
Lexical Mapping Theory Revisited

ONE-SOON HER

5.1 Introduction

The version of Lexical Mapping Theory (LMT) outlined in Bresnan and Zaenen (1990) (hereafter BZ), which replaced the earlier stipulated function-changing rules in Lexical Functional Grammar (LFG) and allowed principled accounts of the linking problems between argument roles and grammatical functions, remains the most widely adopted version of LMT among the many contenders, e.g., Zaenen (1988), Bresnan and Kanerva (1989), Bresnan (1989), Huang (1993), Butt et al. (1997), Ackerman and Moore (2001a,b), Kibort (2007, 2008), among many others. It is also the version of LMT adopted by Bresnan (2001), by now a standard reference of LFG's theoretical underpinnings, and Falk (2001), by far the most accessible textbook on LFG.¹

In this paper I aim to propose an alternative version of LMT which, while maintaining not only the spirit of BZ but also its explanatory power, is more consistent in its principles and also simpler in organization. Section 2 first summarizes and reviews BZ's version of LMT, section 3 then presents the revisions proposed, and section 4 applies this revised LMT to the same transitive, unaccusative, unergative, and passive examples from BZ to demonstrate that this simpler version works equally well. I also review Zaenen (1988) and apply this revised LMT to the dative alternation and passive in English. Section 5 concludes

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the paper.

5.2 LMT in Bresnan and Zaenen (1990)

At the heart of LMT is the a(rgument)-structure, which consists of a predicator with its thematic roles, each of which is marked with a classification feature for its grammatical function. Two examples are given in (1) and (2), where $[-r]$ means unrestricted and $[-o]$, unobjective.

- (1) pound < ag pt >
 $[-o]$ $[-r]$
- (2) freeze < th >
 $[-r]$

The argument roles in an a-structure are listed left-to-right in descending order according to their relative prominence in a universal hierarchy, as in (3) (e.g., Bresnan and Kanerva (1989)). The most prominent role in an a-structure, e.g., agent in (1) and theme in (2), is referred to as $\hat{\theta}$, or theta hat.

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

The syntactic features assigned to each role are $[\pm r]$, (un)restricted (whether a function is restricted as to its semantic role), and $[\pm o]$, (un)objective (whether a function is objective), which serve to classify grammatical functions into natural classes, as in (4). Negative features being unmarked, a hierarchy obtains, as in (5), where SUBJ is the least marked and thus the most prominent, and OBJ_{θ} , the most marked and the least prominent. Note that in (5) OBJ and OBL_{θ} are indistinguishable for markedness.

- (4) Feature Decomposition of Grammatical Functions:

	$-r$	$+r$
$-o$	SUBJ	OBL_{θ}
$+o$	OBJ	OBJ_{θ}

- (5) Markedness Hierarchy of Grammatical Functions:

$$\text{SUBJ}_{([-r-o])} > \text{OBJ}_{([-r+o])} / \text{OBL}_{\theta}([+r-o]) > \text{OBJ}_{\theta}([+r+o])$$

Every role in an a-structure is associated with exactly one feature for its syntactic function by a set of universal unmarked choices, as in (6).

- (6) Intrinsic Classification (IC) of A-Structure Roles:
- a. Patientlike roles: $\theta \longrightarrow [-r]$
 - b. Secondary patientlike roles: $\theta \longrightarrow [+o]^2$
 - c. Other roles: $\theta \longrightarrow [-o]$

The three unmarked choices in (6) ensure that all roles in an a-structure are underspecified with exactly one feature [r] or [o], never unspecified nor fully specified, for syntactic realization.

Following Bresnan and Kanerva (1989), morphological operations can alter the lexical stock of an a-structure by adding, suppressing, or binding thematic roles, e.g., passive, which suppresses the syntactic realization of $\hat{\theta}$, as shown in (7).

- (7) Passive: $\hat{\theta} \longrightarrow \emptyset$

There are also universal mapping principles that determine the ultimate mapping of each of the expressed underspecified roles.

- (8) Mapping Principles:
- a. Subject roles:
 - (i) $\hat{\theta}[-o]$ is mapped onto SUBJ; otherwise:
 - (ii) $\theta[-r]$ is mapped onto SUBJ.
 - b. Other roles are mapped onto the lowest compatible function in the markedness hierarchy in (5).

As pointed out by Falk (2001, 104) and Her (2003, 6), there is an inconsistency between (8a) and (8b). Essentially, (8a) supplies only negative features to the role designated to be SUBJ, while (8b) does exactly the opposite and assigns only positive features. Thus, (8) can be restated as (9) in terms of feature supplements.

- (9) Mapping Principles:
- a. Subject roles:
 - (i) Add negative features to $\hat{\theta}[-o]$; otherwise:
 - (ii) Add negative features to $\theta[-r]$.
 - b. Add positive features elsewhere.

Aside from the inconsistency in the mapping of subject roles and non-subject roles, the choice of the ultimate subject role is stipulated. Ideally, the mapping between a role and SUBJ, and indeed any other grammatical function, should be the consequence of a unified mapping principle for subject roles as well as non-subject roles. Furthermore, BZ's model, like most of the other contenders, also needs additional

²I shall ignore the distinction between symmetric versus asymmetric languages, where only the former allow the secondary patientlike roles to be [-r] as well (Bresnan and Moshi 1990).

output constraints, i.e., Function-Argument Biuniqueness (i.e., each a-structure role must be associated with a unique function, and conversely) and the Subject Condition (i.e., every predicator must have a subject) to ensure grammaticality. Again, ideally, such output constraints, instead of being ad hoc stipulations, should be consequences of a unified mapping principle (e.g., Her (1998, 1999, 2003, 2010), Kibort (2007, 2008)).

5.3 Revisions Proposed

The first change I propose relates to the markedness hierarchy of grammatical functions in (5), which assumes that a negative feature is less marked than its positive counterpart, as shown in (10a) below, but does not distinguish between the two negative features, $[-r]$ and $[-o]$. OBJ and OBL_{θ} are thus not distinguishable for markedness. That is why Bresnan (2001, 309) must call (5) a ‘partial’ ordering of functions. In the spirit of Zaenen (1993, 151), Ackerman and Moore (2001b, 44), and Kibort (2007), I propose that $[-r]$ should be seen as less marked than $[-o]$; intuitively, this is because $[-r]$ uniquely identifies argument roles that are ‘empty’, or athematic, as well as grammatical functions not restricted to a specific role (e.g., Bresnan (2001, 366)). The addition of (10b) enables a comprehensive ordering of argument functions, as in (11).

- (10) Markedness Hierarchy of Grammatical Features (revised):
- a. $[-f] > [+f]$
 - b. $[-r] > [-o]$

- (11) Markedness Hierarchy of Grammatical Functions (revised):
- $$SUBJ_{([-r-o])} > OBJ_{([-r+o])} > OBL_{\theta}([+r-o]) > OBJ_{([+r+o])}$$

The second change is regarding (6), the intrinsic classification of a-structure roles. Following Her (2003), I propose to simplify the classification and only assign patient or theme an intrinsic feature $[-r]$, repeated in (12). Other roles do not receive any intrinsic classification.

- (12) Intrinsic Classification (IC) of A-Structure Roles (revised):
- $$\text{patient/theme: } \theta \longrightarrow [-r]^3$$

In addition, I propose to follow Zaenen (1988), Bresnan and Kanerva (1989), Ackerman (1992), Markantonatou (1995), Kibort (2007,

³The IC is open to typological variation and thus parameterization, e.g., Her and Deng (2012) propose that there is no IC in Formosan languages, in order to allow a morphosyntactic operation to map any focused role to SUBJ. Thus, neither BZ’s LMT nor the one proposed in this paper can account for ergative languages in general. See Manning (1996) for discussion.

2008), Her (2003, 2010), among others, and allow morphosyntactic operations, in addition to morpholexical operations such as passive. Ackerman (1992, 56) characterizes the difference between morphosyntactic and morpholexical operations 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.

Though all morphological operations are by definition language-specific, the default morphosyntactic operation in (13), that Her (2003) proposes for English and Chinese, has the potential to be universal.

(13) Language-specific Default Classification (DC):

If $\theta \neq \hat{\theta}$, then $\theta \rightarrow [+r]$

My strategy is to keep the IC maximally general, invariable, and thus elegant by leaving anything non-universal, thus parametric or language-specific, to the morphological component. This allows a more expressive a-structure, where roles can be unspecified (no $[\pm r]$ nor $[\pm o]$), underspecified (only $[\pm r]$ or $[\pm o]$), or fully specified (both $[\pm r]$ and $[\pm o]$), while in BZ's model roles are uniformly underspecified (only $[\pm r]$ or $[\pm o]$). Finally, the most significant revision proposed is to the internally-inconsistent mapping principles in (8). Adopting the spirit of a unified mapping principle in Her (1998, 1999, 2003, 2010) and Kibort (2007, 2008), I propose this precise formulation in (14).

(14) Unified Mapping Principle (UMP):

Map each a-structure role that is available \dagger onto the highest function in (13) that is compatible \ddagger and available \dagger .

\dagger A role θ is *available* for mapping if all roles to the left of θ are mapped; a function F is *available* for mapping to θ if F is not fully specified for by another role and also not linked to a role to the left of θ .

\ddagger A function is *compatible* if it contains no conflicting feature.

The immediate advantage, aside from the obvious simplicity and consistency of this single principle, is that the two stipulated output constraints, Function-Argument Biuniqueness and the Subject Condition, are no longer needed, as both are already implicitly incorporated in (14) and thus can be seen as natural consequences of the mapping principle.

5.4 Illustrative Examples

The focus of grammatical data in BZ is on the phenomena of deep unaccusativity; so we shall start with the same illustrative examples in BZ to illustrate the revised LMT. Note that agent in our revised LMT is entirely unspecified in a-structure and yet does receive the desired mapping in (15) and (18).

- (15) **Transitive** (e.g., *John pounded the metal*):

a-structure:	pound	<	ag	pt	>
				[-r]	
UMP:			s/o/o _θ /OBL _θ	s/o	
			SUBJ	OBJ	

- (16) **Passive** (e.g., *the metal was pounded*):

a-structure:	pound	<	ag	pt	>
				[-r]	
Passive:			∅		
UMP:			s/o		
			SUBJ		

- (17) **Unaccusative** (e.g., *the river froze*):

a-structure:	freeze	<	th	>
			[-r]	
UMP:			s/o	
			SUBJ	

- (18) **Unergative** (e.g., *the dog barked*):

a-structure:	bark	<	ag	>
UMP:			s/o/o _θ /OBL _θ	
			SUBJ	

Next, we illustrate how the dative alternation (e.g., *Lee gave her a book/Lee gave a book to her*) can be accounted for in this revised LMT. Zaenen (1988, 16) proposes the default classification in (19), in addition to the intrinsic classification of ag[-o] and pt/th[-r], to account for the dative construction in (20).

(19) Default Classification (DC) (Zaenen, 1988, 16):

- a. the highest role $\rightarrow [-r]$
- b. the next role $\rightarrow [+o]$
- c. the third role $\rightarrow [+r]$

(20) **Dative** (e.g., *Lee gave her a book*):

a-structure:	give <	ag	go	th	>
IC		[-o]		[-r]	
DC		[-r]	[+o]		
		SUBJ	o/o _θ	s/o	
Well-formedness		SUBJ	OBJ _{go}	OBJ	
Cond.					

However, as pointed out by Her (2010, 112), this account does not allow the prepositional dative, where the goal links to OBL_{θ} marked by *to*. Thus, it can only derive the passivized theme SUBJ and goal OBJ in (21a), but fails to derive the goal OBL_{θ} (21b) and the passivized goal SUBJ in (21c).

- (21) a. %A book was given her (by Lee). (✓)
- b. A book was given to her (by Lee). (X)
- c. She was given a book (by Lee). (X)
- d. **Passivized dative:**

a-structure:	give <	ag	go	th	>
IC		[-o]		[-r]	
Passive		∅			
DC			[+o]		
			o/o _θ	s/o	
Well-formedness			OBJ/OBJ _{go}	SUBJ	
Cond.					

Adopting the morphosyntactic operation of the dative alternation put forth in (22) by Her (1999) and thus assuming the prepositional dative, also known as the indirect-object construction (e.g., Haspelmath (2011)) and indirective (e.g., Dryer (1986), Siewierska (2003)), is the unmarked form and the double-object dative is marked, I now demonstrate how the dative alternation is accounted for in the model proposed here. See (23) and (24).

- (22) Dative (English):
If <ag go th>, then go $\rightarrow [+o]$

(23) **Prepositional dative** (e.g., *Lee gave a book to her*):

a-structure:	give <	ag	go	th	>
IC					[-r]
DC			[+r]		
UMP		s/o/o _θ /OBL _θ	OBL _θ /o _θ	s/o	
		SUBJ	OBL _{go}	OBJ	

(24) **Double-object dative** (e.g., *Lee gave her a book*):

a-structure:	give <	ag	go	th	>
IC					[-r]
Dative			[+o]		
DC			[+r]		
UMP		s/o/o _θ /OBL _θ	o _θ	s/o	
		SUBJ	OBJ _{go}	OBJ	

The reason for posing the Dative as a language-specific operation instead of parameterized IC choices on the triadic argument structures is because the dative alternation is not universal. In the 378 languages examined by Haspelmath (2011), exactly 50%, or 189, have the indirect-object construction only; merely 83, or 22%, have the double-object form only. It is thus justifiable to derive the marked case of double-object morphologically.⁴ Yet, the unmarked indirect-object form is not universal, as the operation in (22) is language-specific and is absent in the 189 direct-object languages, but it applies obligatorily in the 83 double-object languages and optionally in some 40 mixed languages like English, which have both constructions.⁵

Assuming that the morpholexical operation of passive, in addition to the suppression of $\hat{\theta}$, also includes a parameterized option to passivize goal, as in (25) (Her, 1999, 102-103), we can now see the interesting interaction between dative and passive in English. Again, the LMT model proposed here correctly accounts for the data observed.

(25) Passive (English)

If $\langle \theta \dots (\text{go}) \dots \rangle$, then $\theta \longrightarrow \emptyset$ (& $\text{go} \longrightarrow [-r]$)⁶

⁴This line of argument is well-accepted in typological accounts of word order variation in derivational approaches. Cinque (2005), for example, derives Greenberg's Universal 20, which concerns the word orders of D, Num, A, and N, and the attested exceptions, by base-generating the unmarked, most common, order of $D > \text{Num} > A > N$ and obtaining all the other attested orders via movement of N.

⁵However, due to space limitations, this is still a partial account as it leaves primary object constructions (Dryer 1986), also known as the secundative (Siewierska 2003), unaccounted for.

(26) a. **Prepositional dative & passive w/o go[-r] option**
 (e.g., *a book was given to her (by Lee)*):

a-structure:	give <	ag	go	th	>
IC				[-r]	
Passive		∅			
DC			[+r]		
			OBL _θ /OBJ _θ	S/O	
UMP			OBL _{go}	SUBJ	

b. **Prepositional dative & passive with go[-r] option**
 (e.g., *she was given a book (by Lee)*):

a-structure:	give <	ag	go	th	>
IC				[-r]	
Passive		∅	[-r]		
			S/O	S/O	
UMP			SUBJ	OBJ	

Assuming that structures derived via a morphological operation are marked in relation to their counterparts derived without this operation, (26b) is more marked than (26a). In turn, structures in (26) are less marked, with only passive, than the ones in (27) below, with both dative and passive.⁷

(27) a. **Double-object dative & passive w/o go[-r] option**
 (e.g., *%a book was given her (by Lee)*):

a-structure:	give <	ag	go	th	>
IC				[-r]	
Passive		∅			
Dative			[+o]		
DC			[+r]		
			OBJ _θ	S/O	
UMP			OBJ _{go}	SUBJ	

⁶As demonstrated in Her (1999, 2010), while languages like English allow this option, languages like Chinese do not. The LMT model proposed here can account for this distinction; due to space limitations, I will not go into this interesting typological issue.

⁷This analysis does not bring in the co-variation in word order associated with this construction. See Siewierska and Hollmann (2007) for a corpus-based study.

b. **Double-object dative & passive with go[-r] option**(e.g., *%a book was given her (by Lee)*):

a-structure:	give	<	ag	go	th	>
IC					[-r]	
Passive			∅	[-r]		
Dative				[+o]		
				OBJ	S/O	
UMP				OBJ	SUBJ	

The fact that goal in (27) may map onto either OBJ and OBJ_{go} further adds to the obscurity of the output of the interaction of dative and passive and thus further increases its markedness; this high degree of markedness may explain why this construction is only grammatical in British dialects or in certain literary styles (e.g., Jaeggli 1986, 596; Anderson 1988, 300; Dryer 1986, 833). To summarize, the several dative constructions in English are related by Dative, a morphosyntactic rule, and Passive, a morpholexical rule, as shown schematically in (28). The Dative rule marks (28a) and (28e), and the Passive rule marks (28c), (28d), and (28e). (28e) is the only construction marked by both. The degree of markedness is thus directly related to the application of these morphological rules.

- (28) a. Lee gave a book to her. (unmarked)
 b. Lee gave her a book. (Derived from (a) via Dative, marked)
 c. A book was given to her. (Derived from (a) via Passive, marked)
 d. She was given a book. (Derived from (a) via Passive, marked)
 e. %A book was given her. (Derived from (a) via Dative and Passive, even more marked)

5.5 Conclusion

The version of Lexical Mapping Theory put forth in Bresnan and Zaenen (1990) (BZ) is the most widely accepted version in the literature of LFG. For example, it is adopted by Bresnan (2001), the most authoritative reference of LFG's theoretical underpinnings, and by Falk (2001), the most accessible textbook on LFG. The goal of this paper is to propose some revisions to BZ's model to further strengthen its internal consistency, formal rigor, and empirical coverage. Assuming the same two features [$\pm r$] and [$\pm o$] for the decomposition of grammatical functions and the unmarkedness of negative features, I further propose that [-r] is less marked than [-o]. This allows a comprehensive ordering of markedness, i.e., SUBJ > OBJ > OBL _{θ} > OBL _{θ} . I also propose a

single intrinsic $[-r]$ classification of patient/theme and put in a default $[+r]$ classification for all non- $\hat{\theta}$ roles. The latter morphosyntactic operations increase the expressivity of the theory but not at the expense of formal rigor. The most significant revision is replacing the stipulated mapping principles for SUBJ roles and non-SUBJ roles and the two output well-formedness conditions with a single unified mapping principle, which consistently favors the unmarked parallel matching between argument roles and grammatical functions. Finally, transitive, unaccusative, unergative, passive, and dative constructions in English are used as illustrations for the model of LMT proposed. Further applications should confirm that the simplicity and internal consistency of the proposed model broadens the LMT's empirical coverage.

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