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Structure of Mandarin Particles with Evidence of Acquisition Data

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ABSTRACT
This study explores the properties and structure of Mandarin particles under the framework of generative syntax. Over the years, Chinese syntacticians differ in the categorization of the particle 'le' while acquisition researchers tend to disregard this distinction. In our study, five longitudinal studies in CHILDES corpora are examined to address this ambiguity of 'le' in Mandarin acquisition, and separate time windows are found from acquiring sentence-final 'le' to postverbal 'le'. Children's early syntactic knowledge on this demonstrates the necessity of a two-le analysis. Then, with tests on negated sentences, a structure is proposed to account for the head position of the postverbal 'le'. Le's behavior in sentences of negated forms differs from that of the other essential postverbal particle 'guo', and thus the minimal structure within Mandarin inflectional domain needs to be expanded as a way to accommodate both acquisition data and negation tests. Implications of the relations between theoretical syntax and acquisition are discussed.

Keywords: *Mandarin, Syntactic Acquisition, Generative Syntax*

1. INTRODUCTION

Mandarin heavily utilizes a set of 'particles' to convey certain grammatical meaning. These particles include '-de' as a relativizer for adjectives [14], '-ne' as a sentence-final particle to signal modalities [8], and a range of post-verbal particles as aspect markers.

The aim of this paper is two-fold. First, I will discuss the categorization of the particle "le" of Mandarin using evidence from the perspective of acquisitions of syntax; Then, I will explore the structure of two selected particles "le" and "guo" under the framework of generative syntax.

Over the years, Chinese syntacticians differ in the specific categorization of the particle 'le', with some of them distinguishing verbal 'le' from sentence-final 'le' [15], while others such as P.Li and Liu [9][10], supporting a unified analysis.

Sybesma claims that verbal "le" is a perfective aspect marker:

(1) Wo chi le pingguo.

I eat LE apple.

"I have eaten an apple." (action completed)

While sentence-final "le" indicated "inchoativity", or the "relevant state" of the sentence, as Chao [2] indicates:

(2) wo qu xuexiao le.

I go school LE.

"I'm going to school (now)"

On the other hand, Li proposes a one-le analysis which argues that "le" is a unique particle that indicates "contrast to the previous state" [9], and they focus on the ambiguity of "le" for intransitive verbs like the following example, which could be interpreted either as an aspect marker or an inchoative indicator since both ways of reading is possible:

(3) ta shuijiao le.

She sleep LE.

She has fallen asleep/ She (starts to) sleep.

Within the fields of language acquisition, researchers usually avoid the distinction of different types of 'le'. Erbaugh reports that Mandarin children typically acquire aspect marker 'le' at around 2;4, MLU 1.5-2.5, with her data counting both sentence-final 'le' and verbal 'le'.Erbaugh claims that the use of the aspect marking 'le' for Mandarin children is "sporadic, broad and correct", although "many were ambiguous between

perfective and current relevance" [6]. Furthermore, Liu's study on the acquisition of 'le' directly takes Li's analysis and states that only one type of 'le' exists in Mandarin and children typically acquire it as early as 1;9 [9][10].

The major key to the categorization of 'le' could be attributed to a question of acquisition. Children's early knowledge of this particle and the average time window of acquiring 'le' may reveal how this particle is treated in the underlying structure. If children show that they distinguish between verbal 'le' and sentence-final 'le', then we should propose two separate time windows for acquiring different le's, and two-le analysis should prevail in the fields of Chinese syntactical theory and acquisition. On the other hand, if children's utterances show no knowledge of 'le' distinctions, then the credibility of two-le analysis would be questioned, as an acquisition-wise explanation to the positional difference between these two kinds of 'le' would be necessary.

2. EXPERIMENT 1: CLAN ANALYSIS ON THE ACQUISITION OF "LE"

2.1. Methods

I investigated five longitudinal studies on Mandarin-speaking children with consecutive transcripts ranging from 1;5 to 3;4. These children were native Mandarin speakers raised in Taiwan and Shenzhen, and the age range was picked to reflect the general time window for "le" proposed by early researches described in the introduction. All transcripts in these studies were in natural parent-children settings with spontaneous production from the children, and typically one transcript was available for each month in the range. The data was gathered from TCCM (Taiwan Corpus of Child Mandarin) and Deng & Yip on the CHILDES website (Table 1) [3][5].

Table 1. General information of the 5 longitudinal studies

Name	Num of Transcripts	Age Range	Source
Wang	12	2;5 – 3;4	TCCM
Yang	13	1;5 – 2;9	TCCM
Chou	16	2;1 – 3;4	TCCM
Tong	22	1;7 – 3;4	Deng & Yip(2018).
Xu	11	1;6 – 2;5	TCCM

The analysis was conducted using the software Computerized Language Analysis (CLAN) to extract all utterances containing "le" by target children in the data [11]. In total, 1257 "le" utterances were examined by CLAN. These utterances were further categorized into two groups: sentence-final le and non-sentence-final le. Here, "sentence-final" only means the literal environment le appears – at the end of the utterance, and "non-sentence-final" means that the "le" is not at the periphery of a sentence. Additionally, sentences in which question marker is at the end and "le" is at the penultimate position were also categorized in the "sentence-final" group, like example (4) below.

(4) ta shui le ma?

he sleep LE Q.

"Is he starting to sleep?"/ "Has he fallen asleep?"

2.2. Analysis of Non-occurring errors

Ernst's work on negations in Mandarin provides powerful evidence for the two-le analysis [7]. Ernst points out that the verbal le cannot coexist with negations while sentence-le is fine:

(5) Wo jintian bu-qu xuexiao le.

I today NEG-go school LE.

I'm not going to school today.

* (6) Wo bu chi-le pingguo.

I NEG eat-LE apple

Intended meaning: "I have not eaten an apple"

(7) Wo bu chi pingguo.

I NEG eat apple.

"I don't eat apples."

Acknowledging the fact that verbs do not move in Mandarin, adding the negation "bu" blocks the covert feature checking from V to T, and thus the aspect marker 'le' is impossible to appear in this way of negation (Using another type of negation "meiyou" (NEG-AUX) could make negated sentences maintain the perfective aspect, but aspect marker (i.e., verbal) "le" is still impossible in negations. See section 3.3).

Although one-le analysis may propose a solution to this negation asymmetries in adult grammar, the interaction of le and negation could demonstrate one's knowledge of the essential difference of two les. If children do not distinguish between sentence-final le and verbal le, then we would expect them to make errors like example (6).

Accordingly, children in my studies never produced a single utterance in the form of example (6). On the other hand, there were various examples of negations with sentence-final le, starting from their earliest utterance with the particle 'le' in these transcripts.

(8) meiyou qiche le.

Not car LE.

There is no car (anymore). (Tong, 1;7)

Therefore, the fact that children never used non-sentence-final le with negations together proves that children do have early knowledge of different types of le.

2.3. Results

As mentioned in Section 1, intransitive sentences with le arouse ambiguities like example (2). To solve this, we should look at the mandatory use of verbal le in children's speech: the le that appears after a transitive verb and before the object.

Table 2. Results of "le" acquisition

Name	Range	S-F Le	S-F Le MLU	V LE	V LE MLU	TRANS V
Wang	2;5 – 3;4	Before 2;5	3.131 at 2;5	2;7	2.858	Before 2;5
Yang	1;5 – 2;9	1;10	2.267at 1;10	2;6	2.977	Before 1;8
Chou	2;1 – 3;4	Before 2;1	1.956 at 2;1	2;9	2.674	Before 2;1
Tong	1;7 – 3;4	1;7	1.644 at 1;7	2;5	3.104	Before 1;7
Xu	1;6 – 2;5	1;8	1.280 at 1;8	2;5	2.395	Before 1;8

The results of the acquisition time analysis are in the table above. The age and MLU for acquiring "sentence-final" le and "verbal le" refer to the time of the transcripts in which the target child produced the specific type of le for the first time, and it must also satisfy the following conditions:

(1) In earlier transcripts, the target child never produced this type of le.

(2) This type of le must also be found in the child's utterances in a later transcript.

(3) The utterance was not an imitation of a parent's speech or a line in a story-reading session. (These situations were picked out by hand)

If there was no earlier transcript because of the age range of the study, the result was marked as "before age xx" in the result table since no exact time can be determined.

The result demonstrates that children acquire sentence-final "le" at around 1;8 on average, 1.73 MLU (only data of Yang, Tong, and Xu were calculated here). This result matches Liu's report of acquiring "le" at around 1;9, but is much earlier than Erbaugh's estimation which is at around 2;4 [6][10]. Besides example (8) given above, Yang's first utterance of sentence-final was also in a negated sentence:

(9) wo bu diu le.

I NEG throw LE.

I will not throw (anymore). (Yang, 1;10)

The result also shows that their mandatory use of verbal le happens much earlier, which is at around age 2;6, MLU 2.8016. This result is slightly later than Erbaugh's report on acquiring the aspect marker "le', but again, Erbaugh includes all ambiguous utterances in her study. Their utterances of verbal le were largely error-free as Erbaugh notes [6].

(10) mama zhe na-le shenme dongxi?

Mama this bring-ASP what things.

Mama, what (kind of) things have you brought? (Wang, 2;7)

(11) kandao-le yi-ge taozi.

See-ASP one-CL peach.

(0 Pro) has seen a peach. (Yang, 2;8)

One could argue that the acquisition time of verbal le might be earlier than my results reported above, because children may have acquired the verbal le but have not mastered the use of transitive structures, and thus their mandatory use of verbal le is delayed. To eliminate this possibility, I add the final column the result table above which gives an estimated time for first utterances of transitive structures, like example (12).

(12) wo hai-yao qiche.

I still-want car.

"I want more (toy) cars." (Tong, 1;7)

The last column in the result table demonstrates the roughly estimated time window for acquiring transitive verbs, as a way to demonstrate that children typically

acquire transitive verb structure before their first utterances of mandatory verbal le.

2.4. Discussions

Investigating children's utterances of "le" sentences in longitudinal studies provides us with a new perspective on the exact categorization of this particle in the fields on syntax. First, I show that there is separate acquisition time for two kinds of le, with the sentence-final le at around 1;8, much earlier than the verbal le at around 2;6. My result helps build a better timeline for the acquisition of Mandarin morphology, for a long-ignored distinction has been addressed in the analysis. This poses challenges for one-le analysis. Even if Liu claims that the unique marker "le" gets separate functions in different environments, further theories are needed to explain this acquisition-wise problem [10].

Second, I show that children's performance on the verbal le (aspect marker) displays adult grammar level accuracy, without the critical error Ernst proposes [6]. If children indeed only acknowledge one type of le at an early age, we would expect at least one error speech of this type. The non-occurring error issue suggests that subcategorizations of "le" might be necessary even for one-le analysis.

My experiment does not, however, deny the possibility of unifying all morphological markers in Mandarin syntax. But in essence, the two-le analysis might be preferred in the fields of language acquisition and syntax in Mandarin.

3. EXPERIMENT 2: THE STRUCTURE OF POST-VERBAL PARTICLES

Having demonstrated the necessity of a two-le analysis in Mandarin, this section aims to provide a structural account for 'le'. As mentioned in Section 1, sentence-final 'le' pertains to the "relevant state" of the sentence, and it falls into the clausal periphery as Rizzi proposes [12]. On the other hand, Sybesma suggests that the postverbal 'le' serves as the marker for the aspect [+perfective] and usually indicates the result of a completed action [15].

Traditional analysis usually interprets the position of postverbal particles in Mandarin as a result of affix-lowering and that such markers are base-generated at the head position [13]. In this section, I will demonstrate why such analysis is not without its flaws and why a minimal structure that treats different postverbal particles as the same syntactic properties within the inflectional domain is insufficient.

3.1. Negation Test

The non-existing negated sentences that have been partly described in section 2.2 attests to the incompatibility of 'affix-lowering' analysis of postverbal 'le'. Comparing Example (1) and *(6), in the negated form of a sentence which originally includes "le", the inclusion of 'le' is impossible. If 'le' was indeed, base-generated within the AspP, then it should be present in the negated structure anyway. I propose that the post-verbal 'le' should not be base-generated within the AspP. Instead, 'le' is generated in a sentence through a morphological process after [+perfective] aspect has been covertly checked by the verb, as illustrates by the following structure (the X' is neglected as specifiers are irrelevant in this test):

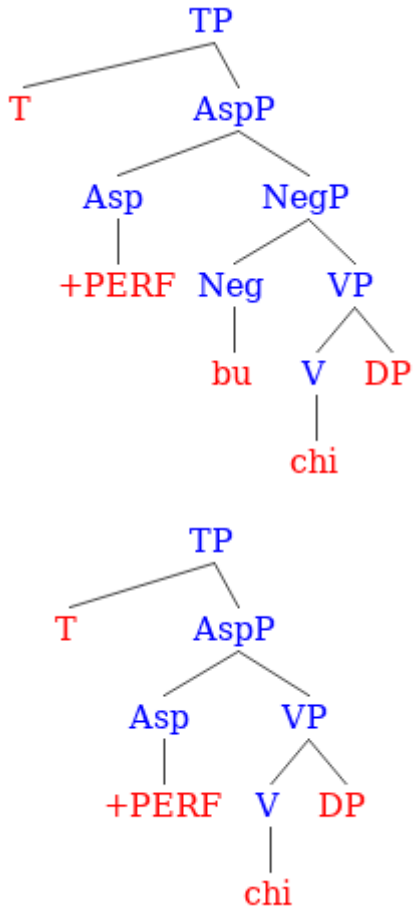

Figure 1 The partial structure for Example (7) and Example (1)

From my proposed structure, it is clear to see that, in sentences like example (1), [+Perfective] is checked covertly by the verb and thus 'le' in presented; while in the negated sentences like example (7), the NegP will block the process of covert feature-checking, leading to the absence of 'le'. Additionally, it is notable that due to the absence of 'le' in negated sentence, the interpretation of the completed state of an action also disappears. Example (7) gets the same habitual interpretation just as in English. (See Section 3.3 for a possible discussion of how to preserve the 'completed state' interpretation and the different forms of negation.)

3.2. Structure of "guo"

Li & Thompson categorizes 'guo' as an 'experiential' aspect marker that indicates that an event has happened in the past before [8]. Ernst points out that it differs from the English present perfective because it requires 'a change of state after the end of the described situation.', and that this event could happen at any time in the past [7]. Consider the following examples:

(13) Wo chi guo lilulian.

I eat GUO durian.

"I have eaten durians before."

(14) Wo qu guo Beijing.

I go GUO Beijing.

"I have been to Beijing before."

As another particle that follows the verb, if 'guo' is also categorized as the aspectual marker, then we should expect it functions similarly to the postverbal 'le', However, this is not true when it comes to the negated sentence:

(15) Wo mei chi guo liulian.

I NEG eat GUO durian.

"I have not eaten durians before."

(16) Wo mei qu guo Beijing.

I NEG go GUO Beijing.

"I have not been to Beijing before"

Surprisingly, 'guo' is present in the negated sentence, and the interpretation of the 'experience' stays. This demonstrates that at least, 'guo' should not be at the same head position as the postverbal 'le'. A new functional projection is needed to hold 'guo', and this position should not be intervened by the NegP. I propose the following structure:

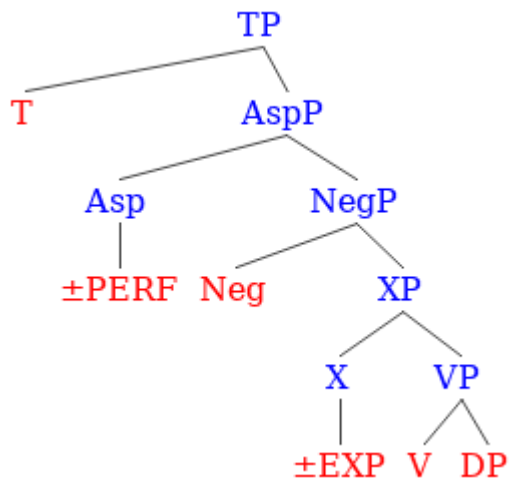

Figure 2 The structure with respect to 'le' and 'guo'

As illustrated by Figure 2, the new functional projection for 'guo' should be placed below the NegP so that the feature at the X head can be checked by the verb, and the [+Perfective] feature remained unchecked. If we follow Cinque's idea that separate aspect projections do exist, then this XP should be the AspP that dedicates to the experiential aspect [4]. The structure I am proposing is also not necessarily contradictory to the Mirror Principle [1], as shown by the following example:

(17) Canjia guo le huodong, wo lijie le youyi de zhongyaoxing.

Participate GUO LE activity I understand LE friendship DE importance.

"Having participated in the activity, I have understood the importance of friendship."

When 'guo' and 'le' follows the verb simultaneously, it is strictly ordered so that 'guo' must come before 'le'. According to Mirror Principle, 'le' should be placed higher in the structure than 'guo' does, which corresponds with my proposal.

There is no evidence that I could find to determine whether 'guo' is base-generated at the head or is the result of a morphological process. To maintain the consistency of aspectual markers, one might prefer the latter. For now, this issue will remain unclear as no evidence could be found to support either analysis.

3.3. Discussion on negations and postverbal particles

It is noteworthy that different words for negations have been used in the data I provided in this paper. Consider example (7), (15) and the new example(18) below:

(7) Wo bu chi pingguo.

I NEG eat apple.

"I don't eat apples."

(18) Wo mei (you) chi pingguo.

I NEG (have) eat apple.

"I haven't eaten the apple" (action has not started yet)

(15) Wo mei chi guo liulian.

I NEG eat GUO durian.

"I have not eaten durians before."

(15b) (*Wo bu chi guo liulian.)

As I mentioned in section 1, example (7) gets a habitual interpretation due to the absence of 'le', where 'bu' is used. While in example (18), the perfective interpretation stays, where 'mei' is used. The reason why (7) is introduced first is that 'bu' is the intuitive

negated word that one might come up with (for the author). The first problem is, why do we get a perfective interpretation in (18) when using 'mei' rather than 'bu'?

When negating a sentence with 'mei', an optional auxiliary verb 'you', which means have, could be used, and 'mei you' is usually preferred in formal speech. Wang claims that 'mei you' is in fact inseparable, and when 'mei' appears alone, 'you' is deleted by a late PF rule [16]. Wang also states that 'mei' is just a morphological variant of 'bu', when adjacent to 'you'. Now if we take this idea further, we might say that all 'mei' are actually 'mei you' as a result of the merge of the auxiliary verb 'you' and the negation 'bu/mei'. Consequently, 'mei you' together is able to check the [+pefective] aspect while the main verb remain blocked, resulting in a perfective interpretation. This should at least partially resolve the first problem. Wang's approach is debatable, however. Ernst provides another perspective on the relations between 'bu' and 'mei' that contradicts Wang's approach and my answers here [7]. Thus, future research is needed on the topics of relations between 'bu' and 'mei'.

The second problem is that why (15b) is ungrammatical. From my analysis, it is clear that we should treat 'le' and 'guo' differently, but there are no such things that prevents the generation of (6b). Even if we claim that 'bu' and 'mei' are in complementary distribution, and that 'bu' only appears when the sentence is [-perfective] and [-experiential], an underlying mechanism is still needed to explain this phenomenon.

4. CONCLUSION

In general, my study first addresses the ambiguity of 'le' analysis in Mandarin syntax theory and acquisition, with CLAN analysis from five longitudinal studies in CHILDES corpora. The analysis on non-occurring errors in children's utterances, along with the discovery of separate average time window for the acquisition of sentence-final 'le' (before 1;11) and the acquisition of the mandatory use of verbal 'le' (around 2;6), suggest that the distinction of two 'le's are not just positional but rather syntactical.

Then, following the syntactical two-le analysis approach, the generative structure of the postverbal 'le' and 'guo' in Mandarin is explored. Evidence from negated sentences disproves the affix-lowering analysis and a morphological account is needed instead. Furthermore, 'guo', traditionally recognized as one of the aspect markers, is argued to have different functional projections from 'le' due to their disparate behavior in negated sentences. This supports Cinque's idea that AspP should be subcategorized [4], but does not necessarily contradict the Mirror Principle.

My study further indicates the reciprocity between the fields of theoretical syntax and syntactic acquisition. Analysis on acquisition data may reveal the essential syntactic differences from ambiguous surface structures, and in return, structural establishment from syntactic theories may facilitate the process of identifying specific language development in the fields of language acquisition. To refine the timeline of syntax development in children, future acquisition researcher may want to carefully examine data from a more structural perspective, instead of a linear check on grammatical properties.

Issues remain regarding the relations among negations, aspects, and particles. This requires further work that incorporates more tests on the compatibility of other postverbal particles within the current generative framework established in Chinese linguistics. Additionally, future research on the separate acquisition time window of particles in Mandarin may be needed to substantiate the proposed categorization of my study.

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