The Accessibility Hierarchy in Chinese Relative Clauses

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Abstract
Generative grammarians often believe that learner language is systematic in that it adheres to fundamental principles that guide natural languages. For instance, numerous second language acquisition (SLA) studies have reported that learners’ acquisition order of English relative clauses (RCs) follows the “Noun Phrase Accessibility Hierarchy” (NPAH). The NPAH is roughly presented as Subject>Object>Indirect Object (IO)>Object of Preposition (OPreP), where “>” means “easier to relativize”, or “easier to acquire” as many SLA researchers interprets. However, recent studies raise doubts to the implicative power of the NPAH in the L2 acquisition of East Asian languages. Specifically, no previous studies have examined the relative acquisition difficulty across the above-mentioned four types of RCs in Chinese. Chinese uses the gap strategy for Subject and Object relativization, and the resumptive pronoun strategy for relativization in IO and OPreP positions. This study explores (in)consistencies between Chinese as a Foreign Language (CFL) learners’ learner language and the NPAH. We found that learners rely more on “pronoun” strategies as the position goes lower on the hierarchy. That is consistent with the NPAH observation that pronoun retention is more common in lower positions. Further analysis found that each individual participant’s learner language always adheres to the NPAH in the uses of gap versus pronoun strategies.

Keywords
Accessibility Hierarchy; Chinese relative clauses; acquisition difficulty

Introduction
Relative clauses (RCs) are an important sentence structure in many languages. In 1977, a generalization of the typology of RCs, referred to as the Noun Phrase Accessibility Hierarchy (NPAH, or AH), was made by Keenan and Comrie. The NPAH can be roughly presented as Subject>Object>Indirect Object>Object of Preposition, whereas “>” means “easier to relativize”, and is thought to be predictive of the relative difficulty of different types of RCs in language acquisition, until recent doubts have been raised as to the hierarchy’s applicability to East Asian languages. English examples of different types of RCs are illustrated below:

(1) a. [NP the man, [CP that [TP i kissed me]]] – Subject RC (SU)
   b. [NP the man, [CP that [TP I kissed __i ]] ] – Direct Object RC (DO)
   c. [NP the man, [CP that [TP I gave the book to __i ]] ] – Indirect object RC (IO)
   d. [NP the man, [CP that [TP I talk to __i ]] ] – Object of Preposition RC (OPreP)

An overwhelming number of acquisition studies in both first and second language (L1 and L2) of the postnominal RCs find that acquisition difficulty and orders are often consistent with the AH (Gass, 1979; 1982; Doughty, 1991; Eckman, Bell, & Nelson, 1988, etc.). It was thus proposed that processing ease might be responsible for the AH. However, several recent L2 acquisition studies in East Asian languages, including Japanese, Korean, Cantonese report findings that are not consistent with the NPAH (Jeon & Kim, 2007; Ozeki & Shirai, 2007; Yip & Matthews, 2007). Previous works on the processing ease and acquisition studies of Chinese RCs also yield controversial findings. The current project sets out to examine whether the NPAH can be applicable to L2 Chinese. Could the AH rightfully indicate the relative difficulty of different types of Chinese RCs for L2 learners? Could the NPAH constraint be applicable to Chinese relative clauses?

1 Background
The primary strategy for relativization is the gap strategy and an alternative is the resumptive pronoun strategy. Any RC-forming strategy must apply to a continuous segment of the hierarchy, and strategies that apply at one point of the AH may in principle cease to apply at any lower point (Keenan...
Comrie, 1977, p. 67). The use of the resumptive pronoun strategy has the reverse implicational order than the primary gap strategy: if a resumptive pronoun is used in position X, the resumptive pronoun must be used in all lower positions that can be relativized at all (Comrie & Keenan, 1979). The hierarchy also allows a possible overlap of the strategies as long as a particular strategy applies to a continuous segment of the hierarchy. Both the gap strategy (in which there is movement) and base generation with resumptive pronoun strategies are available to derive relative clause structures in Chinese: The gap strategy is used in SU and DO relative clauses, and resumptive pronouns are obligatory in IO and OPrep relativization. (2a-d) illustrate examples of Chinese relative clauses.

(2)a. [exihuan Lisi de na ge ren] zai  e like Lisi DE that CL person at Beijing shangxue.
   ‘The person who likes Lisi is studying in Beijing right now.’

b. [Lisi xihuan e de na ge ren] zai  Lisi like e DE that CL person at Beijing shangxue
   ‘The person that Lisi likes is right now studying in Beijing.’

c. [Wo jie-gei ta shu de na ge ren] xuexi hen renzhen.
   I lend-to he book DE that CL person study very serious
   ‘The person that I lent the book to studies very hard.’

d. [Wo xiang ta wen-lu de na ge ren] feichang naixin.
   I towards he ask-way DE that CL person very patient.
   ‘The person whom I asked the way of is very patient.’

2 Sentence Combination Task
2.1 Methods
2.1.1 Participants
45 native speakers of English participated in the experiment. All were CFL students enrolled in an intensive language program at an institute in North America that specializes in foreign language teaching. Prior to the conduct of the experiment, these participants received language instruction for 4 hours a day on weekdays for 2.5 semesters. Those participants were judged by the institutes’ trained professionals to be intermediate-mid to intermediate-high L2 speakers of Chinese by the American Council on the Teaching of Foreign Languages (ACTFL) standard. Participants ranged from 18 to 36 years old.

2.1.2 Materials and procedures
A written Sentence Combination Task was used to elicit production. Each participant was given a written test paper with 20 pairs of sentences and was instructed to combine pairs of sentences in each item, following the examples in the instruction section. (3) provides a test item with a pair of sentences. In the experiment, the items were presented in simplified Chinese characters, with pinyin/Romanization at the top of each character.

(3) Gangcai wo mama zai zhaoyi ge
   Just.now I mom PRG look.for one CL nvren.
   woman
   ‘Just now my mom was looking for a woman.’

   Na ge nvren xing Li.
   That CL woman name Li
   ‘That woman is named Li.’

The targeted answer for (3) is a DO relative clause, i.e., (4), which combines the information in the two statements in (3).

(4) Gangcai wo mama zai zhaoyide
   Just.now I mom PRG look.for DE
   na ge nvren xing Li.
   that CL woman name Li
   ‘The woman that my mother was looking for just now was named Li.’

The 20 test items include 4 items eliciting each of the following types of RCs: SU, DO, ID, OPrep, and Possessive RC in the Object position. Only the first four types of RCs are analyzed here. See Appendix for the test.

The items are randomly ordered and controlled for animacy: the second sentence in the pair always has a stative verb (e.g. ‘live’, ‘like’), or a predicate AdjP (which is roughly equivalent to a stative verb), or a copula, and the head noun of the target RC is [+human]. The experiment also has a counterbalanced design for SU and DO relatives: each SU relative has a DO relative counterpart. This experiment was administered in a regular class period of 50 minutes. Two instructors at that institute and the author together administered the experiment. A five-minute practice session with sample items was conducted before the main experiment.
2.2 Scoring
The test was scored based on whether the participants produced the target sentence, like (4). The scoring was either 1 (correct) or 0 (incorrect). Target-like productions with a pre-RC demonstrative (na ge ‘that CL’) and RCs without a demonstrative also receive 1 point.

Some participants combined pairs of sentences into a sequence that is not target-like by using the first sentence in the pair as the main sentence in their production. Such productions often do not yield a production with a relativization structure (when the second sentence in the pair contained a copula or an adjective phrase) and is considered a miscombination error. Data from participants who made this type of error for most survey sentences, as well participants whose production could not be in anyway potentially analyzed as RC structures were excluded from analysis, leaving 34 participants’ data for analysis.

2.3 Results
The scoring for each type of RCs is summarized in Table 1; different types of errors were identified and summarized in Table 2.

Table 1  Scoring of Different Types of RCs

<table>
<thead>
<tr>
<th>RC type</th>
<th>SU RC</th>
<th>DO RC</th>
<th>IO RC</th>
<th>OPrep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>121</td>
<td>117</td>
<td>27</td>
<td>39</td>
</tr>
<tr>
<td>Mean accuracy</td>
<td>88.97%</td>
<td>86.03%</td>
<td>19.85%</td>
<td>28.68%</td>
</tr>
</tbody>
</table>

Table 2 Error Types in Different Types of Relative Clauses

<table>
<thead>
<tr>
<th>Error types</th>
<th>SU RC</th>
<th>DO RC</th>
<th>IO RC</th>
<th>OPrep</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronoun retention</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Missing pronoun</td>
<td>/</td>
<td>/</td>
<td>90</td>
<td>46</td>
<td>136</td>
</tr>
<tr>
<td>Change into SU RC</td>
<td>4</td>
<td>7</td>
<td>14</td>
<td>25</td>
<td>66</td>
</tr>
</tbody>
</table>

Note. Some error types, including miscombinations, missing/wrong preposition in OPrep RC, missing RC marker de, structural errors irrelevant to relative clause, and orthographical errors not included.

Pronoun retention refers to cases where a pronoun was used in a position where there should be a gap, i.e., in the relativization of SU and DO positions in Chinese. Missing pronoun errors are cases where learners failed to a resumptive pronoun in IO and OPrep relative clauses. Resumptive NP errors occur only in IO and OPrep relativization in the data. That is, instead of using a resumptive pronoun, learners used the head NP in the position that was being relativized. An example was given in (5), with ‘one-CL friend’ within the RC as the resumptive NP.

(5) Xiaozhang gei-le yi ge pengyou
   Xiaozhang give-PERF one CL friend
500-kuai-qian de na-ge pengyou
500-CL-money DE that-CL friend
mei-you gongzuo
not-have job

Intended: ‘The friend whom Xiaozhang gave 500 dollars to does not have a job.’

The error of change into a SU RC type applies to situations where when DO, IO, or OPrep relative clauses were being elicited, learners produced SU RCs instead, sometimes with the addition of passive marker bei in their production and occasionally involving a meaning change. (There were no cases where targeted Subject RCs were changed into other types of relativization by learners.) For instance, a paired-item eliciting an OPrep relative clause was shown in (6a), with the targeted production in (6b). An example of such an error of change into SU RC type was given in (7).

(6)a. Wo mama xiang yi ge ren wen-lu.
   I mom from one CL person ask-way.
   ‘My mother asked a person for directions.’
   Na ge ren shi ge lao taitai.
   That-CL person BE CL old lady
   ‘That person was an old lady.’

b. Wo mama xiang ta wen-lu de na ge
   I mom from her ask-way DE that CL
   ren shi ge lao taitai.
   person BE CL old lady
   ‘The person that my mother asked directions from was an old lady.’

(7) Xiang wo mama wen-lu de ren shi
    from I mom ask-way DE person BE
    ge lao taitai.
   CL old lady
   ‘The person who asked my mother for directions is an old lady.’

The error of missing pronoun is self-explanatory and the resumptive NP error will be discussed in the next section.

2.4 Discussion
2.4.1 SU versus DO relatives
The scores for SU and DO RC productions were higher than the scores of IO and OPrep RCs, indicating that the latter two types of relativization are much harder, consistent with the implicational order that one would assume based on the NPAH.

But scores of SU versus DO RCs were close, i.e. 121 vs. 117, which did not seem to provide support for the expected ease of SU relatives.
But this was not evidence against the hierarchical difference either; it could be explained in terms of a “ceiling effect”, since “the hierarchy does not exclude grammars in which both SU and DO relatives emerge simultaneously and are acquired before [other types of] relatives” (Eckman, 2007, p. 325). It is possible that these L2 learners of Chinese have acquired similar competence in SU and DO relativization at the time of the experiment. Additionally, the error of changing RC type may indicate that Subject RCs could indeed be easier than other types, since participants tended to produce Subject RCs even when they have to add an additional grammatical element or changed the meaning of the combined sentence.

2.4.2  IO and OPrep relatives

The score for IO relatives is higher than the score for OPrep relative clauses (27 vs. 39). This might be taken to imply that learners have acquired better competence with OPrep than IO relativization, which would be puzzling if one believes that consistency between the hierarchy and acquisition difficulties should be universal.

At the same time, it is noticeable that the most prevalent error in IO relativization is missing pronoun, which directly leads to less accuracy with IO RCs. Learners made fewer missing pronoun errors with OPrep RCs. Recall that the NPAH states that both the gap strategy and the resumptive pronouns are legitimate strategies in a language. If one considers the learners’ learner language, (interlanguage, or IL) to be an independent language, disregarding how much the IL conforms to the target language, the learners’ relativization strategies can be summarized as Table 3. In Table 3, instances of missing pronoun were temporarily not considered as an “error” but were instead analyzed as the learners’ use of a gap strategy in these positions. Recall that there were also two instances of pronoun retention error in Direct Object RCs as seen from Table 2. These were also considered as a relativization strategy instead of an error here. It is obvious from Table 3 that as the position goes lower on the hierarchy, L2 learners tend to rely more on the resumptive pronoun strategy and avoid the gap strategy.

Table 3 Strategies Used for Different Types of RCs

<table>
<thead>
<tr>
<th>RC type</th>
<th>SU RC</th>
<th>DO RC</th>
<th>IO RC</th>
<th>OPrep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap</td>
<td>119</td>
<td>117</td>
<td>90 (*)</td>
<td>46 (*)</td>
</tr>
<tr>
<td>Pronoun strategy</td>
<td>0</td>
<td>2 (*)</td>
<td>27</td>
<td>39</td>
</tr>
</tbody>
</table>

Note. * indicates that using the pronoun strategy for DO and the gap strategy for IO and OPrep RCs are not target-like.

That is consistent with the original observation stated by the NPAH, that pronoun retention is more common in lower positions.

2.4.3  Individual data

Since one cannot assume the interlanguage of all learners to be the same, it is important to examine individual learners’ use of relativization strategies in order to assess the rule of the NPAH to learners’ IL. Assuming again that both the gap strategy and the resumptive strategies are potential strategies in a learners’ IL, with a few productions with other error types such as change into SU RC type excluded, individual learners’ use of different strategies are summarized in Table 4, with comparable natural language examples cited in Keenan & Comrie (1977) listed.

Table 4 Patterns of pronoun retention in learner language

<table>
<thead>
<tr>
<th>SU</th>
<th>DO</th>
<th>IO</th>
<th>OPrep</th>
<th>Number of Participants</th>
<th>Natural languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>+</td>
<td>+</td>
<td>2</td>
<td>2</td>
<td>Persian; English</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>+</td>
<td>5</td>
<td>5</td>
<td>Genoese; Chinese</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>7</td>
<td>Shano; Japanese;</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>17</td>
<td>17</td>
<td>English; English</td>
</tr>
<tr>
<td>-</td>
<td>(+)</td>
<td>(+)</td>
<td>1</td>
<td>1</td>
<td>Japanese; English</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>?</td>
<td>2</td>
<td>2</td>
<td>English</td>
</tr>
</tbody>
</table>

Note. “-” means that pronouns are not retained in that position when it is being relativized (a gap strategy is used when relativizing an NP in that position); “+” means that a pronoun strategy is used when relativizing an NP in that position. “(+)” means that the retention of the pronoun varies in the learners’ production and is optional in the natural language examples. “?” indicates lack of data. Irrelevant errors such as RC internal structural errors and miscombination are excluded from consideration in this table.

Two learners started using the pronoun retention strategy occasionally at the DO position on the hierarchy, and they used the pronoun strategy systematically for IO and OPrep RCs. Seven L2 learners used the gap strategy systematically for the RCs on SU, DO, and IO positions, and they used the pronoun strategy systematically for OPrep RCs. Six five participants used relativization strategies that conform to the grammar of the target language, i.e., Chinese: they used the gap strategy on SU and DO positions, and the pronoun strategy at lower positions. Seventeen L2 learners used the gap strategy to relativize all the four positions. That matches with the grammar of relativization strategies in English. Finally, two learners used
the gap strategy systematically for SU, DO, and IO positions, but there is no evidence of their using either the gap or the pronoun strategy for OPrep RCs because they made other errors such as miscombination, changing RC type, etc. Finally, one particular learner used the gap strategy systematically for SU and DO RCs, but uses the pronoun strategy occasionally for IO and OPrep RCs. Still, this learners' IL is not inconsistent with the hierarchy, as the AH does not exclude a grammar that permits flexibility within the two relativization options (gap and pronoun) on two adjacent positions. In sum, although the patterns that participants adopted in using different strategies did not always adhere to the target language form or the native language form, learners were using alternative strategies in a way consistent with the principles dictated by the NPAH.

However, if one is to interpret higher accuracy automatically as "less difficulty" or "better competence", then the Accessibility Hierarchy does not always predict the learners' acquisition difficulty: L2 participants achieved higher scores for targeted OPrep than IO relative clauses. To this, the author would like to entertain a possibility that some psycholinguistic factors may have caused the L2 participants to use the gap strategy more in IO position than in the OPrep position, thus having learners committing errors of missing pronouns in IO positions. The same psycholinguistic factors could have motivated the typology of the Accessibility Hierarchy in natural languages, from which we always observe that the gap strategy is used in higher positions, while the resumptive pronoun is used in lower positions. While the current paper does not delve into the details, Keenan & Comrie (1977) discussed possibilities from the processing perspective to explain the AH. In previous SLA studies that examined the relative difficulty of SU versus DO relative clauses in English, researchers also discussed the relevance of psycholinguistic factors in learner production (Hamilton, 1994; Izumi, 2003, etc.).

The author would like to tentatively hypothesize why consistency between the NPAH and acquisition difficulty was often found in English as a second language studies: this could be largely due to the fact that English RCs use the gap strategy throughout the four positions under examination, and therefore processing difficulty, which results in the markedness described in the AH, would have triggered learners to progressively rely more on resumptive pronoun strategies in lower positions, resulting in less accuracy in those less accessible positions. One should also note that the NPAH was not originally formulated as a predictor of acquisition difficulty or acquisition order.

2.4.4 Resumptive NPs

There were three cases of resumptive NP error with IO relative clauses and four cases with OPrep RCs. While these cases are not counted in the "resumptive pronoun" strategy in Table 3, they do indicate that those learners are also using a non-movement strategy in relativizing these positions. Relativization using a resumptive NP is not referred to as a legitimate relativization strategy by the NPAH, but interestingly, examples of resumptive NP were reported in the L1 acquisition of Chinese RCs by Chinese children (Hsu, Hermon, & Zukowski, 2009). It is possible that while learners have not acquired the relativizing strategy at the IO and OPrep positions, they are aware of the subordinate relationship of the relative clause to the main clause, as well as a co-indexing relationship of the relative head to the relativized position within the RC. There could be several reasons why such an error is not seen in SU and DO relative clause production: for one, those positions are higher on the hierarchy, and may be "easier to acquire"; or because the filler-gap distance in SU and DO relatives are shorter, using a movement strategy in those positions are not as "costly" and the learners' processor can "afford" it.

3 Conclusion

There is evidence from this experiment that Indirect Object and Object of Preposition Relative Clauses are indeed harder than Subject and Object RCs. L2 learners can produce Direct Object and Subject relative clause with similar accuracy. This can be interpreted as a ceiling effect; on the other hand, evidence such as change into SU RC type errors may indicate that Subject RCs could be easier in terms of less processing cost.

To address our first research question: Can the NPAH predict the relative difficulty of different types of RCs for L2 learners? If accuracy rate is taken as an indicator of production ease, then the AH could not serve as such a predictor. As to the second research question, could the Hierarchy be applicable to Chinese as a foreign language learners' interlanguage, both group and individual data do indicate that learners' interlanguage adheres to this natural language constraints: Learners used the gap strategy as the primary strategy, starting at the highest position (i.e., Subject), and used that strategy on a continuous segment on the hierarchy; learners also used pronoun coindexation as an alternative strategy at lower positions on a continuous segment on the hierarchy. In that sense, L2 Chinese speakers’ learner language exhibits
patterns consistent with the AH.

References

Appendix  Sentence Combination Task Survey
Combine Sentences 合成句子
Following the examples, combine each pair of the sentences into one.

Example: (a) 一个朋友送了我一束花。那个朋友是美国人。→ 送了我一束花的那个朋友是美国人。
(b) 小王昨天遇见一个女生。那个女生很漂亮。→ 小王昨天遇见的那个女生很漂亮。
(c) 昨天晚上王先生跟一个女孩子跳舞。那个小姐是我的同学。→ 昨天晚上王先生跟她跳舞的那个女孩子是我的同学。
(d) 有个朋友送了我一件礼物。那个朋友对大家都很友好。→ 送了我一件礼物的那个朋友对大家都很友好。

Exercises:
(1) 刚才有女人在找我妈妈。那个女人姓李。
(2) 王经理赔了一个客人三百美金。那个客人很不讲道理。
(3) 张力一直鼓励一个同学。那个同学和他在一个班上学中文。
(4) 安妮和一位老师在吃饭。那位老师会说法语。
(5) 昨天小王帮了一个美国学生。那个美国学生是班上新来的朋友。
(6) 坏人打伤了一个女人的丈夫。那个女人非常担心。
(7) 王先生在屋子里等一个朋友。那个朋友是他中学的同学。
(8) 小李在走廊问候一个人。那个人以前也在这个学校读书。
(9) 我妈妈向一个人问路。那个人是个老太太。
(10) 坏人抢了一个男的的钱包。那个男人非常生气。
(11) 我弟弟送了一个女孩一本书。那个女孩很高兴。
(12) 小偷偷了一个同学的电脑。那个同学很不高兴。
(13) 我哥哥向一个朋友买了一台电脑。那个朋友在电脑公司工作。
(14) 有个小孩在路上撞倒了小王。那个小孩很小还不太会走路。
(15) 小张给一个朋友五百块钱。那个朋友没有工作。
(16) 我哥哥借给了一人一本中文书。那个人想了解中文文化。
(17) 我向一位老师请教了这个问题。那位老师对学生特别好。
(18) 小林弄坏了一个孩子的玩具。那个孩子很不开心。
(19) 有个朋友每个周末都陪小李。那个朋友和他关系特别好。
(20) 有个同学昨天拜访了小张。那个同学待人很热情。