

# Tamil Children's Comprehension of Recursive Locatives and Relativized Sentences

Usha Lakshmanan

## 1. Introduction

The current research investigated Tamil children's comprehension of recursive-phrases to determine evidence in support of Roeper's (2011) proposals for a two-step acquisition path leading to adult-like understanding of Indirect-Recursion: (1) Direct-Recursion (i.e., conjunctive interpretation via a simple Merge operation) and (2) Indirect-Recursion (iterative embedding of one phrasal category inside another of the same type). Previous research on English, Japanese and other languages supported a two-step acquisition path (e.g., Fuchimori 2010; Limbach and Adone 2010; Pérez-Leroux et al. 2012; Tavakolian 1981). The evidence (for possessives, locatives/PPs etc.) showed that children < 6 have difficulties going beyond single recursives (e.g., *Tom's dog*; *The apple on the plate*) and misinterpret 2-part (3-and 4-part) recursive phrases as conjunctives (e.g., *Tom's friend's dog* is interpreted as "Tom's dog and his friend's dog"; *The apple on the plate under the table* as "The apple on the plate and the apple under the table"). Likewise, they also experience difficulties with understanding relativized sentences such as, *The dog chased the horse that jumped over the fence*, and misinterpret them instead as coordinate sentences (e.g., "The dog chased the horse and jumped over the fence").

However, in my previously published research on Tamil children's comprehension of recursive possessives in Tamil<sup>1</sup> (Lakshmanan 2021), I found that Tamil children (< 5 years and > 5 years) were equally successful on 1-part,

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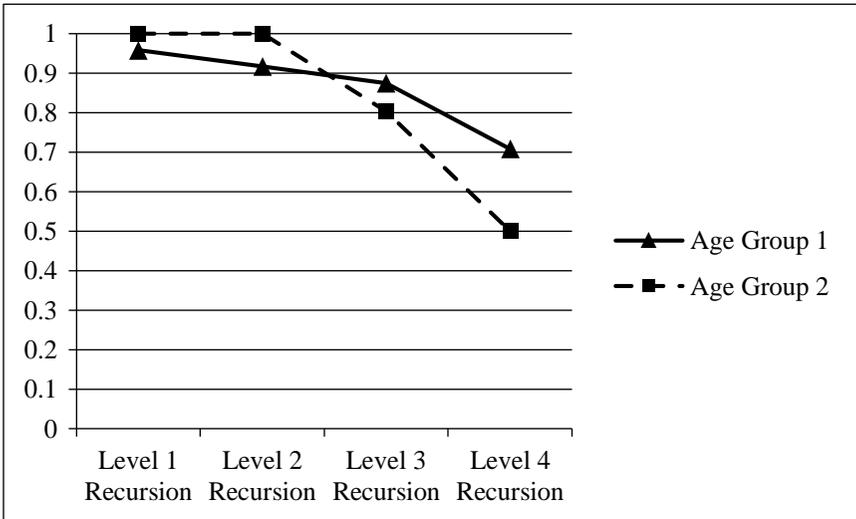
\* Usha Lakshmanan, Southern Illinois University Carbondale, usha@siu.edu. I am grateful to the Tamil children who participated in the study and to their parents. I thank L. Kalavathi, Maheswari, and B. Rajeswari for their help in recruiting participants for the study. I thank Yee Pin Tio for her feedback on the pictures used in the tasks and Latha Shanker for her help with the data analysis. I am grateful to R. Amritavalli, Barbara Lust, Tom Roeper, Deb Foucault, Vaijayanthi Sarma, Jill de Villiers and the audience at the oral presentation at BUCLD 46 for their valuable comments and discussion. This research was made possible through a sabbatical leave in the fall of 2018, granted to me by Southern Illinois University Carbondale.

<sup>1</sup> Tamil belongs to the Dravidian language family and is primarily spoken in India (in the southern state of Tamil Nadu and the Union territory of Puducherry). Besides India, Tamil is also spoken in Malaysia, Sri Lanka, and Singapore; it is also used in immigrant communities in the U.S. and Canada.

2-part, 3-part and 4-part possessives. A picture-cum-story context, adapted from the one developed by Tom Roeper (2011) and Terunuma et al (2017), was used to assess the children's comprehension of recursive possessives in Tamil. The story revolved around two friends--Balu and Sanjay and their families. They all went to the beach where they had a great time. They each got a balloon and the pictures showed each one holding a different colored balloon. Examples of questions (in Tamil) that were used to assess the children's comprehension of 1-part, 2-part, 3-part and 4-part recursive possessives are shown in (1a-1d).

- (1) a. Balu-(v)-ooDu balloon enna niram?  
 Balu-GEN balloon-NOM what color  
 'what is the color of Balu's balloon?'
- b. Balu-(v)-ooDu akkaa-(v)-ooDu balloon enna niram?  
 Balu-GEN sister-GEN balloon-NOM what color  
 'What is the color of Balu's sister's balloon?'
- c. Kavya-(v)-ooDu tambi-ooDu pirenD-ooDu balloon  
 Kavya-GEN younger brother-GEN friend-GEN balloon-NOM  
 enna niram?  
 what color  
 'What is the color of Kavya's younger brother's friend's  
 balloon?'
- d. Asha-(v)-ooDu tambi-ooDu pirenD-ooDu naay-ooDu  
 Asha-GEN younger brother-GEN friend-GEN dog-GEN  
 balloon enna niram?  
 balloon-NOM what color  
 'What is the color of Asha's younger brother's friend's dog's  
 balloon?'

Overall, the results indicated that the interaction between Age-Group and Possessive Recursion Type did not significantly impact the proportion of correct responses to the questions (see Figure 1). Nor were there significant main effects for Age group. Only Possessive Recursion Type had significant main effects. Pairwise comparisons showed that the mean differences between 1-part, 2-part and 3-part possessives were not statistically significant; only the mean differences between 1-part, 2-part versus 4 part possessives were significant; and the mean differences between 3-part and 4 part possessives approached significance. In sum, the evidence from my previous work on recursive possessives in Child Tamil (Lakshmanan 2021) was that, unlike what has been observed for Child English, Child Japanese and other languages, Tamil children below the age of 5 years and above the age of five years were equally successful in understanding indirect recursion in possessives (including multiple possessives) although they experienced some difficulties with 4-part possessives.



**Figure 1: Mean proportion of target responses given by Age Group 1 (< 5 years) and Age Group 2 (> 5 years) children for each Possessive Recursion Type (Lakshmanan 2021).**

In Lakshmanan (2021), I attributed early emergence of indirect-recursion, in relation to possessives in Child Tamil, to its branching directionality (i.e., Tamil is a consistently left-branching, head final, SOV language), its overt morphological (agglutinative) form-function mapping (i.e., there are no homophonous forms, unlike in the case Japanese, where the genitive and locative forms are identical), and importantly, Tamil children's early experience with complex kinship terminology<sup>2</sup>. The current study builds upon my previous work on the development of recursive possessives in Child Tamil. Specifically, the study sought to investigate whether the advantage observed for possessives also extends to recursive locatives and relativized sentences in Child Tamil.

As stated earlier, Tamil is a head-last consistently left-branching language, and as in the case of possessives, locative phrases and relative clauses are also left-branching. Locative phrases are marked by an overt locative case marker (or postposition). Unlike in English, recursive locative phrases require linking via relativization (i.e., more explicit mapping of embedding). Examples of single level and two-level recursive locatives are provided in (2) and (3) respectively.

<sup>2</sup> Tamil has complex kinship terminology, that is, specific (single) lexical items which encode or represent complex (hierarchical) kinship relationship concepts, which Tamil children are exposed to from an early age. In Lakshmanan (2021) I hypothesized that Tamil children's early experience with such complex kinship terms could provide them with an advantage (vis-à-vis English and Japanese speaking children) in the processing and interpretation of indirect recursive possessives.

- (2) kuLatt-ile iru-kkir-a mudalai-ai kaami  
 pond-LOC be-PRES-RP crocodile-ACC Show(IMP)  
 ‘Show me/point to the crocodile in the pond’  
 (Literally: Show me the crocodile that is in the pond).
- (3) a. kuLatt-ile iru-kkir-a ] mudalai meela iru-kkir-a]  
 pond-LOC be-PRES-RP crocodile on be-PRES-RP  
 kurang-ai kami  
 monkey-ACC show(IMP)  
 ‘Show me/Point to the monkey on the crocodile in the pond’  
 (Literally: Show me the monkey that is on the crocodile that is  
 in the pond)
- b. marattu kizhe iru-kkir-a kuuDay-ile iru-kkir-a pazham  
 tree below be-PRES-RP basket-LOC be-PRES-RP fruit  
 enna pazham  
 what fruit  
 ‘Tell me the name of the fruit in the basket under the tree’  
 (Literally: What is the fruit that is in the basket that is under  
 the tree?)

Without relativization, the interpretation of sentences such as 3(a-b), for example, would be consistent with a conjunctive reading as illustrated in (4).

- (4) kuLatt-ile mudalai meela kurang-ai kami  
 pond-LOC crocodile on monkey-ACC show(IMP)  
 ‘Show me/Point to the monkey in the pond and the monkey on the  
 crocodile’

Relative clauses in Tamil are prenominal (left-branching) and consist of three types, namely the Participial relative, the Tag relative and the Correlative. The participial relative is a predominant mode of relativization in Tamil and is frequent in both colloquial and formal Tamil (Annamalai 1969; Lehmann 1989; Lakshmanan, 2000). Furthermore, it is a movement relative and involves movement of a null WH-Operator (Lakshmanan 2000). In terms of its interpretation, the participial relative is pragmatically neutral with respect to the hearer’s knowledge about the presupposition in the relative clause. Examples of the participial relative clause type are shown in (5-6).

The example in (5) shows the relativized sentence in the unmarked SOV order, with the participial relative clause embedded within the Object Phrase. The relative clause along with the head noun (i.e. the object) can be scrambled past the subject as shown in (6), resulting in the OSV word order. The verb in the embedded relative clause, which is positively specified for tense (but not agreement), takes the Relative Participial suffix -a.

- (5) Relativized Sentence (Unmarked SOV order)  
 maaDu [[veeli taanDi gudi-cc-a] naay-ai]  
 Cow-NOM fence cross-VBP jump-PAST-RP dog-ACC  
 torattittu  
 chasePAST.3SN  
 ‘The cow chased the dog that jumped over the fence’
- (6) Relativized sentence (Scrambled word order: OSV)  
 [[veeli taanD-i gudi-cc-a] naay-ai] maaDu  
 fence cross-VBP jump-PAST-RP dog-ACC cow-NOM  
 torattittu  
 chase-3SN  
 ‘The cow chased the dog that jumped over the fence’

Recall that in recursive locatives, explicit mapping of the embedding via relativization is required. The examples of relativization in the recursive locatives shown in (2-3) are also of the participial relative type.

Unlike the participial relative, the Tag relative is a non-movement relative (Lakshmanan, 2000). It is typically attested in colloquial Tamil and is pragmatically restricted to contexts where the hearer knowledge of the information contained in the relative clause can be presupposed. The relativized sentence, shown in (7), illustrates the use of a tag relative.

- (7) [[pro veeli taanDi gudi-cc-adu-illa] ante maaDu]] naay-ai  
 fence cross-VBP jump-PAST-3SN-COMP that cow. dog-ACC  
 torattittu  
 chase-PAST.3SN  
 ‘The cow chased the dog that jumped over the fence’  
 (Literally: ‘A cow/It jumped over the fence, isn’t it? that cow chased  
 the dog’)

The correlative, which is also pragmatically restricted, rarely occurs in colloquial Tamil and is more common in the formal/literary variety (Lakshmanan, 2000: 590).

Lakshmanan (2000) investigated the acquisition of relative clauses by Tamil children (age range: 2;11 to 6;6) using a picture-cued production task. The study found that younger children (< 5 years) produced significantly fewer participial relatives than the older children (> 5 years). The younger children preferred Tag-relatives, which as stated earlier, does not entail movement, unlike the participial relative; whereas the older children, preferred participial relatives, which involves movement of a null-WH operator. However, although the younger children exhibited a preference for the Tag-Relative, every child in the younger age group produced at least one (or more) participial relatives which indicated that the age related differences observed does not stem from differences in their underlying competence. The results based on Lakshmanan’s (2000) study on Tamil children’s

production of relative clauses, differs from the results based on an early experiment on Tamil children's comprehension of complex structures by Garman (1974), who argued that young Tamil children employ pre-linguistic strategies in their processing of complex sentences, including participial relative clauses. However, as Lust and Eisle (1991) have observed in their critique of Garman's study, Garman's conclusions regarding the children's use of pre-linguistic strategies are not valid, and that in fact, the findings of his study point to the children's sensitivity to the grammar (i.e., the left branching directionality) of Tamil.

## **2. Methodology**

### **2.1. Participants**

Twenty-six Tamil children from low income households, who were living in the city of Chennai, in the State of Tamil Nadu in India, were recruited to participate in the current research. The current research formed a part of a larger study, which included my previously reported work on Tamil children's comprehension of recursive possessives (Lakshmanan, 2021). The children ranged in age from 2;10 to 7;5. The children were recruited from local day care centers, kindergarten and elementary schools in the Mylapore area of Chennai. They were assigned to two age groups: Group 1 and Group 2. Group 1 consisted of 12 children (7 Females and 5 Males) below the age of 5 years, with a Mean age of 3;7 (Age Range = 2;10 - 4;10). Group 2 consisted of 14 children (7 Females and 7 Males) above the age of 5 years with a Mean Age of 6;6 (Range = 5;3 - 7;5). The children's home language was Tamil, which they were exposed to from birth. Group 2 (older children) were attending an English medium school when the study was conducted.

### **2.2. Materials and Procedures**

A picture cum story task, partly based upon an experimental item in the study by Pérez-Leroux et al (2018) used to elicit recursive PPs, was created to assess the Tamil children's comprehension of recursive locatives. As shown in Figure 2, the story revolved around a family of monkeys and their friends, two crocodiles. The monkeys have moved newly to the area next to a large pond. While they have mangos a'plenty on the bank where they live, they have to go across to the other side to avail of the delicious bananas. The crocodiles help them by taking them across on their backs. The picture shown in Figure 2 is a black and white version of the original picture (in color) that was presented to the children. After the children were familiarized with the story and the pictures of the various objects and characters, they were asked comprehension questions involving one-part locatives (3 trials in all) and 2-part locative phrases (5 trials in all), which could be responded to via a pointing action and/or an oral response. The session with each child was conducted individually.



**Figure 2: Picture-cum story task for assessing comprehension of recursive locatives**

Examples of the one-part and 2-part locative phrases, used to assess the children's comprehension, are shown in (2) and (3) respectively and are repeated in (8-9). In relation to the sample experimental item in (8), as can be seen from the picture in Figure 2, there are two crocodiles (one in the pond and one on the bank). In relation to the item in (9a), the picture depicts each of the crocodiles (the one in the pond and the one on the bank) carrying a monkey on their backs. There is also a monkey shown wading in the pond. As for the sample experimental item illustrated in (9b), the picture depicts one basket, under a tree, with a mango in it, and another basket, which is not under a tree, that has a banana in it; there is also a banana that is lying on the ground, under the tree but not inside a basket.

(8) Level 1 recursion: Locative

kuLatt-ile      iru-kkir-a      mudalai-ai      kaami  
 pond-LOC      be-PRES-RP      crocodile-ACC      Show(IMP)  
 'Show me/point to the crocodile in the pond'  
 (Literally: Show me the crocodile that is in the pond)

(9) Level 2 recursion: Locative

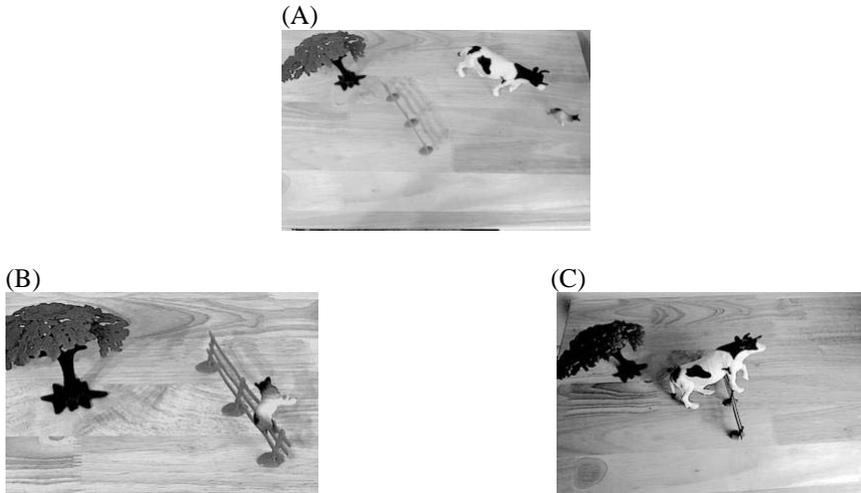
a. kuLatt-ile iru-kkir-a ] mudalai meela iru-kkir-a]  
 pond-LOC be-PRES-RP crocodile on be-PRES-RP  
 kurang-ai      kami  
 monkey-ACC      show(IMP)  
 'Show me/Point to the monkey on the crocodile in the pond'  
 (Literally: Show me the monkey that is on the crocodile that is  
 in the pond)

- b. marattu kizhe iru-kkir-a kuuDay-ile iru-kkir-a pazham  
 tree below be-PRES-RP basket-LOC be-PRES-RP fruit  
 enna pazham  
 what fruit  
 ‘Tell me the name of the fruit in the basket under the tree’  
 (Literally: What is the fruit that is in the basket that is under  
 the tree?)

Let us turn now to the task used to assess the children’s comprehension of relativized sentences. A sentence-picture matching task was used to assess the children’s comprehension of relativized sentences. In all, there were seven target relativized sentences, with the relative clause embedded within the Object phrase. Only the participial relative clause type was used and all the sentences were in the unmarked SOV order, as illustrated in (5), which is repeated in (10).

- (10) maaDu [[veeli taanDi gudi-cc-a] naay-ai]  
 Cow-NOM fence cross-VBP jump-PAST-RP dog-ACC  
 torattittu  
 chase-PAST.3SN  
 ‘The cow chased the dog that jumped over the fence’

In the sentence-picture matching task, the children were first shown a picture of the different animals on a farm. They were familiarized with the animals and their ability to identify and name the animals was verified. It is important to note that there was more than one animal belonging to the same animal category. The picture with all the farm animals was placed such that it was visible to the child during the sentence picture matching task. They were then shown pictures (in color) of events involving some of the animals and were familiarized with them. Then the sentence picture matching trials began. There were 7 trials in all. In each trial, a picture (in color), depicting an event, such as the one in (A) in Figure 3, was presented. Then two more pictures (also in color), depicting the events as shown in (B) and (C) were presented below the picture in (A). I then spoke aloud a Tamil sentence describing an event. For example, in relation to the sample pictures shown in Figure 3, the target Tamil sentence used to assess the children’s comprehension was the one shown in (10), which means ‘The cow chased the dog that jumped over the fence’. In the event described, the distractor picture is the one in (C), where the cow is shown jumping over the fence, which would be consistent with a coordinate interpretation. The children were asked to choose between the two pictures in (B) and (C) that would, along with the first one in (A), match the event described in the target relativized sentence presented. So for the example sentence uttered, in relation to the pictures in Figure 3, the child was expected to select the picture in (B), where the dog is shown jumping over the fence, which would be consistent with a relative clause embedded response.



**Figure 3: Sample sentence picture task for assessing comprehension of relativized sentences**

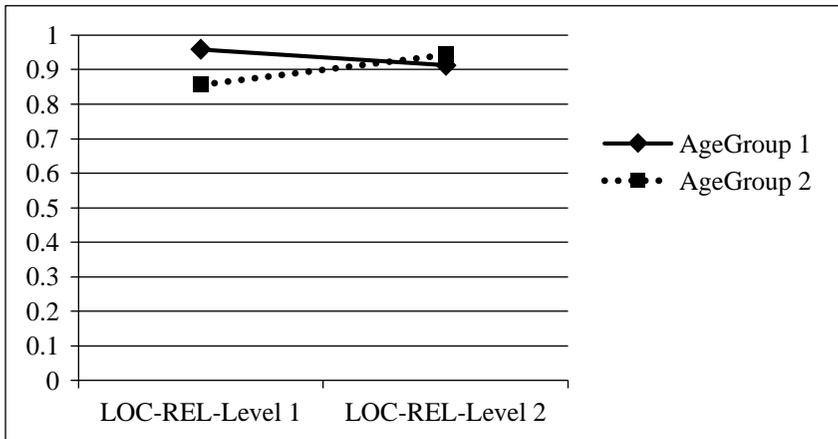
The entire interview session with each child was audiotaped. The children's responses were also noted down in writing (on coding sheets). The audiotaped recordings of the children's responses to the target experimental comprehension items were transcribed. The responses in relation to the recursive locative items were categorized based on their accuracy in interpreting the single and two-part locatives. The children's responses to the sentence-picture matching task, involving relativized sentences, were categorized into two types, namely, Relative-clause Interpretation Type and Coordinate clause Interpretation Type.

The proportion of correct responses in the two categories of recursive locatives (Level 1 [one-part] and Level 2 [two-part]) was computed for each child. Repeated Measures ANOVA with AgeGroup (between-subjects variable) and locative-Recursive-Type (within-subjects variable) was carried out with proportion of accurate responses as the dependent measure in order to determine whether there was a significant interaction between Age Group and Recursive locative Type.

As for the relativized sentence, the proportion of responses in each of the two categories of Sentence Interpretation Type (i.e., Embedded Relative Clause Interpretation Type and Coordinate Clause Interpretation Type) was computed. Repeated Measures ANOVA with AgeGroup (between-subjects variable) and Sentence Interpretation-Type (within-subjects variable) was carried out with proportion of responses as the dependent measure, in order to determine whether there was significant interaction between Age Group and Sentence Interpretation Type.

### 3. Results

The chart in Figure 4 presents a visual comparison of the Mean Proportion of target responses given by the children for Level 1 recursive locatives (Group 1 < 5 years:  $M= 0.958$ ,  $SD= 0.118$ ; Group 2 > 5 years:  $M= 0.856$ ,  $SD= 0.216$ ) and for Level 2 recursive locatives (Group 1: < 5 years:  $M= 0.913$ ,  $SD= 0.181$ ; Group 2: > 5 years:  $M= 0.943$   $SD=.094$ ). The results of the Repeated Measures ANOVA showed that the interaction between Age-Group and Locative Recursion Type did not significantly impact the proportion of correct responses to the comprehension questions ( $p=.211$ ). Nor were there any statistically significant Main-Effects for Age-Group ( $p=.484$ ) or Recursion Level Type ( $p=.443$ ). The Tamil children (regardless of their age) were equally successful in understanding both Direct (Level 1) and Indirect (Level 2) recursive locative phrases, which, as stated earlier, entail the use of relativization for embedding.<sup>3</sup>

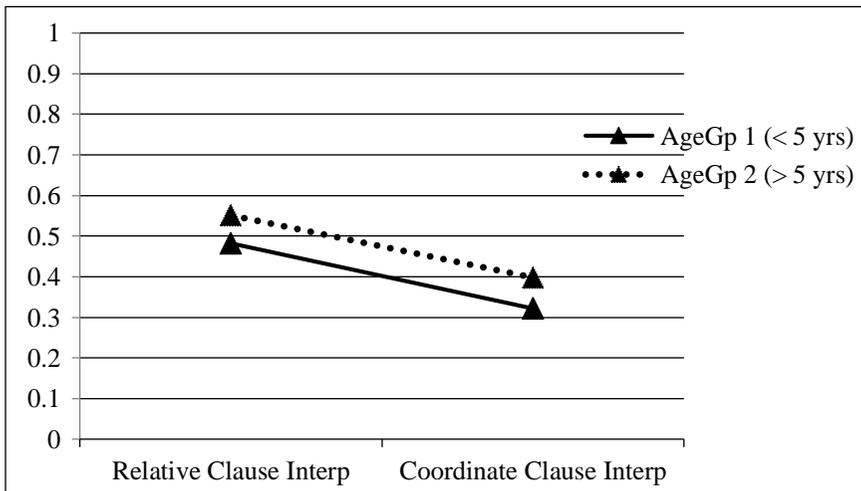


**Figure 4: Mean Proportion of accurate responses by Locative-Recursion Type (Level 1, Level 2) for Age Group 1 (< 5 years) and Age Group 2 (> 5 years)**

We now turn to the results for the children's comprehension of relativized sentences. A visual comparison of the performance of the children in the two Age groups is depicted in Figure 5. Repeated Measures ANOVA revealed no significant interactions ( $p=.975$ ) between Age-Group (Group 1 < 5; Group 2 > 5) and Relativized-Sentence Interpretation Type (Relative clause; Coordinate-clause). Nor were there any statistically significant Main-Effects for Age-Group

<sup>3</sup> Four of the children in Age Group 1 (< 5 years; N=12) were excluded from the analysis of the data on recursive locatives and relativized sentences. This was because although the four children completed the task assessing their comprehension of recursive possessives (reported in Lakshmanan 2021) they did not complete the tasks on recursive locatives and relativized sentences.

( $p=.097$ ) or Sentence Interpretation Type ( $p=.185$ ). For the relativized sentences, both groups performed similarly, interpreting some correctly, as involving an embedded relative clause (Group 1:  $M = 0.482$ ,  $SD = 0.305$ ; Group 2:  $M = 0.551$ ,  $SD = 0.290$ ), and misinterpreting some as coordinatives (Group 1:  $M = 0.322$ ,  $SD = 0.238$ ; Group 2:  $M = 0.398$ ,  $SD = 0.303$ ). However, they did less well on relativized sentences than on recursive locatives, which, as stated earlier, also requires the use of relativization for embedding. They also did less well on relativized sentences, when compared to their performance on recursive possessives (as reported in Lakshmanan 2021; see Figure 1).



**Figure 5: Mean Proportion of responses by Interpretation Type (Embedded Relative Clause ; Coordinate clause) for Age Group 1 (< 5 years) and Age Group 2 (> 5 years)**

#### 4. Discussion and Conclusion

The findings of the current research support the findings of my previous work on recursive possessives (Lakshmanan 2021). Similar to recursive possessives, there are no age-related differences in relation to the acquisition of recursive locatives and relativized sentences by Tamil children. Crucially, Tamil children below the age of 5 years and children above the age of 5 years were equally successful in understanding indirect recursion in locatives, which is different from what has been reported for other languages including Child English and Child Japanese. The findings based on recursive possessives and recursive locatives in Child Tamil suggest that crosslinguistic differences could help account for the advantage evidenced in child Tamil development. Unlike English, Tamil is consistently left branching in possessive phrases, locative phrases and relative clauses, and the branching directionality is in line with other Tamil phrasal types. In Lakshmanan (2021), I attributed early emergence of indirect recursion in the

possessive domain to three factors. Tamil is consistently left-branching across different phrasal types. The form-function mapping in relation to the Genitive case is more direct than in languages such as Japanese where the Genitive case marker is homophonous to the locative case form. A third factor is the existence of complex kinship terminology in Tamil, which provides the Tamil speaking child with early experience with specific labels that represent complex hierarchical (possessive) relationships in the familial domain. Similar factors could contribute to the early emergence of recursive locatives in Child Tamil as well. In addition, the requirement for explicit mapping of the embedding involved in recursive locatives, via relativization, could also play a facilitative role. Although the children in both age groups performed similarly in their comprehension of relativized sentences, they performed less well overall, in comparison to their performance on recursive possessives and locatives. In the case of relativized sentences, recall that only sentences in the unmarked word order SOV, with the relative clause embedded within the Object phrase was used. In other words, in the linear ordering or presentation of the sentence, the verb in the embedded relative clause follows the subject of the main clause, and precedes the main clause verb, which occurs in the sentence final position. The children may have therefore been garden-pathed leading to misperception of the RP (relative participle suffix) in the relative clause as VBP (verbal participle ending), which is used to indicate coordination, thus leading them to interpret relativized sentences in the SOV order as coordinate sentences.<sup>4</sup> While further research involving relativized sentences, where the object containing the relative clause is scrambled past the subject is needed (i.e., OSV), the children's success on recursive locatives, which involve relativization, supports early emergence of indirect of recursion in the relative clause domain as well.

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<sup>4</sup> Lakshmanan (2000; 2006) reports very early emergence of the verbal participle form (as early as 1;9 and 2;1) in Tamil children's spontaneous speech. Sarma (2021), also reports early productive and adult-like use of the verbal participle form in verb-stacking (serial verbs) in the spontaneous speech of a Tamil speaking child.

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