On Thawing Frozen Scope[1]

Hongchen Wu, Yaobin Liu, Lei Liu, Gary Mar
hongchen.wu@stonybrook.edu; yaobin.liu@stonybrook.edu;
lei.liu.1@stonybrook.edu; gary.mar@stonybrook.edu

December 15, 2017. Milan, Italy

Outline

1. data showing Mandarin is not simply a scope-frozen language;
2. why previous scope approaches cannot correctly derive the scope ambiguity for these data;
3. how the scope ambiguity of these data can be derived under Fox(2000)s Scope Economy theory.

1. Data

Simple transitives in Mandarin (1) generally do not allow inverse scope as do their counterparts in English (2). However, it has been observed (Huang 1982, Aoun and Li 1989, Soh 1998, Liu and Wu 2016) that PPDs as in (3) and (4) do exhibit scope ambiguity.

(1) *(you) liangge xuesheng jiejue-le meige wenti.* $2 > \forall$, *$\forall > 2$
(have) two student solve-ASP every problem
'There are two (particular) students who solved every problem.'

(2) Two students solved every problem. $2 > \forall$, $\forall > 2$
   a. 'There are two (particular) students who solved every problem.'
   b. 'Every problem was such that two students (or other) solved them.'

(3) *Zhangsan mai-le liangben shu gei meige ren.* $2 > \forall$, $\forall > 2$ *(Huang 1982:179)*
Zhangsan buy-ASP two book to every man
   a. 'There were two books that Zhangsan bought for everyone.'
   b. 'For every man *x*, Zhangsan bought two books for *x*.'

(4) *Laoshi song-le yixie pingyu gei meige xuesheng.* $\exists > \forall$, $\forall > \exists$ *(preferred)*
teacher give-ASP some comment to every student
   a. 'The teacher gave some (same) comment to every student.'
   b. 'For every student *x*, the teacher gave some (different) comment to *x*.'

The fluid scope is also found in locatives, such as (5), as reported by Liu and Wu (2016).

[1]We would like to thank Professor Richard Larson, and all the faculty and graduate student participants, in the Scope Seminar offered in Spring 2017 at Stony Brook University, New York, for their comments on the ideas presented here. The errors that remain are our own.

(5) *Chushi fang-le yige jiaozi zai meige panzi li.* *?*$\exists > \forall$, $\forall > \exists$
Chef put-ASP one dumpling in every plate inside
'The chef put a dumpling on every plate.'

Relative clauses containing quantifiers also exhibit scope fluidity (Huang 1982:214, Wu et al. 2017):

(6) *Wo jian-guo [jiang meizhong yuyan de sange xuesheng].* $3 > \forall$, $\forall > 3$
I meet-APS [speak every language DE three student

a. 'I have met three students who speak every language.'
b. 'For every language, I have met three students who speak it.'

2. Why Previous Approaches Do Not Work?

2.1. Isomorphic Principle (Huang 1982)

1. **General condition on scope interpretation**: Suppose A and B are both QPs or both A-NPs or A-expressions; then if A c-commands B at S-Structure (SS), A also c-commands B at the Logical Form (LF)

2. **Huang (1982)'s analysis for PP datives** The ambiguity of PP datives like (3) and (4) are "directly from the c-command account, because in double object constructions the two objects c-command each other as sisters of V" (Huang 1982:179).

3. There are two problems with Huangs (1982) analysis of PP datives:

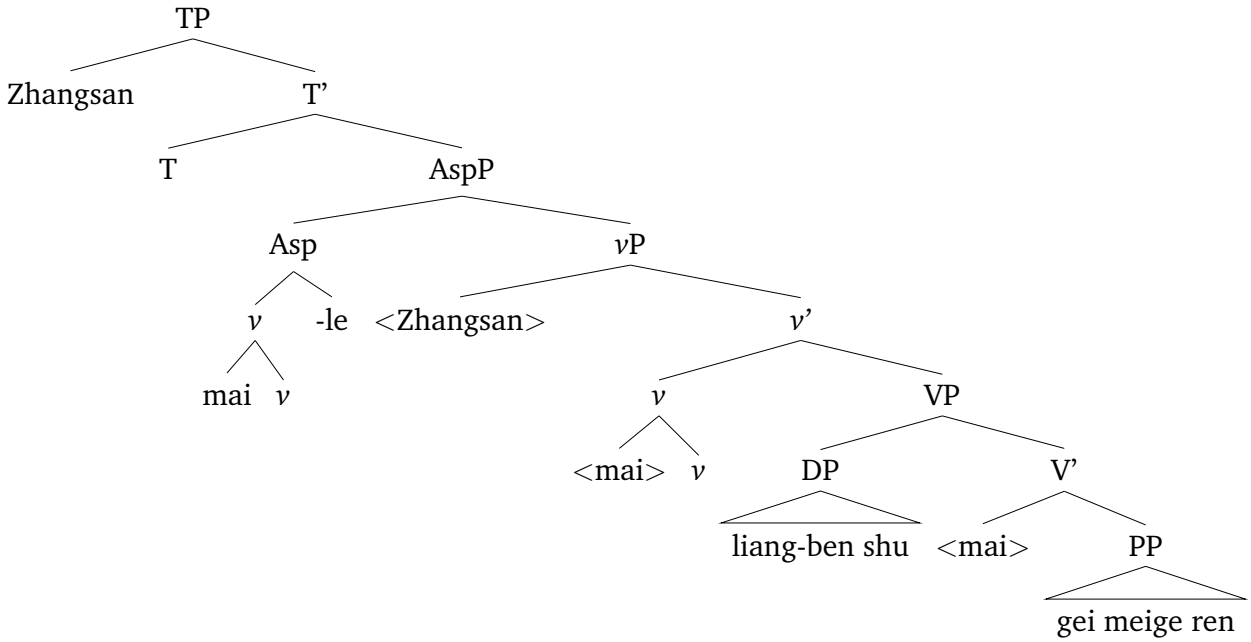
   (a) Huang (1982) assumes a 'relaxed' c-command relation to "allow an NP object to c-command across a dominating PP node." (pp. 179).

   (b) Huang (1982) assumes that for PP datives, the two objects have no hierarchy difference, which is dubious under the thematic hierarchy theory (Agent>Theme>Goal, Larson 2014, 2016) and current accounts of the probe-goal relation with respect to Mandarin vPs (Gu 1999, Paul and Whitman 2009). According to these current views, scopal ambiguity cannot be derived from the Isomorphic Principle, which requires hierarchical parity.

4. However, under current view, the syntactic derivation of (3) should be as follows, which prevents from deriving scope ambuguity under Isomorphic Principle.

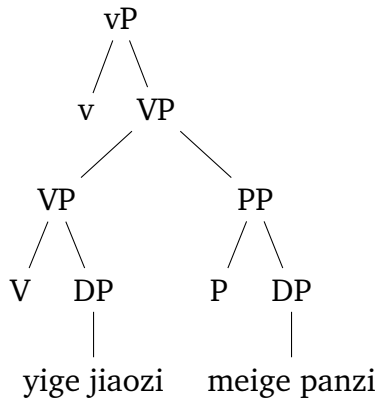
(**??**) *Zhangsan mai-le liangben shu gei meige ren.* $\exists > \forall$, $\forall > \exists$
Zhangsan buy-ASP two book to every man

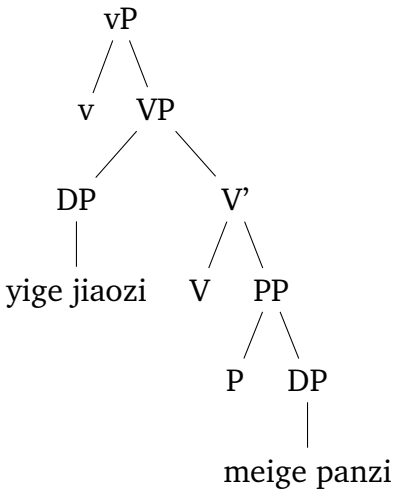
a. 'For every man *x*, Zhangsan bought two books for *x*.'
b. 'There were two books that Zhangsan bought for everyone.'

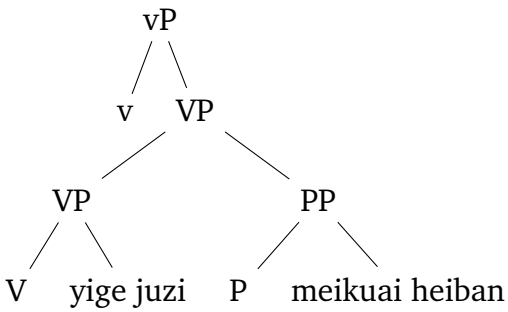


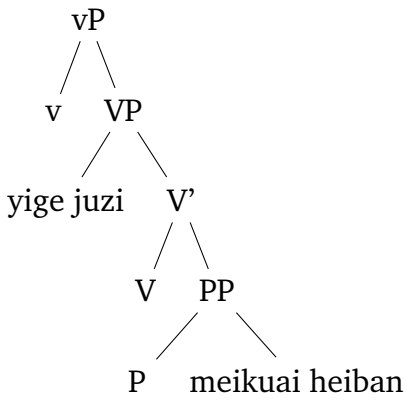
5. In the locative case (5), whether we treat the PP as an adjunct (*left*) or an argument (*right*), it is not possible to derive the ambiguity from the Isomorphic Principle.

(**??**) *Chushi fang-le yige jiaozi zai meige panzi li.* *?*∃ > ∀, ∀ > ∃
Chef put-ASP one dumpling in every plate inside
'The chef put a dumpling on every plate.'









6. In the case of relative clauses containing quantifiers, there is a unidirectional c-command relation between the external quantifier phrase (QP) *sange xuesheng* ('three student') and the QP inside the relative clause *meizhong yuyan* ('every language'), which blocks the derivation of the ambiguity of (6) under the Isomorphic Principle.

2.2. Scope Principle (Aoun and Li 1989, 1993)

1. **Scope Principle**: A quantifier A may have scope over a quantifier B iff A ccommands a member of the chain containing B.

2. **Minimal Binding Requirement**: Variables must be bound by the most local potential antecedent ($\overline{A}$-binder).

3. The ambigious cases should be look like (7): "QP_2 c-command QP_1 and QP_1 c-commands the trace of QP_2.".

   (7) $QP_2\ x_2\ QP_1\ x_1\ t_2$

4. Liu and Wu (2016) has shown that Aoun and Li (1989, 1993)'s approach cannot correctly predict the ambiguity of PP datives and locatives. [2]

5. As shown in the trees above, for PP datives and locatives, there is no overt movement to form a chain which makes one QP over the other, hence there is no way to derive the ambiguity for these cases.

3. Deriving scope interpretations using Fox(2000)'s theory of Scope Economy

3.1. How does Fox (2000)'s Scope Economy theory work?

1. Three core assumptions

[2]Aoun and Li (1989) accounts for the ambiguity of PP datives like (3) through arguing that PP dative construction is derived from Double object construction (DOC); but this assumption is dubious under the current view of the derivational relation between PP datives and DOCs.

(a) **Type Disparity**: QPs can be projected into positions where they are not interpretable *in situ*, such as object positions. To avoid **type mismatch** (Heim and Kratzer 1998), QPs in such positions must raise to positions where they can be interpreted. Any position that is a sister of a node with type $< t >$ or $< e, t >$is interpretable.

(b) **Scope Economy**: Instances of Quantifier Raising (QR) / Quantifier Lowering (QL) not forced by type considerations must have a **semantic effect** (i.e. truth-condition effect).

(c) **Shortest Move**: QR must move a QP to the **closest position** at which it is semantically interpretable.

2. Two kinds of QR

(a) **Obligatory QR** (motivated by resolving type mismatch), exemplified by the movement of QP_2 in the following cases:

i. A boy loves every girl.
$[_{TP}$ QP_1 a boy ... $[_{vP}$ QP_2 every girl $[_{vP}$ t_1 loves $t_2]]]$

ii. John loves every girl.
$[_{TP}$ $John_1$ ... $[_{vP}$ QP_2 every girl $[_{vP}$ t_1 loves $t_2]]]$

(b) **Optional QR and QL** (required to have semantic effect): for example i, the inverse scope reading can be derived either through optional QR of QP_2 to [Adjoined,TP] crossing QP_1, or through QL of QP_1 crossing QP_2; while in example ii, optional QR of QP_2 can not result in semantic effect.

i. A boy loves every girl.
$[_{TP}$ QP_2 every girl $[_{TP}$ QP_1 a boy ... $[_{vP}$ t_2 $[_{vP}$ t_1 loves $t_2]]]]$
$[_{TP}$ t_1 ... $[_{vP}$ QP_2 every girl $[_{vP}$ QP_1 a boy loves $t_2]]]$

ii. John loves every girl.
* $[_{TP}$ QP_2 every girl $[_{TP}$ $John_1$ ... $[_{vP}$ QP_2 every girl $[_{vP}$ t_1 loves $t_2]]]$

3.2. Derivations of Mandarin data under Fox(2000)

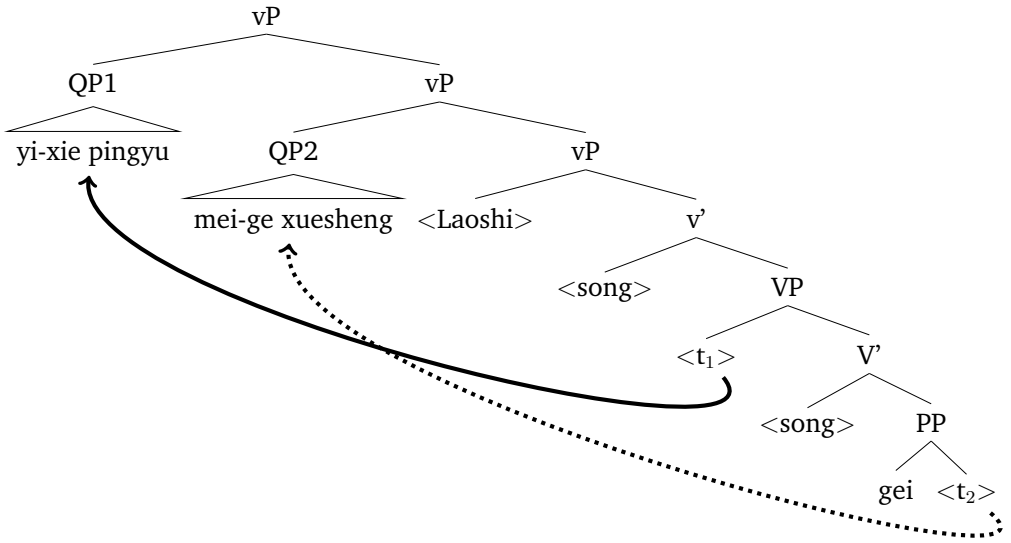
1. The two scope readings in Mandarin PP Datives like (4)
According to Fox (2000), any node with the type <t> can provide an adjunction site where the QPs can be interpreted, hence the obligatory QR of both the direct object QP *yixie pingyu* ('some comment') and the indirect object QP *meige xuesheng* ('every student') to an adjoined vP position, as required by Type Disparity and Shortest Move. Since there is no restriction on the ordering of QR between the two QPs, two scope readings thus arise, as shown in the trees below. [3]

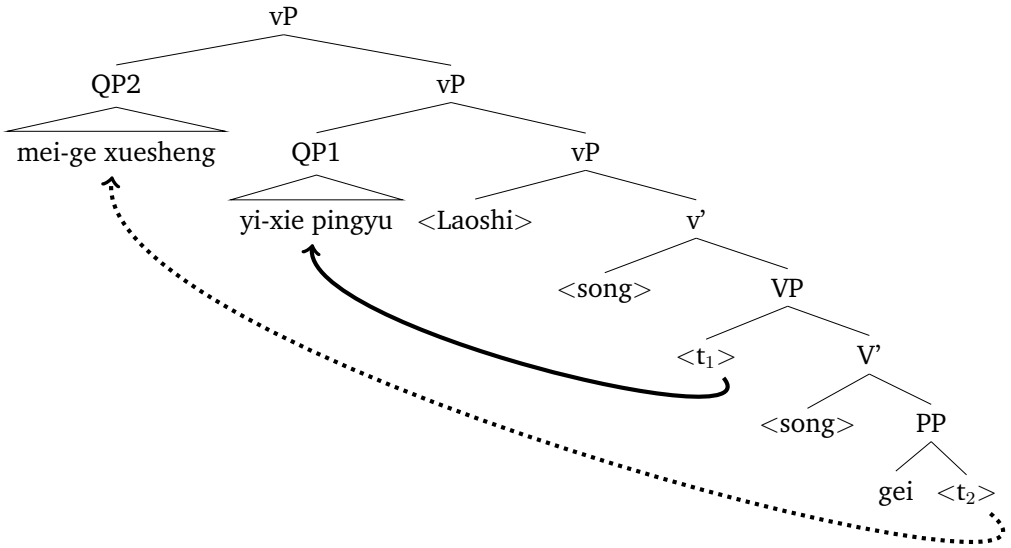
(**??**) *Laoshi song le yixie pingyu gei meige xuesheng.*
teacher give perf some comment to every student

a. 'The teacher gave some (same) comment to every student.'

[3]Similar derivations can be used to derive the ambiguity of locatives (5) too.

b. ‘For every student x, the teacher gave some (different) comment to x.’

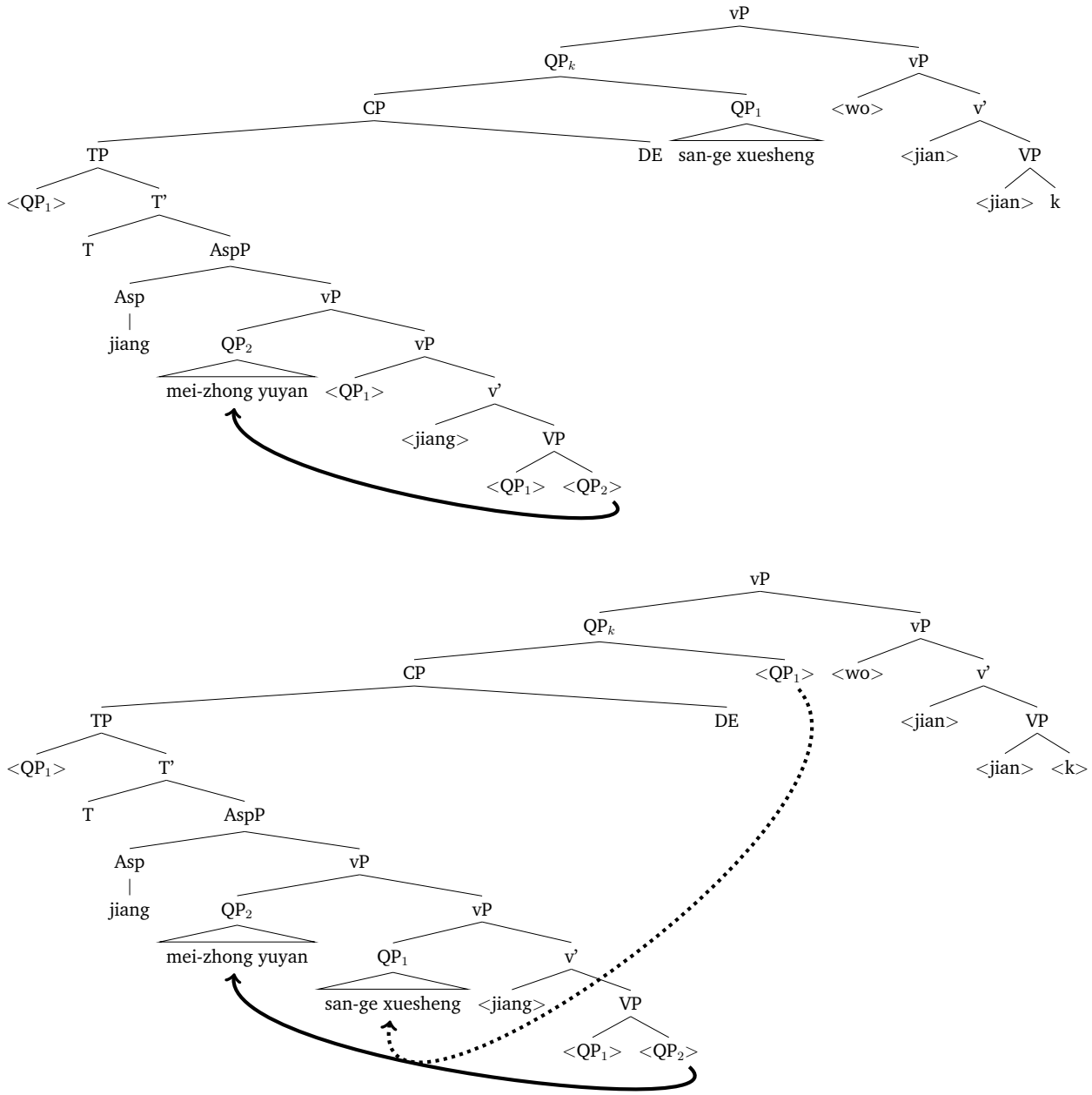




2. The derivation of scope interpretation of quantified RC like (6)
Head-raising in Mandarin allows the head noun *sange xuesheng* (‘three students’) to raise to an adjunct position of the CP (Hsiao 2003). This allows not only for the reading ($3 > \forall$), but also for the reading ($\forall > 3$) through QL of *sange xuesheng* back to the vP inside relative clause.

(**??**) *Wo jian-guo [jiang mei zhong yuyan de san ge xuesheng].*
I meet-APS [speak every CL language DE three CL student
a. ‘I have met three students who speak every language.’

b. ‘For every language, I have met three students who speak it.’



4. Summary

1. We have argued against the stereotypical view that Mandarin is simply a scope-frozen language in contrast to English as a scope-fluid language. This dichotomy has been assumed in the literature and various authors have attempted to explain it. For example, Huang invokes the Isomorphic Principle and Li and Auon propose a chain based principle to explain scopal ambiguity. Empirical evidence of scopal fluidity in Mandarin

concerning PP datives, locatives, and quantified relative clauses containing quantifiers shows the theoretical limitations of both of these previous approaches.

2. These examples of scopal ambiguities we have pointed out in Mandarin can be derived using Fox (2000) in a way that provides a unified theoretical approach for explaining scopal ambiguity in both Mandarin and English.

3. We believe the approach sketched here is more compatible with a cognitive approach to natural language processing. Recent neuro-linguistic studies of priming effects on ambiguity have been carried out mostly in English (Raffray and Pickering 2010; Chemla and Bott 2015) . As a future research project, we intend to use these methods to study priming effects in Mandarin as well to investigate scope fluidity from a processing perspective.

References:

- Aoun, J., and Y.-H. A. Li. 1989. Scope and Constituency. *Linguistic Inquiry*. 20(2), 141-172.
- Aoun, J., and Y.-H. A. Li. 1993. *Syntax of Scope*. Cambridge, Mass.: MIT Press.
- Chemla, E., and L. Bott. 2015. Using Structural Priming to Study Scopal Representations and Operations. *Linguistic Inquiry*, 46(1), 157-172.
- Fox, D.. 2000. *Economy and Semantic Interpretation*. Cambridge, Mass.: MIT Press.
- Gu, Y.. 1999. *Shuangbinyu Jiegou ['Double object construction']*. in Xu, L. eds., *Gongxing yu gexing: hanyu yuyanxue zhong de zhengyi*. Beijing: Beijing Language and Culture University Press. 60-90. (in Chinese)
- Heim, I., and A. Kratzer. 1998. *Semantics in Generative Grammar*. Blackwell: Malden, Mass.
- Hsiao, F. P. F.. 2003. *The Syntax and Processing of Relative Clauses in Mandarin Chinese*. Ph.D. Thesis. MIT.
- Huang, C.-T. J.. 1982. *Logical Relations in Chinese and the Theory of Grammar*. MIT Ph.D thesis.
- Larson, R.K.. 2014. *On Shell Structure*. Routledge. London.
- Larson, R.K..2016. *Hierarchies of Features vs. Hierarchies of Projections*. Ms. Stony Brook University.
- Liu, Y., and H. Wu. 2016. *Quantifier Scope in Mandarin Ditransitives*. NACCL 28 (28th North American Conference on Chinese Linguistics), Utah, USA.
- Paul, W., and J. Whitman. 2009. Applicative Structure and Mandarin Ditransitives. in Duguine, M., S. Huidobro and N. Madariaga, eds.,. *Argument Structure and Syntactic Relations from a Cross-Linguistic Perspective*. Amsterdam-Philadelphia: John Benjamins. 261-282.
- Raffray, C. N., and M. J. Pickering. 2010. How Do People Construct Logical Form During Language Comprehension? *Psychological Science*, 21:10901097.
- Soh, H. L.. 1998. *Object Scrambling in Chinese*. MIT Ph.D thesis.
- Wu, H., R. Larson, Y. Liu, L. Liu, and G. Mar. 2017. *Rethinking Mandarin Quantifier Scope*. NELS 48 (48th Annual Meeting of North East Linguistic Society), Reykjavk, Iceland.