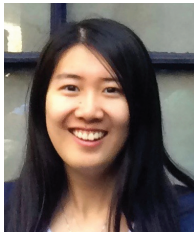


# MANDARIN LOCALIZERS:

Their Grammatical Category and Syntactic Distribution

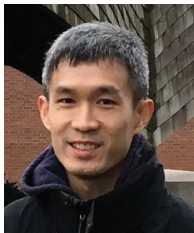
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## Abstract

If you say “the ball is on/to the right of the chair,” how many spatial configurations between the chair and the ball can you think of? Is there contact between the ball and the chair? If not, how far is the ball away from the chair? If you use another perspective, is the ball still on the right?

Spatial configurations in Mandarin are expressed via elements called *localizers*, and ambiguities are a natural part of these expressions. This essay proposes that those ambiguities result from different underlying syntactic structures. I argue that the complex morphemic structure of localizers can yield multiple syntactic structures, each with their own unique corresponding semantic interpretations. I introduce the concept of *facet* (e.g., “right-side-of”) generated by the geometry of the referent (e.g., “the chair”) and postulate a syntactic Facet node that merges on top of the DP<sub>Ground</sub> (e.g., “the chair”). Additional layers of syntactic structure introduce the concepts of vector projection, region, and perspective, each deriving a piece of the final meaning.

The purpose of this essay is to contribute to the investigation of how human language encodes localizers and spatial information. Specifically, I look at how Mandarin speakers express the relative locative position of a referent based on the frameworks proposed by Benedicto and Salomón (2016) and Svenonius (2008). By considering the underlying structure of the elements under question, I am able to provide an explanation for the apparent ambiguity of their distributional behavior.

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## Keywords

Mandarin, localizers, AxPart, categorization, syntax, spatial prepositional phrase

## INTRODUCTION

Localizers, as the name suggests, convey locative information and spatial meanings. In Mandarin, there are two kinds of localizers that are consistent with this definition: monosyllabic localizers and disyllabic localizers. The disyllabic one consists of a monosyllabic localizer followed by a second morpheme, as the diagram in Figure 1 illustrates.

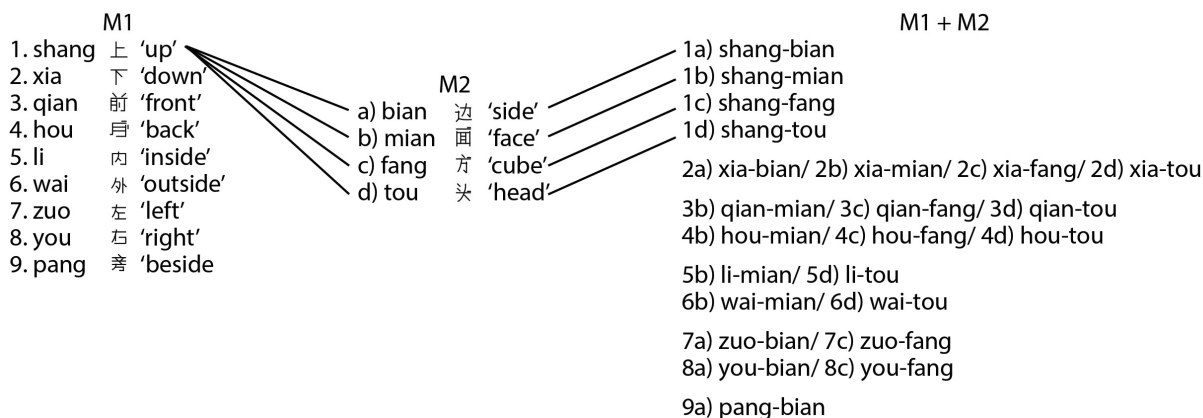
For simplicity, we refer to monosyllabic localizers as M1 (first morpheme) and the other morpheme as M2 (second morpheme) in the following context. Hence, disyllabic localizers are complex morphemes that consist of M1 and M2.

M2 serves as an important functor, which distinguishes these two kinds of localizers not only on the number of morphemes, but also on the semantic meanings available. Sentences including M2s such as *mian* ‘face’ may derive different distinct meanings, while M1s only provide unambiguous readings. See examples (1)–(2) below.

- (1) 房子 的 前面 有 一扇窗  
fangzi de **qian-mian** you yi-shan-chuang  
house PTC front-face have one-CL-window  
a. “There is a window at the facade of the house.”  
b. “There is a window (lying) in front of the house.”

With M2 *mian* ‘face,’ the sentence generates two interpretations: a. and b. The localizer phrase *fangzi de qian-mian* can refer to the facade of the house, which is a part of an object; it can also refer to the space that is in front of the house, which is an area projected out of the object. In contrast, as example (2) shows, a sentence with M1 doesn’t generate ambiguities:

- (2) 房子 前 有 一扇窗  
fangzi qian you yi-shan-chuang  
house front have one-CL-window  
“There is a window (lying) in front of the house.”



**Figure 1.** Diagram of monosyllabic localizers and disyllabic localizers.

Additionally, from a syntactic distributional perspective, M1 by itself cannot work as a DP with referential properties, whereas the combination of M1 + M2 does:

- (3)a.\* (房子) 前 是 红色 的  
 (fangzi) **qian** shi hongse de  
 (house) front be red PTC  
 “The facade (of the house) is red.”
- b. (房子的) 前面 是 红色 的  
 (fangzi) **qian-mian** shi hongse de  
 (house) front-face be red PTC  
 “The facade of the house is red.”

Furthermore, the presence of an M2 such as *mian* ‘face’ seems to be able to license the presence of a DP *de* modifier, whereas M1 itself cannot, as the examples in (4)a–b below show:

- (4)a. 一个人 站在 房子的 前面  
 yi-ge-ren zhan zai fangzi de **qian-mian**  
 one-CL-person stand be-at house PTC front-face  
 A person stands in front of the house.”
- b.\*一个人 站在 房子的 前  
 yi-ge-ren zhan zai fangzi de **qian**  
 one-CL-person stand be-at house PTC front  
 “A person stands in front of the house.”

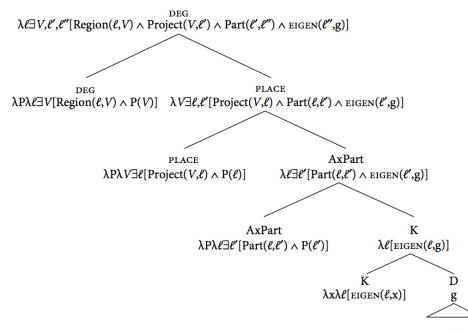
The only difference between (4)a and (4)b is M2 *mian* ‘face.’ Example (4)a is grammatical because M2 *mian* ‘face’ is able to take *fangzi de* as its complement. In contrast, the sentence in example (4)b is ungrammatical, because *qian* by itself does not allow the introduction of the *fangzi de* modifier constituent. It thus seems that it is M2 *mian* that results in the difference in the underlying structures of the two

localizer phrases (e.g., *fangzi de qian-mian* and *\*fangzi de qian*). With the contrast of sentences (4)a and 4(b), I claim that M2 serves as a functional head in the underlying structure of spatial prepositional phrase that opens up the possibility of further structure.

### PREVIOUS WORK ON SPATIAL PREPOSITIONAL PHRASE STRUCTURE

This research is based on the theoretical framework put forward by Svenonius (2008) and Benedicto and Salomón (2016).

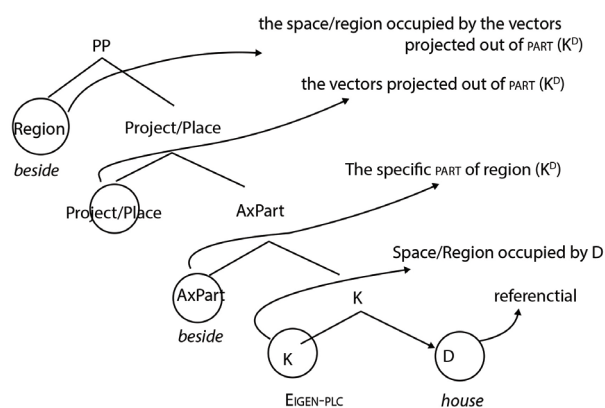
Svenonius (2008) proposes that DP (e.g., *the chair*) merges with K (genitive case marker), such as “of” in English, and generates KP. KP refers to the eigenplace of DP<sub>Ground</sub>—the *space* occupied by the referent. Then KP<sub>Ground</sub> merges with Axial Part (AxPart) and generates AxPartP, which specifies a certain subpart of eigenplace. According to the definition given by Jackendoff (1996), cited by Svenonius, AxPart is a category manifested in many languages by a set of words with meanings such as “front,”



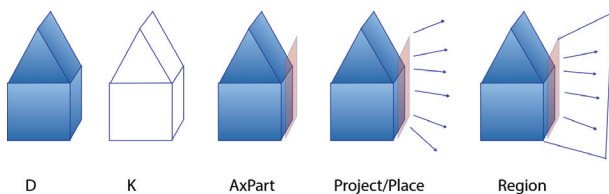
**Figure 2.** Structure of spatial prepositional phrase by Svenonius (2008).

“back,” “top,” “bottom,” “side,” “interior,” “vicinity,” and so on. Both localizers M1 and M1 + M2 in Mandarin are consistent with this definition, but M1s fail to fit into the structure as above, for they fail to take KP as a complement (as shown in example (4)b); furthermore, Svenonius’s tree in Figure 2 does not account for the independent and distinct contribution of these two morphemes, M1 and M2, since there seems to only be one slot for both. This finding suggests that we need another model where both of these two types of localizers are adopted and their differences are manifested.

Benedicto and Salomón’s (2016) adaptation of the Svenonius model may suggest an alternative for Mandarin localizers’ ambiguities. As the authors claim, following Svenonius, the Project/Place head denotes the set of vector spaces projected from AxPart, and the Region head shifts the vector space back into a region (Figures 3 and 4).



**Figure 3.** Structure of spatial prepositional phrase by Benedicto and Solomón (2016).



**Figure 4.** Manifestation of nodes in structure of spatial prepositional phrase by Benedicto and Solomón (2016).

In Mayangna, the language Benedicto and Salomón (2016) deal with, the same morpheme *sait* can appear in either AxPart or Project, with distinct distributional behavior. Consider (5)a and (5)b below.

(5)a.

↙Non-Projective Readings

Alyson ũni saitni yak was tangni sak ki  
 A. house.Pos3s sait.Pos3s P water tank.Pos3s be\_at.STAT PTC.3s  
 ‘There is a water tank on the side of Alyson’s house’

b.

↙Projective Readings

Alyson ũni sait yak was tangni sak ki  
 A. house.Pos3s sait.Pos3s P water tank.Pos3s be\_at.STAT PTC.3s  
 ‘There is a water tank near Alyson’s house’

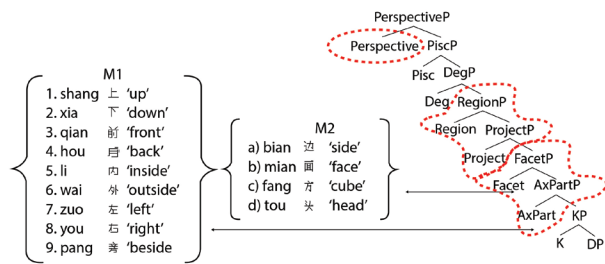
In (5)a, the overt projection of the AxPart node, which is an inflected morpheme *sait-ni*, shifts the house’s eigenplace into one of its subparts, yielding a nonprojective interpretation. In (5)b, however, an invariable *sait* occupies the Project/Place node and yields a projective interpretation. *Yak* projects as the Region head and denotes the region occupied by the vector space projected out of a subpart. In both examples, concrete morphemes are spelled out under the Projection/Place and Region heads.

The Project head and the Place head are put in one node in both previous works. In Mandarin, on the other hand, these heads are in two nodes and correspond to null-phonological forms, due to their nature of being comparatively less inflectional. I also propose that there is an additional head, Facet, occupied by M2.

## HYPOTHESIS

Structurally, I propose that M1 and M2 syntactically project as two different heads: M1’s are AxParts, while M2’s, such as *mian* ‘face,’ function as a Facet head. In this way, the Facet node structurally represents the concept of facets generated by the object.

Three structural areas are highlighted in the representation of the Spatial XP structure in Mandarin, presented in Figure 5: (1) the Facet head, the locus for M2, serves as a functor that transforms a part of the object (the AxPart head, the locus for M1) into a facet projected from the object (DP<sub>Ground</sub>). (2) The Project head, which denotes the vectors projected out of Facet, and above it the Region head, which denotes the space occupied by those vectors in Project projected out of the Facet/AxPart of the referent DP. (3) Finally, along the lines of Chen,



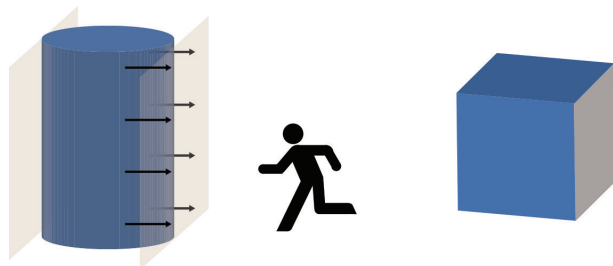
**Figure 5.** Spatial prepositional phrase structure in Mandarin.

Osei-Tutu, and Taherkhani (2018), a Perspective head is used as an operator, which holds a binding relation with its variable AxPart.

### Facets and Axial Parts

Wunderlich (1991), as cited by Svenonius (2008), first defined “eigenplace” as the region occupied by an object, and it is an intrinsic property of  $DP_{Ground}$ . On the basis of that notion, I define Facet as a class of functional heads that indicate the facets generated by the (eigenplace of the)  $DP_{Ground}$ , even if the object does not have inherent facets. For instance, some objects such as buildings and human beings have conventionally defined fronts and backs, tops and bottoms, that is, AxParts that serve as the basis to create a facet (a plane projected out of the part). Other objects with irregular shapes do not have predefined parts. In those cases, as Svenonius (2008) suggests, we may use the speaker to generate the facets: we identify the plane facing the speaker as “front” and the opposite facet as “back” in some conditions in which the referent has no conventionally defined facets. This rule can be applied to both English and Mandarin.

As Figure 6 illustrates, a cylinder is inherently defined with “top” and “bottom,” yet its body, which is a part of its eigenplace as well, has no distinguished “front” or “back.” Hence, the Facet head helps artificially define the concept of facet. For objects with regular shapes, such as cubes, the eigenplace and



**Figure 6.** The distinction between objects with noninherent facets and inherent facets.

facets are partially overlapping. It is this Facet head that the paradigmatic set of M2 is linked to.

M2’s *bian* ‘side,’ *mian* ‘face,’ *fang* ‘cube,’ and *tou* ‘head’ had originally noun meanings (see Figure 1). However, they have undergone partial grammaticalization whereby they lost lexical content. For example, *bian* can be preceded by demonstrative pronouns *zhe* ‘this’ and *na* ‘that,’ which denotes one of its nominal properties. An example is presented below:

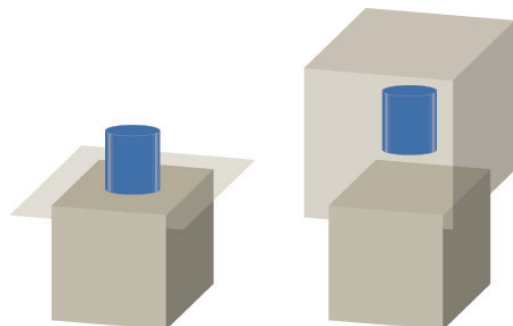
- (6) (山) 这边 有一个村庄  
 (shan) zhe-bian you yi ge cunzhuang  
 (mountain) this-side have one CL village  
 “There is a village in this side (of the mountain).”

Nevertheless, M2s are morphemes that select for and are merged with an M1 projecting as an AxPart head. According to their semantic meanings, I assume that *bian/mian* and *fang/tou* refer to the manner through which the subpart of  $DP_{Ground}$  is projected as a 2D and 3D vector space, respectively. Yet this hypothesis needs more pondering. Note that these suffixes do generate semantic differences. See the example of *shang-mian* and *shang-fang* in Figure 7.

Figure 7 illustrates the semantic difference when M1 *shang* ‘up’ is merged with two different M2s, *mian* ‘face’ and *fang* ‘cube.’ *Shang-mian* ‘on’ suggests that there is contact between the cylinder and the upper part of the  $DP_{Ground}$ ; if our hypothesis above is on the right track, the M2 *mian* Facet head would yield the meaning of a 2D facet/plane (in translucent beige in Figure 7a) out of the corresponding AxPart, *shang* ‘top.’ On the other hand, in the case of *shang-fang* ‘above,’ the figure is placed in the upper space of referent ( $DP_{Ground}$ ) without contact; again, if our hypothesis is on the right track, the M2 *fang* Facet head would yield the meaning of a 3D facet (the

a. shang-mian (up-face)

b. shang-fang (up-cube)



**Figure 7.** Different facets.

translucent beige cubical area in Figure 7b), where the cylinder is located. Further research on how this mechanism may affect our cognition on space and location and the grammar to express it is still needed.

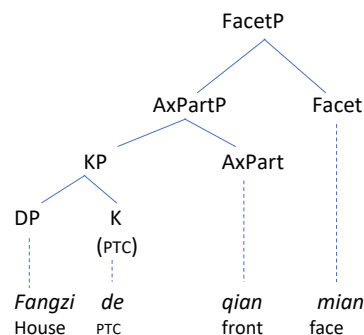
### Projection and Region

In examples (1) and (2) in the introduction, we identified a difference between the interpretation of cases with or without M2: the latter, without M2, denotes only the concept of “vector space” (Wu, 2015), whereas the complex morpheme M1 + M2 can denote both the concept of facets and region. Under the structures proposed here, the node Project introduces a set of vectors emanating out of the Facet head (the arrows in Figure 8b) while Region refers to the area occupied by those vectors (the greyed-out area in Figure 8b). An additional Deg node (see “Degree Modification” section) further marks the range of the vector space.

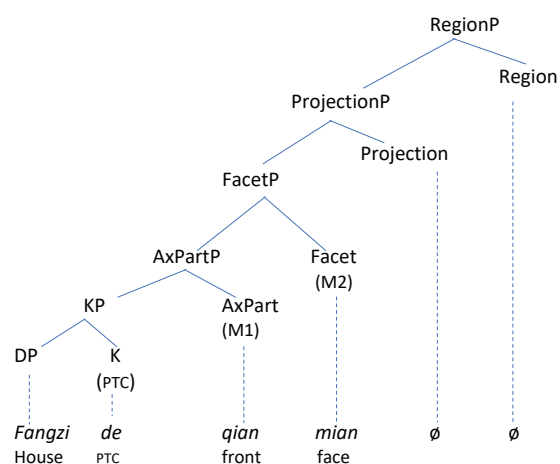
The two examples in (7) represent the meanings of Facet and Region that M2 conveys. These two phrases—full sentences are presented in example (1)—have the same linear order, for the node of Region and Project do not have phonological forms in Mandarin. Due to the nature of being less inflectional, Mandarin has fewer morphemes to distinguish the ambiguous sentences.

Though they have the same linear order, their underlying syntactic structures are different, which results in different semantic meanings. If M1 and M2 *qian-mian* ‘up-face’ is structurally Facet P (as in (7) a), it refers to the front facade of the object house (as represented in Figure 8a). There is no vector space projected from the facet of DP<sub>Ground</sub>, also known as having nonprojective reading: that is where the “contact” interpretation is derived from. In the other case, *qian-mian* ‘up-face’ is structurally Region P (as in (7)b) and refers to the region occupied by the vectors projected by the Facet node (as represented in Figure 8b). In this condition, region is an area that has no contact with DP<sub>Ground</sub>, and the function of the Region node is to shift the vector spaces from projections back into a space area, a region, which makes the vector space referential.

- (7)a. Fangzi de qian-mian  
House PTC front-face  
“The front (side) of the house.”

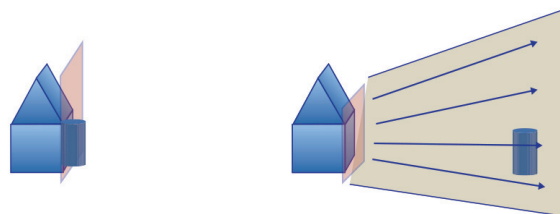


- b. Fangzi de qian-mian  
House PTC front-face  
“In front of the house.”



a. Nonprojective

b. Projective



**Figure 8.** (a.) Nonprojective and (b.) projective, graph from Benedicto and Salomón (2016).

## Degree Modification

Following Svenonius’s proposal, I claim that Deg node is a functor with the information of degree modification. It is a functor that introduces measure phrases (e.g., “ten inches under the desk”) and directional modifiers (e.g., “diagonally over the door”) in English (Svenonius, 2008). One of the most common degree modification in Mandarin is *zui* ‘most.’ Directional modifiers can also apply in Mandarin as well, but measure phrases are less grammatical. Two examples below exemplify that property:

- (8)a. 车 的 正 前方  
 che de zheng **qian-fang**  
 car PTC straight front-cube  
 “straight in front of the car”
- b.\* 车 的 十米 前方  
 che de shimi **qian-fang**  
 car PTC ten-meter front-cube  
 “ten meters in front of the car”

Though both *zheng* and *shimi* are degree modifications, their grammatical properties are different, for example (8)a is grammatical, while example (8)b is not. If we add the morphemes *de difang*, the sentence is then grammatical.

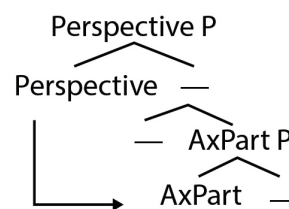
- (9) 车 的 前方 十米 的 地方  
 che de **qian-fang** shimi de difang  
 car PTC front-cube ten-meters PTC place  
 “the place that is ten meters in front of the car.”

Morpheme *difang* can be seen as an overt Region node, like *yak* in Mayangna. Since node Region is occupied by spelled-out morphemes, a Spec-RegionP node, which is projected as *shimi de*, is allowed in example (9).

On the other hand, Deg head can be interpreted from another angle: the head Project renders the set of vectors projected out of the facet encoded in the head Facet, Region node marks the range of the space occupied by vector space without specifying it, and directional modifiers or measure phrases further restrict the range.

## Perspective

Two perspectives are commonly used: egocentric and object-centric, which suggests that the speakers use themselves or the ground DP as a perspective anchor, respectively. With egocentric perspective, the speaker refers to the facet facing the speaker as “front” and



**Figure 9.** Binding relation between perspective and AxPart (Chen, Osei-Tutu, & Taherkhani, 2018).

the opposite facet as “back” on the condition that the ground has no conventionally defined facets (Svenonius, 2008). In other words, perspective can be one factor in identifying the noninherent facets of grounds (Chen et al., 2018). In the case of object-centric perspective, speakers describe the relative location of the figure with respect to the intrinsic front and back of the ground DP. As in the example given in Figure 8, “house” is defined with front facade, so the use of AxPart will not be changed no matter from which angle the speaker observes. In summary, Perspective head as an operator c-commands the AxPart head as a variable, and there is a binding relation between them (Figure 9).

## CONCLUSION

This study evaluates the structure of Benedicto and Salomón (2016) and Svenonius (2008) by providing cross-linguistic material and analysis of spatial prepositional phrase structure in Mandarin. Our analysis shows that contrary to other languages discussed in the literature, Mandarin provides evidence of two distinct heads: M1 as the locus for AxParts of a referent and M2 as the locus for the facets of a referent, which indicates the facets generated out of the  $DP_{Ground}$  even if the object doesn’t have inherent facets.

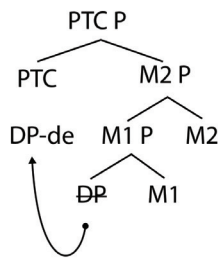
Above this node, we introduced the Project and the Region heads, which denote, respectively, the vectors projected out of the facets of the  $DP_{Ground}$  and the space occupied by those projective vectors.

Additionally, this analysis also adopts a further syntactic projection, that of Perspective, to account for the anchor shift meanings (egocentric vs. object-centric) observed in the Mandarin data as well as in other languages.

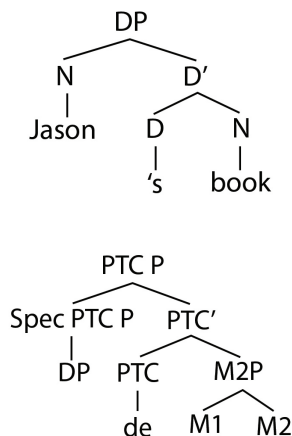
## DISCUSSION AND FUTURE WORK

Though the derivative structure provides a solution in regard to interpreting the internal structure of spatial locative phrase, new problems arise, among which is the scrambled word order. Unlike English and Mayangna that only adopt one pattern of sentence structure, Mandarin can be a language that adopts both head-initial and head-final structure, so the word order in Mandarin can be flexibly changed. Besides combining two merging patterns, movements can help to achieve the right word order as long as there are appropriate reasons.

One possibility is as follows (Figure 10). Since example (2) suggests that the particle (PTC) *de* is only compatible with M2 but not M1, I believe that this head is more likely to be derived by M2. In other words, it takes M2 P as a complement. As a bound morpheme, it urges DP to raise to PTC node, which yields the right word order: DP de M1 M2.



**Figure 10.** One possibility to solve the word order problem.



**Figure 11.** The other possibility to solve the word order problem. [Figure is in two parts]

The other possibility, as Figure 11 illustrates, is based on the assumption that “Particle” head is introduced by M2 P as well. In this tree, DP is placed at Spec-PTC P position. If we compare localizer phrase with the linear order (DP de M1 M2) to a DP “Jason’s book,” it would be easier to understand.

This structure indicates a strong relationship of possession between DP and M2 P, which indicates the nominal properties of complex morphemes M1 and M2. Other unsolved problems in this project, such as the compatibility of degree modification and M2 and division of labor of four M2s need further investigation.

## LIST OF TERMINOLOGIES AND ABBREVIATIONS

“—” : morpheme boundary.

3s: third-person singular

AxPart: a set of words such as “front,” “back,” “top,” “bottom,” “side,” “interior,” “vicinity,” and so on (Jackendoff, 1996).

CL: classifier

Eigenplace: the region occupied by an object (Wunderlich, 1991).

Ground: the reference object for the location of the figure (Talmy, 1978).

P: postposition

POS: possessor

Projection: also known as vector space. Space occupies vectors that are ejected from points in  $DP_{Ground}$  to points in space (Wu, 2015).

PTC: particle

Region: a contiguous set of points in space (Nam, 1995; Kracht, 2002).

STAT: stative



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## ACKNOWLEDGMENTS

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## REFERENCES

- Benedicto, E., & Salomón, E. (2016). The (morpho-) syntax (-semantics) of projective and non-projective PPs in Mayangna. Presented at Università Ca' Foscari, Venice, Italy. December 13.
- Chen, P., Osei-Tutu, K. O. A., & Taherkhani, N. (2018). The contribution of the internal structure of XP-loc to telicity in motion predicates. Unpublished manuscript.
- Huang, C. J., Li, Y. A., & Li, Y. (2011). *The syntax of Chinese*. Cambridge: Cambridge University Press.
- Jackendoff, R. (1996). The architecture of the linguistic-spatial interface. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and space* (pp. 1–30). Cambridge, MA: MIT Press.
- Kracht, M. (2002). On the semantics of locatives. *Linguistics and Philosophy*, 25, 157–232.
- Nam, S. (1995). The semantics of locative PPs in English (doctoral dissertation). UCLA.
- Talmy, L. (1978). Figure and ground in complex sentences. In J. H. Greenberg (Ed.), *Universals of human language* (Vol. 4, pp. 625–649). Stanford, CA: Stanford University Press.
- Wunderlich, D. (1991). How do prepositional phrases fit into compositional syntax and semantics? *Linguistics* (Vol. 29, pp. 591–621).
- Svenonius, P. (2008). Projections of P. In A. Asbury et al. (Eds.), *Syntax and semantics of spatial P*. (pp. 63–84). Amsterdam: John Benjamins Publishing.
- Wu, H. I. (2015). The fine structure of spatial PPs in Mandarin Chinese. In W. D. Tsai (Ed.), *The Cartography of Chinese Syntax* (Vol. 11, pp. 209–234). Oxford: Oxford University Press.