zhe guo rou chi san ge ren *liang tian*.

(51) a. Zhe guo rou gei tamen san ge ren *jinqing-de* chi.
this pot meat give they three CL person whole-heartedly eat
'The pot of meat provides wholehearted eating for them three people.'

b.*Zhe guo rou chi tamen san ge ren *jinqing-de*.

(52) a. Zhe guo rou *bu* gei tamen san ge ren chi.
this pot meat not give they three CL person eat
'This pot of meat does not provide for them three people's eating.'

b.* Zhe guo rou *bu chi* tamen san ge ren.

(53) a. Zhe guo rou *gei-bu-gei* tamen san ge ren chi?
this pot meat give-not-give they three CL person eat
'Does this pot of meat provide for them three people's eating or not?'

b. *Zhe guo rou *chi-bu-chi* tamen san ge ren?

The *gei* construction, like the previous *gou* 'enough' construction, enjoys a full range of syntactic freedom that is not found in the subject-object inversion construction, including bare pronoun objects (48a), non-QP full NP objects (49a), post-object time expressions (50a) or manner adverbs (51a), negation (52a), and A-not-A question form (53a). Likewise, a far greater range of verbs is allowed in the *gei* construction than in the inversion construction.

(54) a. Zhe guo rou gei tamen san ge ren *xiangyong*.
this pot meat give they three CL person enjoy
'The pot of meat provides enjoyment for them three people.'

b.*Zhe guo rou *xiangyong* tamen san ge ren.

Other examples abound, e.g., *zhu* 'cook', *qie* 'cut', *xi* 'wash', *wan* 'play', *xinshang* 'appreciate', etc. The final straw is again the fact that the verb in *gei*'s embedded clause may retain an overt full object (55a) and even double objects (56a).

(55) a. Zhe guo rou gei tamen san ge ren *bao shuijiao*.
this pot meat give they three CL person wrap dumpling
'The pot of meat provides for dumpling-making by them three people.'

b.*Zhe guo rou *bao* tamen san ge ren *shuijiao*.

(56) a. Zhe guo rou gei tamen san ge ren *song laoshi liwu*.
this pot meat give they three CL person give teacher gift
'The pot of meat provides for them three people to use as gifts to give to their teachers.'

b.*Zhe guo rou *song* tamen san ge ren *laoshi liwu*.

Therefore, we can again safely conclude that the inversion construction is not parallel to the *gei* 'give' construction.[20]

3.6 A Morpholexical Operation

Both accounts discussed in 3.4 and 3.5 impose an underlying bi-clausal structure on the inversion construction. However, a *vp*-stacking analysis requires evidence such as the multiple adverbial positions shown in (57b-c).

(57) a. John *–ed* *e* the ball roll down the hill.

b. John *gently* rolled the ball down the hill.
c. John rolled the ball *gently* down the hill.

A syntactically derived construction thus must exhibit some robustness in syntactic behavior and a considerable degree of productivity. The inversion verbs do not fit either criterion. As we have demonstrated, the inversion construction is highly restrictive in its syntactic behavior, prohibiting even negation or A-not-A question. Furthermore, we have also demonstrated that the verbs allowed in the

[20] We can thus also reject proposals where the inversion construction is parallel to a construction with a verb synonymous to *gei* 'give', such as *gong* 'provide' or *gonggei* 'provide'.

inversion construction, though unified under a-structure <*ag th*>, are highly unproductive. We will explore the issue of productivity further.

First of all, subject-object inversion verbs seem to be monosyllabic. All the examples cited by Ren (2005) and in other works cited therein, as well as all the examples my informants and myself can come up with, are monosyllabic verbs. To illustrate, *xiangyong* 'enjoy using, eat' is often used as a polite and formal substitute for *chi* 'eat'. And when it comes to the intake of internal medicine, either *chi* or *fuyong* can be used as the verb, again the latter being more formal. However, inversion is not allowed with the two bi-syllabic alternatives, in spite of their identical semantic content with *chi* 'eat'. This kind of phonological constraints is characteristic of morphological operations, not syntactic derivation.

Furthermore, a precise semantic characterization of the verbs allowed in the construction seems elusive. Ren (2005: 16) observes that inversion verbs must denote an action at the completion of which the theme is to be occupied or possessed. Accommodation verbs certainly fit the description, and consumption does entail possession, so this also covers consumption verbs. This narrows down the kind of <*ag th*> verbs allowed considerably and also nicely unifies verbs of accommodation and verbs of consumption. However, this is still an *over*generalization as many exceptions can be identified.

When you buy something, you end up possessing it, but *mai* 'buy' is not allowed, nor is any of the following: *shou* 'receive', *jie* 'borrow', *na* 'take', *qu* 'take', *tou* 'steal', *qiang* 'rob', *de* 'obtain', *you* 'have', *bao* 'hug, embrace', and *zhan* 'occupy'. The two verbs *chi* 'eat' and *tun* 'swallow' are fairly close in meaning, and something swallowed is certainly occupied, but *tun* allows no inversion between the swallower and the swallowee, nor do *yan* 'swallow', *yao* 'bite', *chang* 'taste', *tian* 'lick', and *jiao* 'chew'. Interestingly, while *jiao* 'chew' is not good, *ken* 'chew (on)' is acceptable, presumably because in certain contexts, *ken* actually means to chew and to eat.

(58) Zhe guo jizhua neng ken/*jiao ji ge ren?
this pot chicken-feet can chew how-many CL person
'How many people can chew this pot of chicken feet and be fed?'

While *he* 'drink' is good, *xi* 'suck', as in *xi kele* 'sucking coke', is not, both referring to a similar action of getting liquid into the mouth. However, when the same verb *xi* refers to the sucking of smoke into the mouth, as in *xi xuejia* 'smoking cigars', or the sucking of powder into the nose, as in *xi kukejian* 'sniffing cocaine', inversion is allowed.

(59) a.*Yi guan kele xi liang ge ren.
one can coke suck two CL person
'One can of coke accommodates the drinking by two people.'

b. Yi bao yan xi shi ge ren.
one pack cigarette suck ten CL person
'One pack of cigarettes accommodates the smoking by two people.'

c. Yi angsi gukejian xi san ge ren.
one ounce cocaine suck three CL person
'One ounce of cocaine accommodates the sniffing by three people.'

On the other hand, Ren's generalization also *under*generates. Take *xi* for example. The ill-formed (60b) is accounted for, because at the completion of washing, possession is not entailed. However, the well-formed (61b) is a surprise. The soap after washing is gone, not possessed or occupied.

(60) a. Liang ge ren xi zhe tiao maotan.
two CL person wash this CL blanket
'Two people wash this blanket.'

b.*Zhe tiao maotan xi liang ge ren.[21]
this CL blanket wash two CL person

(61) a. Shi ge ren xi zhe kuai feizao.
ten CL person wash this block soap
'Ten people use this block of soap to wash themselves.'

b. Zhe kuai feizao xi shi ge ren.
this block soap wash ten CL person
'A block of soap accommodates the washing by ten people.'

Likewise, the grammatical *shua 'brush'* in (62b) is unaccounted for, because at the completion of the brushing of teeth, the toothpaste in question has been consumed but not possessed as is in the case of food and beverages.

(62) a. Shi ge ren shua yi tiao yagao.
ten CL person brush one tube toothpaste
'Ten people use one tube of toothpaste for brushing (teeth).'

b. Yi tiao yagao shua shi ge ren.
one tube toothpaste brush ten CL person
'A tube of toothpaste accommodates the brushing (of teeth)
by ten people.'

The point is quite clear, then. All these idiosyncrasies in syntactic behavior and arbitrary gaps in lexical generalization all point to a morpholexical solution, not a syntactic one. A morpholexical operation is proposed in (63) to account for the additional extent role bound with the existing agent role, which explains the fact that the inverted agent, now the object, also denotes the extent of

[21] This sentence is good only in the sense of (61b), where the blanket is the thing used for washing, not the thing being washed.

the action. Following Huang (1992), the term 'composite' role will be used to refer to a role formed by two composing roles, such as *ag-ext*.

(63) Extent-addition morpholexical operation:
V_a<*x y*>*, *x* = *ag* & *y* = *th*, → V_a <*x-z y*>, *z* = *ext*

*V_a denotes an action at the completion of which *x* is to be possessed or occupied by *y*.

In this informal formulation, the verb class of V_a in (63) is also understood to have many gaps and allow certain exceptions. In terms of linking, both <*ag-ext*-SUBJ *th*-OBJ> or <*ag-ext*-OBJ *th*-SUBJ> are well-formed. Before going into the specific problem this inversion poses for linking, we should demonstrate that in the inverted sentences it is indeed subject-object inversion; in other words, the inverted theme is indeed the subject and the inverted agent the object. Examples of the subject raising construction are given in (64) to demonstrate that the preverbal NPs are indeed (raised) subjects (Tan 1991). In (64a), *shi* is a raising verb, and so is *yinggai* 'should' in (64b); thus, the only preceding NP can only be a subject in both sentences.

(64) a. Zhe zhang chuang shi shui tamen si ge ren.
this CL bed SHI sleep they four CL person
'This bed does sleep them four people.'

b. Zhe guo rou yinggai chi tamen liang ge ren.
this pot meat should eat they two CL person
'This pot of meat should feed/serve them two people.'

Furthermore, as convincingly argued for in Sybesma (1999), all postverbal bare nominals in Chinese are complements, not adjuncts. Thus, the unmarked postverbal NPs in (65) must be non-oblique objects. Again, evidence from the *ba*-construction confirms the postverbal NP's objecthood.

(65) a. Zhe zhang chuang ba tamen si ge ren shui de
this CL bed BA they four CL person sleep DE
yao-suan-bei-tong.
ache-all-over
'Sleeping in this bed has made them four people ache all over.'

b. Zhe guo rou ba tamen liang ge ren chi de xin-man-yi-zu.
this pot meat BA they two CL person eat DE fully-content
'Eating this one pot of meat made them two people fully content.'

4. A LEXICAL MAPPING ACCOUNT

The first issue that has to be resolved in linking the inversion verbs is how to incorporate the extent role into the existing thematic hierarchy. Huang (1993) proposes that extent ('domain' in his term) be one of the least prominent roles in the thematic hierarchy and the TH be revised as follows:

(66) Revised Thematic Hierarchy:
ag > *ben* > *go*/*exp* > *inst* > *pt*/*th* > *loc*/*ext*

This placement is based on several facts: the extent role is completely lack of characteristics of the agent, it is like the locative in that it also entails the terminus point of the action, and thus like the locative it is predicated of the theme. Huang further proposes that this role be assigned IC [+*o*] in Chinese to account for its objecthood. However, as pointed out in Her (2006), given that the ICs form a universal component of the mapping theory, any assignment of syntactic features by way of an IC thus must either be universal or parameterized. Language-specific assignment must be posited as (part of) a morphological operation. Since the TH is assumed to be universal, I will assume the strongest position and assume that the [+*o*] assignment for the extent role is an IC, and thus universal. The remaining problem is the precise linking mechanism of the a-structure of inversion verbs, summarized in (67) below.

(67) a. Liang ge ren chi yi bang rou.
two CL person eat one pound meat
i. 'Two people eat one pound of meat.'
<*x* *y*> (x = *ag*, y = *th*, z = *ext*)
↓ ↓
S O
people meat

ii. 'One pound of meat feeds/serves two people.'
<*x-z* *y*> (x = *ag*, y = *th*, z = *ext*)
↓ ↓
S O
people meat

b. Yi bang rou chi liang ge ren.
one pound meat eat two CL person
'One pound of meat feeds/serves two people.'
<*x-z* *y*> (x = *ag*, y = *th*, z = *ext*)
S O
people meat

For the canonical <*ag th*>in (67a(i)), the mapping is straightforward. The issue with the a-structure <*ag-ext th*> is two-fold. First, how exactly is a composite role, formed by two composing roles, linked to a single syntactic function? Second, why does inversion occur? We will demonstrate that once the first question is satisfactorily answered, the answer to the second question simply falls out.

4.1 Strict One-to-One Linking and Suppression

As stated earlier, the *θ*-Criterion requires the mapping between thematic roles and syntactic arguments be strictly one-to-one, bidirectionally. Within the LMT adopted in the paper, this condition is incorporated in the unified mapping principle, or UMP. Thus, an explanation is needed as to technically why the linking of a composite role, formed by two thematic roles, such as *ag-ext*, to a single syntactic argument, be it a grammatical function or a syntactic chain, does not violate the UMP or the *θ*-Criterion.

One solution is of course to claim that one-to-one linking is too strict and thus should be relaxed to some extent. For example, the Relativized *θ*-Criterion proposed in Carrier and Randall (1992) indeed allows two theta roles to share the same syntactic assignment.

(68) Relativized *θ*-Criterion (Carrier and Randall 1992: 180)
> An XP chain can be associated with at most one argument position in any given AS (argument structure). Each AS position must be satisfied by one and only one XP chain in the syntax. (*Parentheses added*)

This conception goes back to Chomsky (1981:335) and has also been proposed in Rappaport (1986) and Emonds (1985: chp 2). It is further adopted in some works in the Minimalist approach to syntax (e.g., Hornstein 1998, 2001).[22] However, this weakening of the *θ*-Criterion in fact does not solve our dilemma because it allows an XP to bear two roles but only if they are assigned by two different heads. In the a-structure of 'shui<*ag-ext th*>' all three roles are assigned by the only head available, i.e., *shui* 'sleep'.

It is of course preferred if strict one-to-one linking can be maintained, as it is more constrained and thus makes stronger and more general predictions.[23] This is the position taken in Her (2004), where he claims that the enforcement of strict one-to-one linking entails the suppression of one of the composing roles in the composite role; in other words, consistently, one composing role, and one only, receives syntactic assignment. Therefore, logically, the suppression of a

[22] Within this view, an object raised out of VP should be able to receive another role from v in the vp shell; however, as pointed out by Zhang (2004: 195), no one ever claims that it does. *θ*-Criterion thus needs to be further weakened to rule this out.

[23] As Her (2004: 7) points out, a relaxed *θ*-Criterion would predict that an XP may *in principle* be associated with more than two theta roles, a position that cannot be substantiated. However, setting the number of arguments to two would be an *ad hoc* stipulation. The relaxation of the *θ*-Criterion thus weakens UG.

composing role in linking a composite role is motivated as well as constrained by the one-to-one linking required by the mapping principle or the θ-Criterion.

As mentioned in section 2, role suppression, together with addition and binding, can all be part of morpholexical operations. The suppression, or absorption as it is called within GB, of the highest role, or the logical subject, in the passivization operation is universally accepted. Suppression is also required in constructions such as middle and tough. As a universally independently motivated notion, suppression as part of linking composite roles thus in no way complicates the grammar; quite the contrary.

Since suppression only blocks a role from surfacing as a syntactic *argument*, a suppressed role may still surface as a syntactic *adjunct*. For instance, in a passive sentence, the suppressed external role may still be identified with, and thus semantically linked to, a *by*-adjunct phrase, as in (69a) (Bresnan 1994: 81), or a so-called 'subject-oriented adverb', as in (69b). Even though in the middle construction neither option is allowed, as shown in (70), the fact remains that the suppressed role is still implicit. The car does not drive itself in (70a-c); nor did the treasure bury itself in (69a-c).

(69) a. The treasure was buried (by the pirates).
b. The treasure was buried (intentionally).

c. Baozang bei mai-le.
treasure BEI bury-ASP
'The treasure was buried.'

(70) a. The car drives well (*by the salesman).
b. The car drives well (*intentionally).

c. Zhe liang che hen hao-kai.[24]
This CL car very good-drive
'The car drives well.'

Thus, when a composing role in a composite role is suppressed, it is simply not relevant in relation to the linking of the composite role, which depends entirely on the unsuppressed composing role. However, the fact that a suppressed composing role is bound with the expressed composing role predicts that syntactically the suppressed role can never split away from its bound partner and surface in a separate form, be it an adjunct or a 'subject-oriented' adverb. Thus, the fact that the inverted agent in (71), now the object, does not allow any 'subject-oriented' adverbs or manner adverbs clearly indicates that the agent role is in fact suppressed and the linking of the composite role *ag-ext* is determined solely on the basis of the extent role.

(71) a. yi bang rou (**guyi*/**gaogaoxingxing-de*) chi liang ge ren.

[24] Liu (1995) argues convincingly that *hao*-V is a verb compound which requires a middle construction.

one pound meat intentionally/happily eat two CL person

b. Yi zhang zuozi (**guyi*/**gaogaoxingxing-de*) zuo si ge ren.[25]
one CL table intentionally/happily sit four CL person

This drastic reduction in volitionality, and thus agentivity, also serves as evidence that the agent is suppressed. The restrictions in this regard are thus rather similar to, and yet more principled than, those of the middle construction. The suppression entailed by strict one-to-one linking is thus well-motivated and well-constrained. Note also this concept is not tied to the LFG framework at all, and is in fact applicable in derivational as well as lexicalist frameworks.

Before applying the strict one-to-one linking and the suppression it entails to subject-object inversion verbs, let's look at another case of composite roles where one-to-one linking and suppression satisfactorily account for the inversion construction.

4.2 Resultative Inversion

A resultative compound exhibits an intriguing pattern of linking. As first comprehensively documented by Li (1995), a verb such as *zui-lei* 'chase-tired' allows up to three readings and two of the readings are clearly causative.

(72) Zhangsan zhui-lei-le Lisi.
John chase-tired-ASP Lee
a. 'John chased Lee and made Lee tired.' (causative)
b.*'Lee chased John and John got tired.'
c. 'John chased Lee and (John) got tired.' (non-causative)
d. 'Lee chased John and was made tired.' (causative)

Her (2004, to appear), dissatisfied with the violation of the θ-Criterion by Li's (1995, 1999) account, offers an alternative within LFG's LMT, where strict one-to-one linking and suppression in fact predict that resultative compounding should generate potentially four well-formed a-structures. Following Li (1995), V_{caus} refers to the causing verb and V_{res} the result verb. The resultative compounding process that merges a transitive V_{caus} and an intransitive V_{res} are summarized in (73).

[25] As correctly pointed out by an anonymous reviewer, if this sentence is acceptable, it is an external agent available from the discourse context that *guyi* 'intentionally' refers to, not *si ge ren* 'four people'.

(73) Resultative Compounding

V_{caus}<*x y*> + V_{res}<*z*> →

$V_{caus}V_{res}$ <*α β*>*, where <*α β*> = (i) <*x y-~~z~~*>

(ii) <*x*[caus] ~~*y*~~-*z*[af]>

(iii) <*x-~~z~~ y*>

(iv) <~~*x*~~-*z*[af] *y*[caus]>

(*The role containing an unsuppressed θ_z receives [af], and the other role [caus])

With suppression taken into account, linking is straightforward. As shown in (74a), the causative reading is due to (73ii). However, it is also predicted that a non-causative reading of (74a'), due to (73i), is available. However, given the presence of causativity in (74a), the absence of causativity in (74a') is overridden, logically. The reading in (74b) is impossible as neither of the two compatible a-structures, (73i) and (73ii), produces it. The reading of (74c) is due to the non-causative (73iii). The causativity and apparent inverted linking in (74d), due to (73iv), is also predictable due to a well-established principle: the causer is more prominent than the affectee (Dowty 1991). Note that suppression is indicated by a single cross-out.

(74) Zhangsan zhui-lei-le Lisi.
John chase-tired-ASP Lee

a. 'John chased Lee and made Lee tired.' (causative)
< *x*[caus] ~~*y*~~-*z*[af]> (*x* = *ag*, *z* = *th*)
S O
John Lee

a' 'John chased Lee and Lee got tired.' (non-causative)
< *x* *y*-~~*z*~~ > (*x* = *ag*, *y* = *th*)
S O
John Lee

b.*'Lee chased John and John got tired.' (non-existent)
< *x* *y*-~~*z*~~ > (*x* = *ag*, *y* = *th*)
< *x*[caus] ~~*y*~~-*z*[af]> (*x* = *ag*, *z* = *th*)
*O *S
Lee John

c. 'John chased Lee and (John) got tired.' (non-causative)
< *x*-~~*z*~~ *y* > (*x* = *ag*, *y* = *th*)
S O
John Lee

d. ‘Lee chased John and was made tired.’ (causative)

< ~~*x*~~-*z*[af]	*y*[caus]>	(*y* = *th*, *z* = *th*)
O	S	([caus] > [af])
Lee	John	

4.3 Subject-Object Inversion

We now move on to examine the linking in the subject-object inversion verbs under the same assumptions of one-to-one linking and suppression. Argument-function mapping is illustrated in detail within the LMT presented in section 2.

(75) a. Tamen liang ge ren chi yi bang rou.
they two CL person eat one pound meat
i. ‘Those two people eat one pound of meat.’

	chi < *x*	*y* >	(x = *ag*, y = *th*)
IC:		[-*r*]	
DC:			
	S/O/…	S/O	
UMP:	S	O	

ii. ‘One pound of meat feeds/serves them two people.’

	chi < *x*-~~*z*~~	*y* >	(x = *ag*, y = *th*, z = *ext*)
IC:		[-*r*]	
DC:			
	S/O/…	S/O	
UMP:	S	O	

b. Yi bang rou chi tamen liang ge ren.
one pound meat eat they two CL person
‘One pound of meat feeds/serves them two people.’

	chi < ~~*x*~~-*z*	*y* >	(x = *ag*, y = *th*, z = *ext*)
IC:	[+*o*]	[-*r*]	
DC:	[+*r*]		
	OBJ_θ	S/O	
UMP:	OBJ_θ	S	

Again, the linking of <*ag*-SUBJ *th*-OBJ> in the basic transitive reading of (75a(i)) is mundane; the real issue is why inversion occurs between (75a(ii)) and (75b). The answer virtually falls out under the assumption of strict one-to-one linking. Within the composite role *ag*-*ext*, two possibilities arise in linking. If the extent role is suppressed, the linking is again mundane, much like that of a typical transitive verb. When the agent role is suppressed, the composite role is

then syntactically assigned solely based on the extent role. An apparent inversion occurs. This inversion is only apparent because, technically, the agent role is not syntactically assigned to the object at all; it is suppressed from syntactic assignment all together. However, the semantic content associated with a suppressed role is still implicitly available. In the case of a composite role, the suppressed composing role is inherently bound with its partner and thus always finds an implicit semantic connection with it. Therefore, even though (75a(ii)) and (75b) have inverted linking, their semantic content remains the same. However, crucially, given agent's overt linking in the former but its suppression in the latter, only the former can be modified by a 'subject-oriented' adverb, as shown below.

(76) a. Tamen liang ge ren *guyi* chi yi bang rou.
they two CL person intentionally eat one pound meat
i. 'Those two people intentionally eat one pound of meat.'
ii. 'By their$_i$ intention, one pound of meat feeds/serves them two people$_i$.'

b. Yi bang rou (**guyi*) chi tamen liang ge ren.
one pound meat intentionally eat they two CL person

Finally, note that this LMT account assigns the inverted subject in (75b) to the restricted function of OBJ$_\theta$, rather than the unrestricted OBJ. There is some evidence for that. As demonstrated earlier, the inverted agent is indeed objectlike in that it also appears in the *ba*-construction. However, a typical OBJ in Chinese also allows a counterpart *bei*-construction, while an OBJ$_\theta$ does not.

(77) a. Zhangsan gei-le Lisi zhe ben shu.
John give-ASP Lee this CL book
'John gave Lee this book.'

b. Zhe ben shu bei (Zhangsan) gei-le Lisi.
this CL book BEI John give-ASP Lee
'The book was given to Lee (by John).'

c.*Lisi bei (Zhangsan) gei-le zhe ben shu.
Lee BEI John give-ASP this CL book
'Lee was given the book (by John).'

d.*Liang ge ren bei yi bang rou chi.
two CL person BEI one pound meat eat
'One pound of meat is fed to two people.' (intended meaning)

In (77b), the OBJ *zhe ben shu* 'this book' does passivize, but the indirect object in (77c), which an OBJ$_\theta$ restricted to the theme role, does not. Likewise, the fact that the inverted agent does not passivize, as shown in (77d), would

suggest that it is more likely an OBJ_θ, rather than a full-fledged OBJ. Also, a typical OBJ allows extraction, while an indirect or secondary object does not, as shown in (78) and (79) respectively.

(78) a. Zhe zhong rou, Zhangsan chi.
this kind meat John eat
'This kind of meat, John eats.'

b. Zhangsan chi de zhe zhong rou.
John eat REL this kind meat
'The kind of meat that John eats.'

(79) a.*Lisi, Zhangsan gei-le zhe ben shu.
Lee John give-ASP this CL book
'Lee, John gave this book to.'

b.*Zhangsan gei-le zhe ben shu de ren.
John give-ASP this CL book REL person
'The person that John gave this book to.'

The behavior of the inverted subject in topicalization and relativization, as in (80), is similar to that of an OBJ_θ in (79), not OBJ in (78). Its status as an OBJ_θ thus seems reasonable.

(80) a.*Si ge ren, zhe zhang chuang shui.
four CL person this CL bed sleep
'*Four people, the bed sleeps.'

b.*Zhe zhang chuang shui de si ge ren.
this CL bed sleep REL four CL person
'*The four people the bed sleeps.'

5. DISCUSSION

The analysis of the subject-object inversion construction presented above consists of three components. The first component is data-driven and posits that the inversion verb takes on an additional extent role, which binds with the existing agent role in a-structure. The second component is also data-driven; we demonstrated the extremely restricted range of syntactic behavior this construction allows and the low degree of productivity in the lexical class of the inversion verbs, both strongly suggesting a morpholexical solution and not a syntactic one. The third component argues that strict one-to-one linking requires the suppression of a composing role in a composite role. The three components

are separate and each is independently motivated. The linking facts fall out when the three components are out together.

However, this inversion in question is only apparent because, technically, the more prominent agent role is not syntactically assigned at all; it is suppressed from syntactic assignment. Thus, the subject-object inversion described in this paper is no more an inversion than the passive construction, where the less prominent theme likewise surfaces as the syntactic subject while the agent is suppressed for linking and may or may not appear by way of the adjunct *by*-phrase. An explanatory theory should however be able to account for not only the grammaticality of the inverted linking but also the fact that it is highly marked. The LMT account does offer a potentially promising foundation for a markedness theory in linking.

Based on the concept that grammatical variation is invariably due to some form of grammatical competition (Hsieh 1989, 1991, 2005; Her 1997), Her (to appear) put forward a markedness theory in LMT. Recall that argument roles and argument functions are ranked on their respective prominence scale. The mapping principle maps each role, in a descending order in effect, to the most prominent function possible, in effect also in a descending order. The unmarked linking thus aligns the two prominence scales. A 'skewed' linking is marked and produces a more opaque reading. It is further assumed that an independent role is unmarked, a composite role is not, and that an expressed role is unmarked, a suppressed role is not. More importantly, an innovative concept of *upset* was introduced: an upset occurs when the more prominent item loses out in a competition for unmarkedness. Upsets create opacity. We now re-examine the LMT account offered in (75), summarized in (81), in light of this markedness theory.

(81) Tamen liang ge ren chi yi bang rou.
they two CL person eat one pound meat

a. 'Those two people eat one pound of meat.'
chi < *x* *y* > (x = *ag*, y = *th*)
S O

b. 'One pound of meat feeds/serves them two people.'
chi < *x-z* *y* > (x = *ag*, y = *th*, z = *ext*)
S O

(82) Yi bang rou chi tamen liang ge ren.
one pound meat eat they two CL person

'One pound of meat feeds/serves them two people.'
chi < ~~*x*~~*-z* *y* > (x = *ag*, y = *th*, z = *ext*)
OBJ_{θ} S

Between (81a) and (81b), the latter has a composite role and is thus more marked. Note also that, in (81b), an upset occurs in the competition for independence, or unmarkedness, between agent and theme. This makes the contrast (81b) and the apparent inversion in (82) more interesting. Both contain a (marked) composite role and an upset, but crucially, a further upset is identified in the more opaque (82): the more prominent agent is suppressed and thus loses out to extent in their competition for syntactic assignment. A markedness scale thus obtains among these three readings, shown in (83).

(83) a. <*ag th*> (transparent, *no marked features and no upsets*)
S O

b. <*ag-~~ext~~ th*> (semi-opaque, *one marked feature and one upset*)
S O

c. <*~~ag~~-ext th*> (opaque, *one marked feature and two upsets*)
O_θ S

The reading associated with (83a) is by far the most transparent, as predicted by its fully aligned linking with no marked features, while the opacity of (83c) is also satisfactorily accounted for by the marked feature of a composite role and two upsets.

6. CONCLUSION

Unlike other perhaps more genuine agentive objects reported in certain languages, e.g., Navajo (Hale 1973), Norwegian (Lødrup 1999), and Tagalog (Kroeger 1993), the inversion discussed in this paper involves an *agent-extent* composite role, rather than a straightforward agent role. Under the simplest and also the strictest interpretation of the one-to-one linking imposed by the argument-function mapping principle (or the θ-criterion), a composite role, formed by two composing roles, receives syntactic assignment via one composing role only; the second composing role is necessarily suppressed. Inversion occurs when the extent role wins out in linking and thus forces the suppression of the agent role. Thus, this subject-object inversion is only apparent, as technically the agent role is not syntactically realized at all. The account is formalized in the linking theory within LFG, known as the lexical mapping theory. This lexical mapping account also facilitates a natural explanation of markedness among the competing syntactic structures. The inverted structure is marked because the most prominent agent role not only loses its independence, it is also suppressed to allow linking by the least prominent extent role.

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..agents of two-argument verbs are always subjects.. (Levin and Rappaport Hovav 2005: 24)

Levin, Beth and Rappaport Hovav, Malka, 2005. *Argument realization*, Cambridge University Press.

θ-Criterion: the footnote (Chomsky 1981: 139; fn 14)

> Note that the θ-Criterion, while not unnatural, is not obviously correct. It is rejected in Jackendoff's pioneering work on the topic (Jackendoff (1972)). He argues that, e.g., in "John deliberately rolled down the hill" *John* has a dual θ-role, as agent and as theme. I will assume that such cases should be dealt with by modification of θ-role assignment rather than by modification of the θ-Criterion, though it is not obvious that this decision is the right one.

Adjunct θ-role, not subject to θ-Criterion (Zubizarreta 1982, Roberts 1985)

Zubizarreta, Maria Louisa, 1982, *On the relationship of the lexicon to syntax*. PhD dissertation, MIT.

Roberts, Ian, 1985, Agreement parameters and the development of English auxiliaries. *Natural Language and Linguistic Theory* 3.1: 21-58.

"Weak" θ-Criterion:

> Each argument bears a ~~one-and-only-one~~ θ-role, and each θ-role is assigned to one and only one argument.

Williams, Edwin, 1985, PRO and subject of NP. *Natural Language and Linguistic Theory* 3.3: 297-315.

And in fact, the following exhibits double associations:

(43) John gave Mary a kick.

John is associated with the Actor role of *kick*, and Mary is associated with the Patient role of *kick*. There is no analogue of this double association with control structures. Furthermore, the existence of double association cases is further evidence that PRO in NP can give only a partial account of the facts.

Implicit arguments are not the mysterious shadowy presences they are sometimes made out to be. They are really nothing more than the argument slots in the argument structure of predicates, and they must be visible to syntax for the purpose of theta-role assignment in any case, since theta role assignment is nothing more than the linking of an argument slot in the argument structure with a syntactic position. A 'weak' theta criterion, which does not require that every argument slot be so linked, is all that is needed to give implicit arguments, since these are nothing more than unlinked argument slots.

Because the theta roles must be available for syntax anyway for purposes of theta role assignment, no substantial part of the lexicalist hypothesis is given up by the implicit arguments theory outlined in this paper. The argument structure of the lexical item is a complex property of a lexical item that sentence grammar rules have access to. We have given a narrow characterization of the rules that

have access to the argument structure: the rules whose domain of application is the first projection of the predicate (see section 7); this includes theta role assignment, and applications of the binding theory that have implicit arguments as antecedents.