CHINESE INVERSION CONSTRUCTIONS WITHIN A SIMPLIFIED LMT[*]

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ABSTRACT

In this paper, four inversion constructions in Mandarin Chinese, including locative inversion, dative shift, resultative inversion, and domain inversion, are accounted for within a simplified lexical mapping theory (LMT). The simplified LMT differs from the conventional LMT in several respects. First, it allows a-structure roles to be *un*specified, *under*specified, or *fully* specified for syntactic function assignment. Second, a single unified mapping principle replaces previous multiple mapping principles and well-formedness conditions. Inversion may be induced by a language-specific morphosyntactic operation that affects only the syntactic assignment of argument roles to grammatical functions, as in locative inversion and dative shift. Or, it may be the consequence of a morpholexical operation that creates a composite role and thus also the competition for syntactic function assignment between its two composing roles, as in resultative inversion and domain inversion.

1. INTRODUCTION

This paper examines four inversion constructions in Mandarin Chinese: locative inversion, dative shift, resultative inversion, and domain inversion, within a simplified lexical mapping theory (LMT) of Lexical-Functional Grammar (LFG). Section 2 first presents the overall structure and assumptions of LMT and compares two versions of the theory: one proposed in Bresnan and Zaenen (1990) and refined in Bresnan (2001), the other based on Her (1997, 1998) and further revised. Motivations for the revisions proposed will be discussed and the revised theory then serves as the theoretical framework for the analysis of the four inversion constructions in Mandarin Chinese: locative inversion in Section 3, dative shift in Section 4, resultative inversion

in Section 5, and domain inversion in Section 6. Section 7 discusses the implications of the two mechanisms that may induce inversion: construction-specific classification of argument roles, as in locative inversion and dative shift, and the competition for syntactic function assignment between two composing roles in a composite role, as in resultative inversion and domain inversion. Section 8 provides a brief review of the simplified LMT proposed in the paper and concludes the paper.

2. LEXICAL MAPPING THEORY

LFG is well-known for its design of universal grammar where parallel structures, such as c-(onstituent) structure, f-(unctional) structure, and a-(rgument) structure, simultaneously co-describe the grammatical information of a linguistic expression. The correspondence between the c-structure and the f-structure is subject to universal constraints (e.g., Bresnan 2001, Chapter 6); likewise, the mapping between the a-structure and the f-structure has well-motivated limits. The lexical mapping theory is the part of LFG that constrains the correspondence between argument roles and grammatical functions (e.g., Bresnan 2001, Chapter 14).

The pioneering work of Levin (1987) started the development of LMT, which rejected the earlier stipulated function-changing rules and explored principled accounts. Bresnan and Kanerva (1989) first laid out a more comprehensive framework. The overall structure of LMT and the fundamental spirit of maintaining a set of revealing universal constraints have remained stable in the past decade; there are however several versions of the lexical mapping theory in the LFG literature, e.g., Bresnan (1989), Huang (1993), Butt, Dalrymple, and Frank (1997), Her (1998), Ackerman and Moore (2001), and Bresnan (2001). A review of all, or even most, of the existing versions is clearly outside the scope of this paper; I will, however, briefly compare the LMT in the work by Bresnan (2001), which is based on Bresnan and Zaenen (1990), and the one I propose here, which is based on Her (1998), which in turn is closer, in spirit and in overall design, to the LMT proposed in Zaenen (1987), Bresnan and Kanerva (1989), Ackerman (1992), and Huang (1993). The LMT presented in the LFG textbook by Yehuda Falk (2001) also closely resembles LMT in Bresnan (2001).

In the first two subsections below, I will first present the theory of a-structure and the mapping from a-structure to syntactic functions as they are generally conceived in the literature in general and in Bresnan (2001) in particular. I will then present a simplified LMT in the subsection of 2.3 and briefly discuss the motivations of the revisions proposed.

2.1 The Theory of A-Structure

The argument structure, or a-structure, of a predicator consists of its argument roles and their syntactic features. LMT assumes a universal hierarchy among argument roles in terms of their relative prominence.

(1) Thematic Hierarchy:
  agent > beneficiary > experiencer/goal > instrument > patient/theme > locative

The most prominent role in an a-structure, the logical subject, is designated $\hat{\Theta}$. In the following examples of the a-structures of 'pound' in (2) and 'put' in (3), $x =$ agent $= \hat{\Theta}$, $y =$ theme, and $z =$ locative. Note also that roles in a-structure are strictly ordered from left to right according to the thematic hierarchy (1).

(2) *pound* $<$ x y $>$
(3) *put* $<$ x y z $>$

Argument roles, naturally, must be mapped to argument functions, i.e., grammatical functions that are subcategorized for by a predicator. LFG distinguishes argument functions (shown in bold) from non-argument functions (in italics):

(4) *TOP* *FOC* **SUBJ** **OBJ** **OBJ**$_\theta$ **OBL**$_\theta$ **XCOMP** **COMP** *ADJUNCTS*

Argument functions are further decomposed by two binary features: [r] (whether the function is restricted to having an argument role) and [o] (whether the function is objective).

(5) Feature Decomposition of Argument Functions:

	$-r$	$+r$
$-o$	SUBJ	OBL$_\theta$
$+o$	OBJ	OBJ$_\theta$

$[\pm r]$ (un)restricted
$[\pm o]$ (un)objective

With these feature specifications, argument functions thus also form natural classes, as shown in (5), and each function is composed of two features. Furthermore, assuming minus features to be the unmarked value, a partial ordering of markedness hierarchy is also obtained.

(6) Partial Ordering of Markedness Hierarchy of Argument Functions:
$$\text{SUBJ} \quad > \quad \text{OBJ/OBL}_\theta \quad > \quad \text{OBJ}_\theta$$

With only a few exceptions (e.g., Butt, Dalrymple, and Frank 1997), most of the works in LMT accept these assumptions above, and it is also the case in the present work I. Bresnan (2001) further assumes that the underlying lexical semantics of the argument roles determines their choice of syntactic features and proposes the following universal feature assignment.

(7) Semantic Classification of A-Structure Roles for Function:
    a. patientlike roles: θ
                              $[-r]$

    b. secondary patientlike roles: θ
                              $[+o]$

    c. other semantic roles: θ
                              $[-o]$

The classification of secondary patientlike roles as $[+o]$ is in fact due to a restriction that only certain languages allow all patientlike roles to be $[-r]$ (Alsina and Mchombo 1993). English has been claimed to be an asymmetrical language, where the secondary patientlike role is reassigned $[+o]$ (e.g., Bresnan 2001:310, Falk 2001:114); however, there are also symmetrical languages like Chichaga, which allow

all patientlike roles to be [-*r*] (Alsina and Mchombo 1993). This asymmetrical object parameter is stated in (8).

(8) Asymmetrical Object Parameter (AOP):

$$* \quad \theta \qquad \theta \quad => \quad \theta \qquad \theta$$
$$\quad \text{[-}r\text{]} \quad \text{[-}\boldsymbol{r}\text{]} \qquad \text{[-}r\text{]} \quad \text{[+}\boldsymbol{o}\text{]}$$

Cross-language variation in the syntactic assignment of a-structure roles is thus subject to the above universal constraints and parameters. The agent role, being a non-patientlike role, is canonically not encoded as OBJ and is thus classified as [-*o*] by (7c), while patientlike roles are canonically associated with either SUBJ or OBJ and classified as [-*r*] (Bresnan and Kanerva 1989). Secondary patientlike roles, restricted by the feature [+*o*], can be mapped to object functions only, i.e., OBJ or OBJ$_\theta$. All other roles, like agent, are also classified as [-*o*] by (7c). Notice that under the assumptions in (7), every role in an a-structure is underspecified and assigned *exactly* one feature for syntactic function assignment, if my understanding is correct that the LMT as put forth in Bresnan (2001) allows no morpholexical process to add features to a-structure.

Bresnan (2001:310-11) does allow language-specific morpholexical operations to alter the "lexical stock" of an a-structure, as do all LMT researchers, by adding, suppressing, or binding thematic roles (e.g., Bresnan and Kanerva l989). For example, passivization suppresses the syntactic assignment of $\hat{\theta}$, the most prominent role. In fact, having the passive operation as a lexical process, and thus removing it from syntax, was a cornerstone for the development of LFG and sets it apart from transformational theories (e.g., Bresnan 2001, Chapter 3).[1]

(9) Passive: $<\theta\ldots>$
$$\downarrow$$
$$\varnothing$$

2.2 Mapping A-Structure to Syntactic Functions

Subject to certain universal constraints, each argument role is freely mapped onto any and all syntactic functions that have compatible features. Bresnan (2001:311) proposes the mapping principles in (10).

(10) Mapping Principles:
  a. Subject roles:
    (i) $\hat{\theta}$ is mapped onto SUBJ when initial in the a-structure;
        [-o]
        otherwise:
    (ii) θ is mapped onto SUBJ.
        [-r]
  b. Other roles are mapped onto the lowest compatible function in the partial ordering (6).

Note that given the assumption that each role is underspecified with one feature, the syntactic assignment of a role cannot be deterministic in that a role can be mapped to a natural class of two compatible functions. The two mapping principles further narrow down the choices of functions to just one. The mapping principle for the so-called subject roles, in effect, stipulates a deterministic mapping for an initial $\hat{\theta}$[-o] role to SUBJ, and if such a role is not in the a-structure, then any role with [-r] is mapped to SUBJ. The two principles (i) and (ii) in (10a) are therefore strictly prioritized in that (ii) obtains only when (i) does not. Also, an artificial dichotomy is created: SUBJ mapping is stipulated while non-SUBJ mapping follows a more general constraint. Similarly, an asymmetry between SUBJ and non-SUBJ roles exists due to the observation that while mapping principle (10a) maps a role to the *highest*, or the most unmarked, compatible function, i.e., SUBJ, Principle (10b) does exactly the opposite and maps non-subject roles in an a-structure to the *lowest*, or the most marked, compatible function. Mapping is thus inconsistent in terms of the markedness hierarchy of functions.

In addition to mapping principles, two more conditions are needed to further constrain the non-deterministic syntactic assignment of a-structure roles to functions: function-argument biuniqueness and the subject condition.

(11) Function-Argument Biuniqueness:

Each a-structure role must be associated with a unique function, and conversely.

(12) The Subject Condition:

Every predicator must have a subject.

The function-argument biuniqueness condition ensures a strictly one-to-one mapping relation between roles and functions. Computationally, it forces a deterministic assignment when the feature of a role is compatible with two functions and one of the two is already mapped to another role. The subject condition serves the obvious purpose to ensure that one role in a-structure must be mapped to SUBJ. Again, this condition forces a deterministic choice when a role's syntactic assignment is compatible with SUBJ and some other function and all other roles in the a-structure, if any, are incompatible with SUBJ. However, this condition that stipulates SUBJ is required by every predicator is not without controversy and may need to be stipulated as a parameter (Bresnan 2001:321, fn 9).

2.3 A Simplified LMT

The LMT adopted in this paper differs from the one in Bresnan (2001) in several respects. First of all, I propose a simpler initial or intrinsic classification of argument structure roles for syntactic function assignment, where non-patientlike roles are all unspecified.

(13) (Simplified) Semantic Classification of A-Structure Roles for Function (SC):
   a. patient/theme: $\theta_{[-r]}$

   b. secondary patient/theme: $\theta_{[+o]}$

Again, only AOP languages classify a secondary patient/theme in an a-structure as [+o]; in symmetrical object languages, all patient/theme roles are [-r]. Exactly what patient/theme role is secondary is parameterized between patient and

theme; for example, in English, it is the non-patient theme, while it is the non-theme patient in Romance languages (e.g., Falk 2001:115). As we will see in the LMT analysis of resultative compounds in Section 5, Mandarin Chinese, again similar to English, has theme as secondary when patient is also present in the a-structure.

Note that the conventional LMT classifies all non-patient/theme roles as [-o], as in (7c). This classification, universally barring non-patient/theme roles from mapping to OBJ, is inconsistent with the unrestricted ([-r]) nature of OBJ. In the simplified LMT, non-patient/theme roles are unspecified; this allows the (empirical) advantage of mapping such roles to the entire range of argument functions, including OBJ. For example, locative in Chinese may be linked to SUBJ, OBL$_\theta$, as well as OBJ$_\theta$ (cf., Huang and Her 1998), and the English passive goal also allows the same range of functions (cf., Her 1999).

Furthermore, in addition to morpholexical processes, the simplified LMT also allows morphosyntactic operations, following Ackerman (1992:56), where the two types of operations are characterized as follows:

…Morpholexical (Operations), affect the lexical semantics of predicates by altering the semantic properties associated with predicates…

…Morphosyntactic (Operations), assign features supplemental to those supplied by IC assignment: these operations can affect the final GF assignments to arguments but cannot affect the lexical semantics…

Thus, morphosyntactic operations, but not morpholexical operations, are subject to the general monotonicity condition in grammar, that information can only be added but cannot be deleted or changed (e.g., Falk 2001:9). In this paper I will propose two morpholexical operations, resultative inversion and domain inversion, and two morphosyntactic operations, locative inversion and dative shift, for Mandarin. I also propose a default morphosyntactic operation that assigns the default feature [+r] to all roles in an a-structure other than the logical subject, $\hat{\Theta}$.

(14) Default Morphosyntactic Operation (DM):

$\theta \qquad \theta \neq \hat{\Theta}$

$\downarrow$

$[+r]$

This default operation, together with the classification of a-structure roles (13), captures the generalization that in Chinese the logical subject, $\hat{\Theta}$, is canonically mapped to an unrestricted function, i.e., SUBJ or OBJ, and so is a patient/theme role, but the other roles alternate between OBL_θ and OBJ_θ, the two $[+r]$ functions.

Most significantly, I propose a unified mapping principle. Dissatisfied with the strict ordering of the two mapping principles (10a)(i) and (ii) for subject roles, the SUBJ versus non-SUBJ mapping asymmetries, and the stipulations of the subject mapping principles and the subject condition, Her (1998) sought to consolidate all four constraints, i.e., the two mapping principles and the two well-formedness conditions, into a unified mapping principle (UMP), one that is consistent for all syntactic assignments, SUBJ and non-SUBJ roles alike, and thematic and non-thematic roles alike.

(15) The Unified Mapping Principle (UMP):

Each argument role in an a-structure with no higher role available[*]

is mapped onto the highest compatible function available.

(*A role is *available* iff it is not linked to a function, and conversely.)

A higher role in an a-structure is always the one on the left, and therefore also a role higher on the thematic hierarchy (except when it is an initial non-thematic argument, such as a raised subject). The highest compatible function is of course the least marked compatible function on the markedness hierarchy of argument functions (6). Thus, a less marked compatible function is consistently preferred in lexical mapping for the syntactic function assignment of all roles. The spirit of the subject condition is thus maintained, though less rigidly, for SUBJ is the least marked function of all.

Admittedly, the UMP has the actual effect of a rigid left-to-right mapping sequence among a-structure roles by forcing the leftmost role to be mapped first and then the next and so on, with less marked functions preferred. Note however that this apparent ordering is only the (desired) 'side effect'; the exact formulation of this constraint allows mapping to apply freely among a-structure roles without any ordering, in other words, *declaratively*.

To summarize, the LMT I adopt posits simpler classification of argument roles and leaves all non-patient/theme roles unspecified; however, it does allow feature-adding morphosyntactic processes. A single unified mapping principle comprehensively and consistently constrains the syntactic assignment of all roles to all functions. In the following four sections, I will illustrate how four inversion constructions in Mandarin Chinese can be accounted for within this simplified LMT.

3. LOCATIVE INVERSION

Locative inversion verbs, in English and Chinese alike, alternate between an inverted form, as in (16b), and a canonical form, as in (16a).

(16)a. *Yuehan zuo zai tai-shang.*
      John   sit at stage-top
      'John is sitting on the stage.'

   b. *Tai-shang zuo zhe Yuehan.*
      stage-top sit   ASP John
      'On the stage was sitting John.'

A locative inversion verb requires a theme and a locative. To account for this relation-changing inversion construction, Huang and Her (1998) proposed a morphosyntactic operation, which is revised as (17) below. The rule states that in an a-structure with theme and locative, the two roles are assigned [$+o$] and [$-r$] respectively; the only additional role allowed is an optional $\hat{\Theta}$, which however must be suppressed (by passivization). (18) demonstrates how this operation in the simplified LMT accounts for Mandarin locative inversions.

(17) Locative Inversion (LI) (Mandarin, English, Chichewa…):

$$< (\theta) \quad x \quad y > \quad x = th, y = loc$$
$$\varnothing \quad \downarrow \quad \downarrow$$
$$[+o] \quad [-r]$$

(18)a. *Yuehan zuo zai tai-shang.*
    'John is sitting on the stage.'

	zuo/sit <	*x*	*y*	*>*
SC:		$[-r]$		
DM:			$[+r]$	

		S/O	OBL$_\theta$/OBJ$_\theta$	
UMP:		SUBJ	OBL$_\theta$	

b. *Tai-shang zuo zhe Yuehan.*
    'On the stage was sitting John.'

	zuo/sit <	*x*	*y*	*>*
SC:		$[-r]$		
LI:		**$[+o]$**	**$[-r]$**	
DM:		------------------------		
		OBJ	S/O	
UMP:		OBJ	SUBJ	

Note that Chinese locative inversion allows an NP locative subject, while in English the inverted locative must be a PP. The LMT analysis proposed above is therefore quite straightforward for Chinese. It has also been noted that passivized verbs with the same resulting a-structure *<th loc>* also invert, in Chinese and English alike. Passivization therefore may interact with locative inversion. I will adopt, for Chinese, and for the time being for English as well, the standard LMT formulation of passivization, stated in (9), that the logical subject is suppressed. In (19a), the mapping of the canonical structure is illustrated; (19b) shows the passivized grammatical relations, while in (19c) both passivization and locative inversion apply.

(19)a. *Yuehan xie le   zi   zai   qiang-shang.*
    John write ASP character at   wall-top
    'John wrote a character on the wall.'

$$xie/write < \quad x \qquad y \qquad\quad z \quad > x = ag, y = th, z = loc$$

SC: [-*r*]

DM   [+*r*]

              S/O/ O$_\theta$/OBL$_\theta$ S/O   OBL$_\theta$/OBJ$_\theta$

UMP   SUBJ   OBJ   OBL$_\theta$

b. *Zi (bei) xie zai qiang-shang.*
  'A character was written on the wall.'

$$xie/write < \quad x \qquad y \qquad\quad z \quad >$$

SC: [-*r*]

Passive: ∅

DM: [+*r*]

                   S/O   OBL$_\theta$/OBJ$_\theta$

UMP: SUBJ   OBL$_\theta$

c. *Qiang-shang (bei) xie le zi.*
  'On the wall was written a character.'

$$xie/write < \quad x \qquad y \qquad\quad z \quad >$$

SC: [-*r*]

Passive: ∅   y = th, z = loc

LI: [+*o*]   [-*r*]

DM: -----------------------------------

                        OBJ   O/S

UMP: OBJ   SUBJ

4. DATIVE SHIFT

  Similar to locative inversion verbs, dative verbs allow a canonical construction (20a) and also a derived structure where the two internal arguments are inverted, each bearing a different grammatical relation to the verb (20b).

(20)a. *Lisi song le   yi   duo hua   gei ta.*
   Lee give ASP one CLS flower to she
   'Lee gave a flower to her.'

 b. *Lisi song le   ta   yi   duo hua.*
   Lee give ASP she one CLS flower
   'Lee gave her a flower.'

  Her (1999) proposed a morphosyntactic operation, similar to that of locative inversion, which induces changes in the syntactic assignment of a-structure roles, as shown in (21); detailed mapping between roles and functions is illustrated in (22).

(21) Dative Shift (Mandarin, English…):

$$< x \qquad y \qquad z> \quad x = ag, y = go, z = th$$
$$\downarrow$$
$$[+o]$$

(22)a. *Lisi song le yi duo hua gei ta.*
  'Lee gave a flower to her.'

	song/give <	x	y	z	>
SC's				[-r]	
DM's			[+r]		

		S/O/ O$_\theta$/OBL$_\theta$	OBL$_\theta$/OBJ$_\theta$	S/O	
UMP		SUBJ	OBL$_\theta$	OBJ	

b. *Lisi song le ta yi duo hua.*
  'Lee gave her a flower.'

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            song/give <   x          y         z   >
   SC's                                        [-r]
   Dative                          [+o]                    (Mandarin and English)
   DM's                            [+r]
            -------------------------------------------------
            S/O/ Oθ/OBLθ   OBJθ      S/O
   UMP          SUBJ       OBJθ      OBJ
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Like locative inversion, dative shift also interacts with passivization; however, in passive constructions, dative verbs, or more precisely verbs of a-structure *<ag go th>*, display interesting variance. Chinese forbids the passivization of goal, while both goal and theme are passivizable in English, as shown in (23).

(23)a. *Hua (bei) song le gei ta.*
  a' The flower was given to her.

  b. **Ta (bei) song le yi duo hua.*
  b' She was given a flower.

  c. *Hua (bei) song le ta.*
  c' The flower was given her.

To account for passivized dative and the difference in the two languages, the passive operation is revised as (24) and (25) below. In Chinese, the goal role of a passive verb is unspecified and is assigned [+r] by the default operation. It is thus never mapped onto SUBJ. In English, however, goal is *optionally* assigned [-r] by passive and thus may still allow default [+r] if the [-r] option is not taken. The account for sentences in (23) is given in (26).

(24) Passive (Mandarin):

$$<\theta...>$$
$$\downarrow$$
$$\varnothing$$

(25) Passive (English):

$$<\theta_i \qquad (\theta_j)...> \quad \theta_j = goal$$
$$\downarrow \qquad \downarrow$$
$$\varnothing \qquad ([-r])$$

(26)a. *Hua (bei) song le gei ta.*

a' The flower was given to her.

	gei/give < x	*y*	*z >*	
SC			[-r]	
Passive:		Ø		**(Mandarin and English)**
DM		[+r]		

		OBL$_\theta$ /OBJ$_\theta$	S/O	
UMP		OBL$_\theta$	SUBJ	

b. **Ta (bei) song le yi duo hua.*

b' She was given a flower

	give < x	*y*	*z >*	
SC			[-r]	
Passive:	Ø	[-r]		**(English only)**
DM				

		S/O	S/O	
UMP		SUBJ	OBJ	

c. *Hua (bei) song le ta.*

c' The flower was given her.

	gei/give < x	*y*	*z >*	
SC			[*-r*]	
Passive:	Ø			**(Mandarin and English)**
Dative		[*+o*]		**(Mandarin and English)**
DM		[*+r*]		

		OBJ$_\theta$	S/O	
UMP		OBJ$_\theta$	SUBJ	

c' The flower was given her.

	give < x	*y*	*z >*	
SC			[*-r*]	
Passive:	Ø	[*-r*]		**(English only)**
Dative		[*+o*]		
DM		--------------------------		
		OBJ	S/O	
UMP		OBJ	SUBJ	

In Mandarin, the goal role does not get [*-r*] from passivization and thus does not map to SUBJ; this accounts for the ungrammatical (26b). Similarly, the optional assignment of [*-r*] to goal in English passivization accounts for the grammaticality of passivized goal subject in English, as in (26b'). Interestingly, this account also offers a possible explanation for the fact that the passivized theme subject with a non-oblique goal is an unmarked construction in Mandarin, as in (26c), but a highly marked construction in English, as in (26c'). Note that in Chinese the non-oblique goal is mapped to OBJ$_\theta$ only; however, this non-oblique goal is ambiguous between OBJ and OBJ$_\theta$ in English due to the optional assignment of [*-r*] to goal.

5. RESULTATIVE INVERSION

We now move on to another type of inversion, where morpholexical operations actually affect the roles in the thematic structure. A resultative compound is formed by two verbs, where the first verb denotes the causing event and the second indicates the resulting state or event. While the first verb, or V_{caus}, may be either transitive, e.g., *zhui* 'chase' and *sha* 'kill', or intransitive, e.g., *pao* 'run' and *ku* 'cry', the second verb, or V_{res}, is typically intransitive, e.g., *lei* 'tired', *si* 'dead', and *shi* 'wet'. The argument structure of a resultative compound inherits roles from both of the composing verbs; therefore, as shown in (27) to (29), *zhui-lei* inherits $\langle x\ y \rangle$ from V_{caus} *zhui*, $\langle z \rangle$ from V_{res} *lei* and consequently ends up with two possible argument structures: $\langle x\ y\text{-}z \rangle$ (29a), where the single role required by *lei* is bound with the patient role of *zhui* and forms a composite role, or $\langle x\text{-}z\ y \rangle$ (29b), where it binds with the agent of V_{caus}.

(27) *zhui* 'chase $\langle x\ y \rangle$' $x = ag, y = pt$
(28) *lei* 'tired $\langle z \rangle$' $z = th$
(29) *zhui-lei* $\langle x\ y \rangle + \langle \underline{z} \rangle$ → a. $\langle x\ \ \ y\text{-}\underline{z} \rangle$ b. $\langle x\text{-}\underline{z}\ \ \ y \rangle$

Both resulting thematic structures are valid for *zhui-lei*; quite interestingly, however, not two, but three, sets of syntactic function assignment are available from the two thematic structures.

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

   a. 'John chased Lee and Lee got tired.'
           $\langle x\ \ \ \ \ \ y\text{-}\underline{z} \rangle$ $x = ag, y = pt, z = th$
            SUBJ   OBJ
            John   Lee

b. 'John chased Lee and (John) got tired.'

$$< x\text{-}\underline{z} \qquad y >$$

SUBJ   OBJ

John   Lee

c. *'Lee chased John and John got tired.'

$$< x \qquad y\text{-}\underline{z} >$$

OBJ   SUBJ

Lee   John

d. 'Lee chased John and (Lee) got tired.'

$$< x\text{-}\underline{z} \qquad y >$$

OBJ   SUBJ

Lee   John

Still only one grammatical function is linked to the composite role formed by two roles, one from each of the two participating events (also c.f., Huang 1992).[2] Within the a-structure of $<x\ y\text{-}\underline{z}>$ only one reading (30a) is allowed; in other words, syntactic assignment of argument roles produces only one syntactic structure: x to SUBJ and $y\text{-}\underline{z}$ to OBJ. The other thematic structure, $<x\text{-}\underline{z}\ y>$ allows two lexical forms: (30b), where $x\text{-}\underline{z}$ maps to SUBJ and y maps to OBJ, as well as (30d), where the mappings of subject and object are inverted, with $x\text{-}\underline{z}$ mapped to OBJ and y to SUBJ. The syntactic function assignments in (30b) and (30d) are opposite. The question is, of course, why inversion in (30c) is ill-formed, and yet inversion in (30d) is well-formed.

We now take a closer look at how LMT predicts the syntactic function assignment from each of the two thematic structures. We will start with $<x\ y\text{-}\underline{z}>$. If we allow the unified mapping principle (or LFG's previous Argument-Function Biuniqueness Condition or the *Theta*-Criterion in the Government-and Binding Theory) only a narrow interpretation in that a grammatical function can only be linked to a single role, then obviously in a composite role one of the two composing roles must be suppressed (or absorbed) in syntactic assignment, much like the logical

subject in passives. Note that the dominant composing role for syntactic function assignment of a composite role is indicated by a bold character, e.g., **y**-z.

(31) a. Role-function mapping of (30a)

    'John chased Lee and Lee got tired.'

$$< \boldsymbol{x} \qquad \boldsymbol{y}\text{-}\underline{z} > \qquad x = ag, y = pt, z = th$$

SC	[-*r*]-∅	
DM		

S/O/...	S/O	
UMP SUBJ	OBJ	
John	Lee	

$$< \boldsymbol{x} \qquad y\text{-}\underline{\boldsymbol{z}} > \qquad x = ag, y = pt, z = th$$

SC	∅-[-*r*]	
DM		

S/O/...	S/O	
UMP SUBJ	OBJ	
John	Lee	

    b. Role-function mapping of (30c)

    *'Lee chased John and John got tired.'

$$< x \qquad y\text{-}\underline{z} > \qquad x = ag, y = pt, z = th$$

*OBJ	*SUBJ	
Lee	John	

Note that within the composite role *y-z*, or *pt-th*, the two composing roles share exactly the same feature classification, [-*r*], and therefore there is no competition. Given *<x y-z>* then, LMT predicts correctly that (30a) is well-formed, where *x* maps to SUBJ, *y-z* to OBJ. LMT also predicts that (30a) has the only possible syntactic function assignment and thus completely rules out (30c). Thus, two a-structures are allowed by the thematic structure of *<x y-z>* and they conspire to

produce the same functional assignment. The second thematic structure $<x\text{-}\underline{z}\ y>$, on the other hand, similarly allows two a-structures that produce different results. We first look at the 'uninverted' reading (30b).

    c. Role-function mapping of (30b)

      'John chased Lee and (John) got tired.'

```
        < x-z          y >   x = ag, y = pt, z = th
    SC      -∅        [-r]
    DM

          --------------------
            S/O/...    S/O
    UMP SUBJ          OBJ
            John       Lee
```

Note that here the two composing roles, *agent* (x) and *theme* ($\underline{z}$), of the composite role $x\text{-}\underline{z}$ do not share the same classification. Thus, the two cannot figure equally in the syntactic assignment of the composite role. Obviously then, one must be suppressed. In the a-structure of (30b) then, *agent* (x) figures prominently, suppressing *theme* ($\underline{z}$), in linking the composite role $x\text{-}\underline{z}$ to SUBJ; y is linked to OBJ. However, there is obviously another possibility in linking the composite role $x\text{-}\underline{z}$. That is, *theme* ($\underline{z}$) may figure prominently and suppress *agent* (x). In this second a-structure, inversion is the result of $x\text{-}\underline{z}$ linking to OBJ, y to SUBJ.

    d. Role-function mapping of (30d)

      'Lee chased John and (Lee) got tired.'

```
        < x-z           y >   y = pt, z = th
    SC    ∅-[+o]       [-r]   (th is secondary to pt in Chinese, an AOP
    DM                         language, and is thus classified as [+o])

          --------------------
           OBJ/OBJ_θ    S/O
    UMP   OBJ          SUBJ
            Lee         John
```

Now, given that both *patient* (*z*) and *theme* (*y*) are in the a-structure (and that Mandarin is an AOP language), one must be secondary and receive [*+o*]. Our previous hypothesis that Mandarin is like English, and unlike Romance languages, in classifying the non-patient theme as secondary, is borne out by the linguistic fact in (30d). Both (30b) and (30d) are thus also accounted for, as correctly predicted by the simplified LMT.

6. DOMAIN INVERSION

Another well-known but much less studied subject-object inversion construction in Chinese involves verbs of consumption, e.g., *chi* 'eat', *he* 'drink', and *chou* 'smoke', and verbs of accommodation, e.g., *zhu* 'live', *zuo* 'sit', and *shui* 'sleep' (e.g., Her 1998).

(32) *Henduo ren   chi rou.*
     Many   person eat meat
     'Many people eat meat.'

(33) *Yi   jin   rou chi liang ge   ren.*
     one kilo meat eat two CLS person
     'One kilo of meat feeds two people.'

(34) *Yi   zhi   ji   chi liang ge   ren.*
     one CLS chicken eat two CLS person
     a. 'One chicken feeds two people.'
     b. 'One chicken eats two people.'

In (32) *chi* 'eat' is a transitive verb with two roles, *agent* and *theme*, which map straightforwardly to SUBJ and OBJ respectively. However, in (33), the subject and the object appear to be inverted, even though the agent and theme reading can still be obtained. Therefore, out of context a sentence with *chi* 'eat' can be ambiguous, as in (34). What is different between (32) and (33) is that in (33) the object *liang ge ren* 'two people', besides being the agent of *chi*, also specifies the extent of the action. In other words, it also has the role of *domain* (c.f., Teng 1975:95, Huang 1993:372-4).

An argument must be unique in an a-structure. In (35), *yi tian* 'one day' is the domain without the agent reading, while *liang ge ren* 'two people' in (36) is an *agent-domain* composite role. As indicated by (37), *chou* 'smoke' does not allow two domain roles.

(35) *Yi   bao   yan   chou   yi   tian.*
     one pack cigarette smoke one day
     'One pack of cigarettes is enough to smoke for one day.'

(36) *Yi   bao   yan   chou   liang ge   ren.*
     one pack cigarette smoke two CLS person
     'One pack of cigarettes is enough for two people to smoke.'

(37)**Yi   bao   yan   chou liang ge   ren   yi   tian.*
     one pack cigarette smoke two CLS person one day

Therefore, in Mandarin Chinese there is a lexical option for these verbs to add a domain role and bind it with the highest role (c.f., Huang 1993:372), as shown in (38). What these verbs have in common is that there are two roles in the a-structure, the lower of which has SC [-*r*]. Following Huang (1993), I also assume that domain is classified as [+*o*] in Chinese and is on a par with locative in the thematic hierarchy, as shown in (39).

(38) Domain-addition:
             < *x*   *y*>   *x = ag, y = th*
                ↓   ↓
         <(*x*-)*dom*   *y*>
             [+*o*]

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

In (40), the verb *chi* 'eat', with its canonical thematic structure, has straightforward syntactic function assignment. In (41) and (42), *chi* 'eat' has the a-structure *<ag-dom th>*. Similar to the composite roles in resultative compounds, the two composing roles within the composite role *x-z* (*ag-dom*), compete for syntactic assignment due to their distinct SC and thus create inversion.

(40) *Henduo ren chi rou.*

    'Many people eat meat.'

$$chi < x \qquad y > \qquad x = ag, y = th$$

SC		[-r]
DM	-------------------	
	S/O…	S/O
UMP	SUBJ	OBJ
	people	meat

(41) *Yi jin rou chi liang ge ren.*

    'One kilo of meat feeds two people.'

$$chi < x\text{-}\underline{z} \qquad y > \qquad x = ag, y = th, z = dom$$

SC	$\varnothing$-[+o]	[-r]
DM	---------------------	
	OBJ/OBJ$_\theta$	S/O
UMP	OBJ	SUBJ
	people	meat

(42) *Liang ge ren chi yi jin rou.*

    'One kilo of meat feeds two people.'

$$chi < \boldsymbol{x}\text{-}\underline{z} \qquad y >$$

SC		[-r]
DM	------------------	
	S/O…	S/O
UMP	SUBJ	OBJ
	people	meat

7. DISCUSSION

Each of the four inversion constructions examined above is accounted for by a respective morphological operation, which distinguishes a canonical lexical form, the input, from a derived one, the output. The canonical form, undergoing no morphological operations, generates an unmarked, or basic, syntactic structure, while a derived verb such as the passive verb, the locative inversion verb, the dative shift verb, the resultative compound, and the domain-added verb, affected by a morphological process, produces a more marked, non-canonical syntactic construction. In the transformational tradition, these derived constructions used to be treated as the output of stipulated transformations. In fact, that is precisely where the movement-oriented terms such as 'dative shift' and 'locative inversion' find their origin. In the lexicalist tradition, on the other hand, LMT provides such a mechanism 'for deriving NEW predicates from more basic ones which is aimed at to replace, at least partially, the traditional use of Lexical Redundancy Rules', to quote Markantonatou (1995:272). Our LMT account of locative inversion and dative shift by feature-adding morphosyntactic operations thus clearly captures the traditionally recognized derivational relations between the basic form and the derived form. I am therefore making the claim that the (un)markedness of a lexical form and its corresponding syntactic structure is directly reflected in the mapping between a-structure and grammatical functions, as markedness is in this case attributed to morphosyntactic rules that alter the otherwise unmarked, or transparent, syntactic assignment.

Similar observations on markedness can be made in the accounts of deriving resultative inversion and domain inversion by morpholexical operations that extend the thematic roles in a-structure. First, consider again the resultative compound and its three possible grammatical readings, repeated below in (43).

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

a. 'John chased Lee and Lee got tired.'

        $< \boldsymbol{x}$ $\boldsymbol{y\text{-}\underline{z}} >$ *x = ag, y/z = pt/th*

        SUBJ   OBJ

        John   Lee

b. 'John chased Lee and (John) got tired.'

        $< \boldsymbol{x\text{-}\underline{z}}$ $\boldsymbol{y} >$

        SUBJ   OBJ

        John   Lee

c. *'Lee chased John and John got tired.'

        $< x$ $y\text{-}\underline{z} >$

        OBJ   SUBJ

        Lee   John

d. 'Lee chased John and (Lee) got tired.'

        $< x\text{-}\underline{z}$ $y >$

        OBJ   SUBJ

        Lee   John

In isolation, (43) has the 'basic' meaning of (43a), as Li (1995:256fn) clearly describes it, and (43d) is the most difficult reading to obtain. In fact, in Li's extensive research on resultative compounds, the reading of (43d) came much later and it came as 'a surprise' when Li was made aware of its possibility (Li 1995:257). I would argue that this order of saliency among the readings also reflects the degree of straightforwardness, or transparency, in the mapping between a-structure and the syntactic functional structure. In (43a), the composite role *y-z* is formed by two patientlike roles that share identical syntactic assignment. Agent defaults to subject, *y-z* defaults to object harmoniously. Both mapping relations are transparent. In (43b), the complication is that in the composite role, *x-z*, a (lower) composing role *in competition* is suppressed in syntactic assignment. In (43d), however, a *higher* role, *x* (agent), is suppressed by a lower patientlike role, *z*, in linking the composite role to object, thus creating an inversion with the patient mapping to the subject; the syntactic

assignment of thematic roles here is therefore quite opaque. Finally, the syntactic assignment (43c) is ungrammatical and can thus be viewed as completely opaque.

Similar to resultative inversion verbs, domain inversion verbs also allow a highly opaque mapping relation between a-structure roles and syntactic functions. Take (41) as an example, repeated below in (44). This marked inverted structure is possible because a *higher* role, *x* (agent), is suppressed by *z* (domain), a lower role, in linking the composite role to OBJ. This reading, for many speakers, is also difficult to obtain and some may simply find it unacceptable.

(44) Yi jin rou chi liang ge ren.
    'One kilo of meat feeds two people.'

$$chi < x\text{-}\underline{z} \qquad y > \quad x = ag, \, y = pt/th, \, z = dom$$
$$\phantom{chi <} O \qquad\quad S$$
$$\phantom{chi <} people \quad meat$$

I am therefore interpreting lexical mapping, or syntactic assignment of a-structure roles, as one of the ways in which 'iconicity' (c.f., Haiman 1983 and DuBois 1985) is manifested in grammar. A more direct mapping indicates an iconic or transparent association between event-participating semantic roles and abstract syntactic functions.

8. CONCLUSION

To summarize, within the framework of lexical mapping theory, inversion may be induced by morphosyntactic operations that give rise to alternative syntactic assignment of a-structure roles. Both locative inversion and dative shift are examples of such operations that produce alternative lexical forms out of the same thematic structure. Resultative inversion and domain inversion are, however, consequences of morpholexical operations that affect the thematic structure itself. In both cases, two roles are bound in a single composite role and thus may compete for syntactic assignment, if they differ in feature classification. Inversion is always the marked construction where a less prominent role prevails over a more prominent role in the syntactic assignment of the entire composite role.

The simplified LMT differs from the more established LMT, for example, the one put forth in Bresnan (2001), in several respects. First, the classification of a-structure roles for function assignment that I have proposed assigns features only to patient and theme roles. This simpler, less constrained system is more expressive and consistent with the unrestricted nature of SUBJ and OBJ. Whether the SC I have proposed is universally valid of course needs further research.

Second, I allow morphosyntactic operations to supplement features and thus to change syntactic assignment of a-structure roles. This does not seem to be generally accepted in LFG. But, consider the well-accepted suppression operation in passivization and other morpholexical operations. These lexical processes (e.g., resultative inversion and domain inversion), by virtue of adding, suppressing, or binding roles, change the syntactic assignment of roles. Morpholexical operations can therefore be viewed as having two effects, one that affects the stock of roles per se, the other affects the assignment of functions. These are thus computationally powerful operations, exempted from the monotonicity condition. Given the validity and necessity of lexical processes in the lexical theory, morphosyntactic operations, constrained by the monotonicity condition, are entirely reasonable. Allowing such feature-adding operations only increases the expressivity of the formalism as well as the consistency. The operations of locative inversion and dative shift are good examples of feature-adding morphosyntactic operations.

Furthermore, I have proposed a morphosyntactic operation that assigns $[+r]$ to all non-$\hat{O}$ roles by default. This default operation, together with the UMP, captures the generalization that canonically non-$\hat{O}$ non-patient/theme roles are mapped to the less marked restricted function, i.e., OBL$_\theta$. Given the fact that it is a morphosyntactic operation, it is language-specific. However, this does not mean it does not apply cross-linguistically to a certain extent, much like the passive operation.

Perhaps most significantly, I have proposed a single unified mapping principle, which is consistent across all roles and functions and has replaced the previous multiple mapping principles and well-formedness conditions. The analyses given above for the four inversion constructions in Chinese have shown that the simplified LMT is adequate thus far. The simplified LMT as well as the analyses of the four inversion constructions in Chinese I have proposed violate no known principles in LFG and are consistent with the Principle of Direct Syntactic Encoding.

(45) The Principle of Direct Syntactic Encoding (Bresnan 2001:77)

All grammatical relation changes are lexical.

This simplified LMT is also flexible enough to account for some of the typological differences between English and Chinese, for example in the passive dative constructions. This simplified LMT also offers a possible interpretation of markedness of syntactic constructions. This simpler system should thus be preferred over the conventional one if it proves to be at least equally adequate empirically.

NOTES

1. The passivization operation is often referred to as a morphosyntactic operation, rather than morpholexical, e.g., Markantonatou (1995) and Ackerman and Moore (2001). It is quite standard by now to assume that passivization 'absorbs' or suppresses the highest, or external, a-structure role. I thus argue that this operation, in blocking the syntactic assignment of a role, in fact violates monotonicity and is therefore a morpholexical process. However, this disagreement perhaps is a hint that the distinction between morpholexical and morphosyntactic operations is an artificial one. A lexical process may or may not affect the a-structure roles of a lexical item. If it does, it is exempted from monotonicity.

2. The idea of mapping two roles (in a composite role or not), each from a different a-structures, to one grammatical function is not an unreasonable one. For example, Carrier and Randall (1992:180) provided a revised θ-Criterion, where a syntactic argument position can be associated with only one θ-role in any given argument structure. In other words, it is possible for a syntactic position to be θ-marked by two different roles in two different argument structures. In the lexicalist tradition of LFG, we can simply assume that in a-structure a composite role is subject to UMP (or the previous argument-function biuniqueness) like any other role. Or, we can adopt a narrower interpretation, as I do here.

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汉语句法倒置结构在简化词汇映照理论中之解析

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　　本文以一个简化的词汇映照理论（LMT）来解析汉语句法中四个不同的倒置结构：处所词倒置、直接间接宾语倒置、结果式主賓語倒置、与范畴倒置。简化的 LMT 比一般词汇功能语法学家所建构的 LMT 更简单、概化。论旨角色在句法功能的分派上可以是全然明确、部分明确、或全然不明确的；单一的简化映照原则完全取代先前的多重映照原则与约束条件，一致性地分派所有论旨角色的句法功能。句法倒置结构的发生有两种原因。一是由于词态句法律直接影响了论旨角色在句法功能上的分派，如处所词倒置和直接间接宾语倒置即是如此。二是由于词态语意律改变了动词的论旨结构，将两个论旨角色组合为一，这个组合角色仍只能分派到单一的句法功能，因此两个组成的角色在功能分派上产生竞争，间接导引出两种可能的句法表现，其中之一即爲倒置结构，结果式主賓語倒置和范畴倒置皆是如此。

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