Tier-Based Strictly Local Analyses of Negation in Mandarin Chinese

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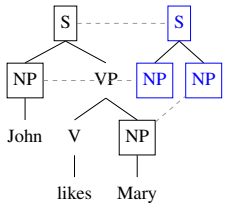
Overview Recent research on computational linguistics suggests that the class of Tier-based Strictly Local (TSL) dependencies is the right fit as an upper bound for a variety of phonological and morphological phenomena (Heinz 2015, Aksënova et al. 2016). Furthermore, Graf (2016) shows that the move and merge dependencies of syntax fits into TSL. In line with this TSL trend, I show that the locality of co-occurrence of Mandarin Chinese negation markers (*bu* and *mei*) can be captured by TSL, which provides evidence that TSL can capture properties of syntactic domains beyond move and merge dependencies.

TSL syntax A TSL grammar is a grammar for non-local dependencies that are local over tiers and all patterns are described by forbidden *n*-gram(s) (Graf 2016). For example, in (1), S and NP on the tier makes the non-local dependencies between S and NP local. If the tree shown in (2) is the forbidden *n*-gram, which means the grammar does not allow a node labeled S to take more than three NPs as its daughter, then derivations like (1) are well-formed. However, if the forbidden *n*-gram is as illustrated in (3), disallowing node S to take less than three NPs as its daughter, then derivations like (1) are ill-formed.

(1)



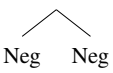
(2) * S

(3) * S

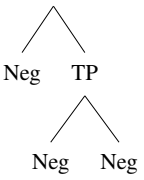
TSL analyses Based on the co-occurrence of *bu* and *mei* (referred as 'Neg1' and 'Neg2' respectively), we put TP and Neg on the tier, and propose a forbidden tree *n*-gram such that for a node labeled TP, its daughter includes more than one negation maker (shown in (4)). That is to say, this grammar will rule out derivations such that there is no TP in between any two negation makers, hence, derivations like (5), (6) are ill-formed. Meanwhile, this forbidden tree *n*-gram can account for well-formed sentences like (7) and (8), which have two Neg1s and two Neg2s respectively. Taking (7) as an example, the corresponding derivation and TSL projection process are presented in (9).

(4) * TP

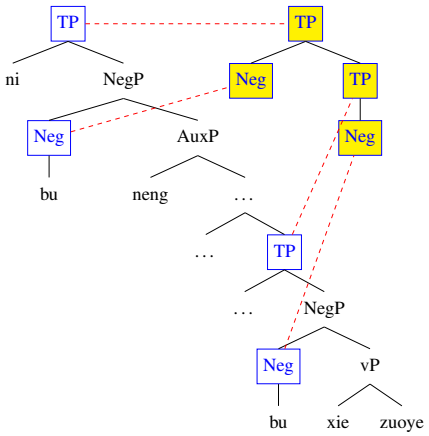
(5) * TP



(6) * TP



(9)



(7) Ni [bu [neng [bu [xie zuoye]]]].
you Neg1 can Neg1 write homework
'you can't not do homework.'

(8) [Mei [ren [mei lai]]].
Neg2 person Neg2 come
'Nobody didn't come.'

In addition, for sentences like (10), instead of treating the two constituents *mei yiyi* ('not meaningful') and *bu haokan* ('not beautiful') as coordinate APs, I argue that they are actually two relative clauses (a.k.a, two CPs) modifying the head noun *hua* ('paintings') together. In this way, inside the syntactic structure of (10), there are two TPs in between the two negation markers. Hence, the TSL grammar I proposed above can account for sentences like (10) and it is not necessary to put AP on the tiers. Similarly, through arguing that the postverbal predicative complement *bu dong* ('not understand') is rather an infinitive clause (a.k.a, TP) than a PP

adjunction, sentences like (11) would not be counterexamples for the TSL grammar mentioned above either.

(10) Wo [bu [xiang mai [[mei yiyi] [bu haokan] de hua]]].
I Neg1 want buy Neg2 meaning Neg1 beautiful DE painting
'paintings that are not meaningful nor beautiful.'

(11) Ta [mei [kan [bu [dong na-ben shu]]]].
he Neg2 read Neg1 understand that-CL book
'It's not the case the he cannot understand that book.'

Beyond TSL? According to its definition, TSL can not handle sibling dependency or C-command relation. In other words, if in Mandarin Chinese, Neg1 and Neg2 can be siblings, or Neg1 must C-command Neg2, TSL is not powerful enough as an upper bound. However, these kind of sibling or C-command dependencies do not exist in double negation in Mandarin Chinese. In (12a), Neg1 and Neg2 are adjacent to each other, but they are not siblings, which is proven by inserting an adverb in between (12b) and doing an ellipsis test (12c). For sentences like (12a), the proper tree structure is (14). For sentences like (13), the proper tree structure is (15). Comparing (13) and (15), it is obvious that C-command hierarchical relation between Neg1 and Neg2 does not matter for capturing the co-occurance of negation markers in Mandarin Chinese. Therefore, the locality of co-occurrence of Mandarin Chinese negation marker is TSL bound.

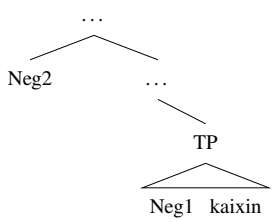
(12) a. Wo [mei [bu [kaixin]]].
I Neg2 Neg1 happy
'It's not the case that I'm not happy.'

b. Wo mei hen bu kaixin.
I Neg2 very Neg1 happy
'It's not the case that I'm very unhappy.

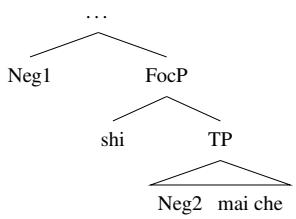
c. Wo mei bu kaixin, ta ye mei.
I Neg2 Neg1 happy, he too Neg2
'It's not the case that I'm not happy. Also, It's not the case that he is not happy.'

(13) Lisi [bu [shi [mei [mai che]]]].
Lisi Neg1 be Neg2 buy car
'It's not the case that Lisi hasn't bought a car.'

(14)



(15)



Conclusion Pointing out negation in Mandarin being TSL not only shows that syntactic notion of locality domain can be captured by the class of TSL dependencies, but also provides support for the TSL trend across language modules. Besides that, it also could be a starting point for investigating whether negation patterns have similar formal complexity across languages.

References **Aksënova, Alëna**, and T. Graf, and S. Moradi. 2016. Morphotactics as tier-based strictly local dependencies. In *Proceedings of the 14th Annual SIGMORPHON*. • **Graf, Thomas**. 2016. Computational Parallels Across Language Modules (slides available online). • **Heinz, Jeffrey**. 2015. The computational nature of phonological generalizations. Ms., University of Delaware.