AN ASSYMETRY IN THE ACQUISITION OF TAGALOG RELATIVE CLAUSES

PRE-DEFENSE DRAFT:

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By

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Acknowledgments

This dissertation bears my name, but this project was a collaborative project that was made possible because of the work by so many people.

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Abstract

The putative subject advantage in RCs is manifested in faster reading and reaction times, higher accuracy in production, and earlier acquisition of sentences involving the agent relative clause (ARC) such as ‘the boy [that _ saw the girl]’, compared to the theme relative clause (TRC) ‘the boy [that the girl saw _ ]’.

This dissertation investigated whether an ARC advantage can be found in the production and comprehension of Tagalog RCs by adults and children. The purpose of the dissertation was to study a language that has been understudied in the field of acquisition, and to use some of its unique properties to provide an insight into why a subject advantage is widely observed. Four experiments were conducted to investigate the production of declarative clauses, comprehension of relative clauses, imitation of relative clauses, and production of relative clauses. The findings from this dissertation point toward an ARC advantage in the comprehension, imitation, and production of Tagalog RCs. The results, combined with what have been found previously for other languages, suggest that the semantic prominence is a key and universal determinant for the relative difficulty of RCs, and can explain a subject advantage manifested in different languages, including Tagalog.
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List of abbreviations

1 1st person
2 2nd person
3 3rd person
A transitive subject/agent
ABS absolutive
ACC accusative
AGR agreement
AF agent focus
AP antipassive
ASP aspect marker
AUX auxiliary
BF benefactive focus
CL classifier
DAT dative
ERG ergative
ERP event related potentials
FOC focus
IF instrumental focus
INTR intransitive
IPFV imperfective
IP inflectional phrase
L linker
LF locative focus
NFOC non-focus
NOM nominative
NP noun phrase
NPAH Noun Phrase Accessibility Hierarchy
NPST non-past
OBL oblique
OSV object-subject-verb
P direct object/patient
PASS passive
PF patient focus
PFV perfective
PROG progressive
PSA primary syntactic argument
PST past
Q question
RC relative clause
REL relativizer
S intransitive subject
SG singular
SOV subject-object-verb
Spec specifier
SVO subject-verb-object
TP tense phrase
TR transitive
V verb
VOS verb-object-subject
XP X phrase
1 Introduction

Studies on the acquisition and processing of relative clauses (RCs) have received much attention especially in regards to the asymmetries found among different types of relative clauses. Particularly, the subject relative clauses exhibit an apparent advantage over object relative clauses—they are faster to read, easier to produce, and acquired earlier.

This dissertation investigates whether such an asymmetry is found in relative clauses in Tagalog, a language largely understudied in the fields of acquisition and psycholinguistics. This is the first experimental study to investigate both the production and comprehension of Tagalog relative clauses.

In this chapter, I first review the relevant literature on relative clauses (§1.1). I then present the relevant morphosyntactic facts (§1.2), and explain how Tagalog would help answer my research questions (§1.3). The subsequent chapters report the results from a production task on declarative clauses (Chapter 2), a comprehension experiment on relative clauses (Chapter 3), an imitation experiment on relative clauses (Chapter 4), and a production experiment on relative clauses (Chapter 5). Chapter 6 presents general conclusion and discussion.

1.1 Subject-object asymmetry in relative clauses

The putative subject advantage in RCs is manifested in faster reading and reaction times, higher accuracy in production, and earlier acquisition of sentences involving the relativization of transitive subjects such as (1), compared to those involving relativization of direct object like (2). These are commonly referred to as a subject relative clause and a direct object relative clause, respectively, but I refer to the relativization of the transitive subject as agent relative clause (ARC), and the relativization of the direct object as theme relative clause (TRC).

(1) the boy [that _ saw the girl]  Agent relative clause (ARC)
(2) the boy [that the girl saw _]  Theme relative clause (TRC)

1 Although a large body of research investigates processing of relative clauses embedded in a sentence, I focus on previous studies that are relevant to the production and comprehension of relative clauses in isolation.
2 I use these terms in order to make the so-called subject relative clauses and direct object relative clauses comparable to RC patterns in Tagalog without committing to particular theoretical view on Tagalog syntax.
An asymmetry in favor of subject patterns was first noted in Keenan & Comrie’s (1977) well-known typological work on the Noun Phrase Accessibility Hierarchy (NPAH), as shown in (3).

(3)  Subject > Direct object > Indirect object > Oblique > Genitive > Object of comparison

According to the NPAH, if a language allows the relativization (and other extractions) of one NP type on the hierarchy, it should allow the relativization of all NPs to the left. For example, if the language can relativize the direct object, the relativization of the transitive subject should be possible as well, but the opposite need not be true: if a language allows the relativization of the subject, it may or may not allow relativization of other NPs. All languages are predicted to allow subject relatives.

The NPAH was later associated with findings from work on language processing, first language acquisition, and second language acquisition, which all documented the difficulty associated with TRCs compared to ARCs. King and Just (1991) used a moving-window self-paced reading task, in which English-speaking adult participants were asked to read a set of sentences word-by-word (Table 1).

<table>
<thead>
<tr>
<th><strong>Table 1. Summary of King &amp; Just (1991).</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
</tr>
<tr>
<td><strong>Sentences</strong></td>
</tr>
<tr>
<td>The reporter [that the senator attacked _ ] admitted the error publicly after the hearing.</td>
</tr>
<tr>
<td>TRC</td>
</tr>
<tr>
<td>The reporter [that _ attacked the senator ] admitted the error publicly after the hearing.</td>
</tr>
<tr>
<td><strong>Tasks</strong></td>
</tr>
<tr>
<td>Participants read a sentence word-by-word, recalled the final word of each sentence, and answered a comprehension question about the target sentence.</td>
</tr>
<tr>
<td><strong>Results</strong></td>
</tr>
<tr>
<td>Comprehension accuracy: ARCs more accurate than TRCs (84% vs. 62%)</td>
</tr>
<tr>
<td>Reading time: ARCs faster than TRCs</td>
</tr>
</tbody>
</table>
Each set was followed by a comprehension question that enquires about the last sentence in the set, which contained either an ARC or a TRC. The results showed that the participants showed higher accuracy in response to comprehension questions about ARCs compared to TRCs, and read ARCs significantly faster than TRCs. They also had more difficulty recalling the final word of the sentence if the sentence contained TRCs, suggesting that TRCs put more demands on working memory.

Studies that investigated elicited production in English have found a similar subject advantage. Zukowski (2009) tested ten typically developing children (age 4;6–7;6, mean 6;0), ten adolescents with Williams Syndrome (age 10;0–16;3; mean 12;5), and 12 adult controls in elicited production of relative clauses (Table 2). Both adults and children were more successful in the production of ARCs (adults 95.4%; children 82.3%) compared to TRCs (adults 53.5%; children 51.0%). In addition, they were more likely to make errors by producing ARCs instead of TRCs (adults 15.5%; children 22.9%), than TRCs instead of ARCs (adults 0%; children 15%). Moreover, non-target responses were more common in response to TRC items (adults 31.1%; children 26.0%) compared to ARC items (adults 4.6%; children 14.6%).

3 King and Just (1991) also conducted a reading span test to measure the participants’ working memory and divided them into a group with high working memory capacity and another group with low working memory capacity. They found that participants with low working memory capacity struggle with TRCs more than the participants with high working memory capacity. The accuracy rate in Table 1 is an average of the two groups.
Table 2. Summary of Zukowski (2009).

| Participants | Typically-developing child speakers of English (age 4;6-7;6, M=6;0, N=10)  
|              | Typically-developing adult speakers of English (N=12)  
|              | Child and adolescent speakers of English with Williams Syndrome (age 10;0-16;3, M=12;5, N=10)  
| Sentences   | ARC  
|             | *The boy that is pointing to the cow.*  
|             | TRC  
|             | *The cow that the girl is pointing to.*\(^4\)  
| Tasks       | Elicited production task  
|             | Participants looked at a sequence of two pictures (pre-change picture in (a) and post-change picture in (b)) and answered questions asked by the researchers, such as “Which cow turned blue?” and “Which cow is Max looking at?”

| Results     | Target RC condition and participant group  
|             | Adults | Children  
|             | ARC   | TRC    | ARC   | TRC     
| ARC         | 95.4% | 15.5%  | 82.3% | 22.9%  
| TRC         | 0%    | 53.5%  | 14.6% | 51.0%  
| Others      | 4.6%  | 31.3%  | 14.6% | 26.0%  

Higher target rate in ARCs compared to TRCs  
TRCs were converted to ARCs more frequently than vice versa

A subject advantage is also reported in studies on languages such as Dutch and German in which relative clauses with ambiguous gaps are more likely to be interpreted as ARCs than TRCs. In the Dutch RC in (4), for instance, the gap can be interpreted as corresponding to the

\(^4\) Although this is technically an oblique relative clause, Zukowski (2009) refers to it as an object gap relative clause.
subject or the direct object. Because embedded clauses in Dutch have an SOV word order, the verb position does not differentiate ARCs and TRCs like English. Although the subject and verb usually agree in number, this does not help when both subject and object have the same person and number. The form of the relative pronoun also does not disambiguate ARCs and TRCs. As a result, the RC in (4) can in principle be interpreted as either the ARC in (5) or the TRC in (6), in which the subject and the object are both singular.

(4) ik schreef aan de man [ die mijn vriendin bezocht ].
I wrote to the man who my girlfriend visited
(Frazier, 1987, p. 545)

(5) ik schreef aan de man [ die _ mijn vriendin bezocht ].
I wrote to the man who my girlfriend visited-SG
'I wrote to the man who visited my girlfriend.'
(Frazier, 1987, p. 545)

(6) ik schreef aan de man [ die mijn vriendin _ bezocht ].
I wrote to the man who my girlfriend visited-SG
'I wrote to the man who my girlfriend visited.'
(Frazier, 1987, p. 545)

Frazier (1987) tested Dutch-speaking adults with ambiguous RCs and found that they were interpreted as ARCs more frequently (74%) than TRCs (26%). Schriefers, Friederici, & Kühn (1995) reported the same results for German RCs.

A subject advantage has also found for languages such as French (Holmes & O’Regan, 1981), Greek (Stavrakaki, 2001), Hebrew (Friedmann, Belletti, & Rizzi, 2009), and Persian (Rahmany, Marefat, & Kidd, 2011), among others. Table 3 summarizes the studies on head-final RCs.
Table 3. Summary of studies on languages with head-final RCs.

<table>
<thead>
<tr>
<th>Language</th>
<th>Task</th>
<th>Population</th>
<th>Results</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch</td>
<td>ambiguity interpretation</td>
<td>adults</td>
<td>A &gt; T</td>
<td>Frazier (1987)</td>
</tr>
<tr>
<td>English</td>
<td>self-paced reading</td>
<td>adults (4:3-4:9; M=4:1)</td>
<td>A &gt; T</td>
<td>King &amp; Just (1991)</td>
</tr>
<tr>
<td></td>
<td>elicited imitation</td>
<td>children (4:6-7:6, M=6:0)</td>
<td>A &gt; T</td>
<td>Diessel &amp; Tomasello (2005)</td>
</tr>
<tr>
<td></td>
<td>elicited production</td>
<td>adolescents with Williams Syndrome (10:0-16:3, M=12:5)</td>
<td>A &gt; T</td>
<td>Zukowski (2009)</td>
</tr>
<tr>
<td>French</td>
<td>eye tracking</td>
<td>adults</td>
<td>A &gt; T</td>
<td>Holmes &amp; O'Regan (1981)</td>
</tr>
<tr>
<td>German</td>
<td>ambiguity interpretation</td>
<td>adults</td>
<td>A &gt; T</td>
<td>Schriefers et al. (1995)</td>
</tr>
<tr>
<td></td>
<td>elicited imitation</td>
<td>children (4:3-4:9; M=4:5)</td>
<td>A &gt; T</td>
<td>Diessel &amp; Tomasello (2005)</td>
</tr>
<tr>
<td>Greek</td>
<td>act out</td>
<td>children (3:4-9:3; M=5:2)</td>
<td>A &gt; T</td>
<td>Stavrakaki (2001)</td>
</tr>
<tr>
<td></td>
<td>picture selection</td>
<td>SLI children (7:3-11:2, M=9:0)</td>
<td>A &gt; T</td>
<td>Friedmann et al. (2009)</td>
</tr>
<tr>
<td>Persian</td>
<td>picture selection</td>
<td>children (2:6-7:5; M=4:10)</td>
<td>A &gt; T</td>
<td>Rahmany et al. (2011)</td>
</tr>
</tbody>
</table>

Different hypotheses have been proposed to explain the subject advantage in these languages: Linear Distance Hypothesis, Structural Distance Hypothesis, Word Order Difference Hypothesis, and Frequency Hypothesis. In the following sections, I will give a brief overview of each proposal.

1.1.1 Linear Distance

Wanner & Maratsos (1978), Tarallo & Myhill (1983), and Hawkins (1989) attributed the subject-object asymmetry in RCs to the distance between the head and the corresponding gap. In ARCs, the only element intervening between the head and the gap is the relativizer, as shown in (7). On the other hand, TRCs have more words intervening between the head and gap, as shown in (8). Because the filler must be retained longer in working memory, it is harder to process TRCs compared to ARCs. Gibson (1998, 2000) took this further and proposed in his Dependency Locality Theory that only new discourse referents, such as lexical NPs and verbs, increase the processing cost and thus cause difficulty. This revised theory would still predict greater difficulty

---

5 The mean age is my recalculation based on the figure reported in the original study.
6 The mean age is my recalculation based on the figure reported in the original study.
7 The mean age is my recalculation based on the figure reported in the original study.
for TRCs. I refer to these theories together as the Linear Distance Hypothesis, following O’Grady, Lee, & Choo (2003).

(7) the boy [that _ saw the girl] \[ARC = 1 \text{ intervening word}\]
\[↑REL\]

(8) the boy [that the girl saw _] \[TRC = 4 \text{ intervening words}\]
\[↑REL NP V\]

1.1.2 Canonical Word Order

Diessel & Tomasello (2005) offered a different explanation. They conducted an oral imitation task with 21 English-speaking children (4;3-4;9; mean 4;1) as well as 24 German-speaking children (4;3-4;9; mean 4;5), in which the participants were asked to repeat the sentences with RCs as well as non-RC filler sentences (Error! Reference source not found.).

Table 4. Summary of Diessel & Tomasello (2005).

<table>
<thead>
<tr>
<th>Participants</th>
<th>Native monolingual child speakers of English (age 4;3-4;9, mean 4;7, N=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences</td>
<td>intransitive subject RC</td>
</tr>
<tr>
<td></td>
<td>There's the boy who played in the garden yesterday.</td>
</tr>
<tr>
<td></td>
<td>ARC</td>
</tr>
<tr>
<td></td>
<td>This's the man who saw Peter on the bus this morning.</td>
</tr>
<tr>
<td></td>
<td>TRC</td>
</tr>
<tr>
<td></td>
<td>This's the girl who the boy teased at school this morning.</td>
</tr>
<tr>
<td>Tasks</td>
<td>Imitation task</td>
</tr>
<tr>
<td></td>
<td>Participants were asked to repeat the sentences that the researcher uttered.</td>
</tr>
<tr>
<td>Results</td>
<td>Accuracy: intransitive subject RCs &gt; transitive ARC &gt; TRC</td>
</tr>
<tr>
<td></td>
<td>TRCs were converted to ARCs more frequently than vice versa</td>
</tr>
</tbody>
</table>

In addition to ARCs, they also looked at the relativization of the intransitive subject. They found that, while TRCs were more difficult for children to imitate than either intransitive subject RCs or ARCs, transitive ARCs were also more difficult than intransitive subject RCs. The Linear Distance Hypothesis

Diessel & Tomasello (2005) claimed that the linear distance cannot account for why intransitive RCs and transitive ARCs differ from each other, because the linear distance between
filler and gap in intransitive RCs and transitive ARCs is the same. They offered an alternative explanation. First, intransitive RCs are easier than other types of relative clauses, because it involves a single referent and is thus conceptually simpler. Second, the difficulty in TRCs arises from its non-canonical word order. As shown in the examples below, the intransitive RC in (10) has a similar word order (SV) to the basic intransitive sentence in (9), and the ARC in (12) has a similar word order (SVO) to the basic declarative sentence in (11). On the other hand, the TRC in (13) has a non-canonical, OSV word order.

(9)  the boy ran.  
    S  V  
    *Basic intransitive sentence*

(10) the boy [that _ ran]  
    S  V  
    *Intransitive subject RC*

(11) the boy saw the girl.  
    S  V  O  
    *Basic transitive sentence*

(12) the boy [that _ saw the girl]  
    S  V  O  
    *ARC*

(13) the girl [that the boy saw _]  
    O  S  V  
    *TRC*

Children are known to start out with a preference for a canonical word order in comprehension as well as in production (Bever, 1970; Slobin & Bever, 1982)—that is, they produce sentences with the canonical word order more often, and comprehend the canonical word order better. Under this approach, the difficulty associated with TRCs is not the distance between filler and gap, but because of its infrequent, non-canonical word order. I refer to this approach as the Canonical Word Order Hypothesis, following Kim and O’Grady (2015).\(^8\)

1.1.3 Structural Distance

Collins (1994) and O’Grady (1997) proposed another distance-related view of the subject advantage in RCs. Drawing on the notion of structural distance, they propose that the key factor

---

8 Another factor that Diessel and Tomasello (2005) did not account for was the length of the test sentences. For example, in the three examples I cited in Table 3, ARC is the shortest of all. This factor should have been controlled for in the test sentences.
is the depth of the gap, which is determined by counting the number of XP nodes (e.g., S, VP, etc.) between the head and the gap. As seen in (14), the ARC has only one node between the head and the gap.

(14) the boy [s that _ saw the girl] \hspace{1cm} ARC = 1 node

However, the TRC in (15) has two nodes between the head and the gap, and the gap is more deeply embedded within the syntactic tree.

(15) the boy [s that the girl [vp saw _]] \hspace{1cm} TRC = 2 nodes

Thus, the structural distance between the head and the gap is greater in TRCs compared to ARCs. This is referred to as the Structural Distance Hypothesis (O’Grady et al., 2003).

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9 Collins (1994) counts functional projections including XP nodes as well as X’ nodes, but for the purpose of this dissertation, this difference does not change what the hypothesis predicts.
1.1.4 Frequency

Another proposal is that the difficulty of RCs depends on the frequency of RCs. It has been known that what is frequent in the input is acquired earlier and easier to comprehend and produce. In adults’ speech, ARCs are reported to be more frequent than TRCs in multiple corpora, including a Switchboard corpus, which collected data from telephone conversations (Roland, Dick, & Elman, 2007). While there were 9,548 ARCs per one million NPs, TRCs were just about half—5,616 per one million NPs.

On the other hand, Diessel (2004, 2009) found that child-directed speech contains more TRCs than ARCs. However, ARCs and TRCs have different distributional patterns in terms of animacy. Fox and Thompson (1990) analyzed a corpus of American English and found that ARCs are more likely to have an animate head, and TRCs are more likely to have an inanimate head. Mak, Vonk & Schriefers (2002) analyzed Dutch and German corpora and also found that most of the TRCs occur with an inanimate head and RC-internal animate NPs. They further conducted a self-paced reading and eye-tracking experiments with Dutch adults and showed that, while the ARCs were read significantly faster than TRCs when both the subject and the object are animate, this asymmetry disappears when the subject is animate and the object is inanimate. Kidd, Brandt, Lieven, & Tomasello (2007) also reported based on a corpus analysis that 3- and 4-year-old English-speaking children produce TRCs with an inanimate head more often (75%) than TRCs with an animate head (10.5%). They also conducted a sentence repetition task with 57 English-speaking children (3;1-4;9) and found that the subject-object asymmetry disappears when the head of TRCs was inanimate, much like the adult processing results from Mak et al. (2002). Gennari, Mirković, & Macdonald (2012) and Montag & MacDonald (2009) also found that English- and Japanese- speaking adults produced passive RCs like (16) more than the active counterpart in (17) when the theme head is animate.

(16) The baby (that/who is) being held by the woman. \textit{Passive RC}
(17) The baby (that/who) the woman is holding. \textit{TRC}

(Montag & MacDonald, 2009, p. 2594)

Furthermore, Wells, Christiansen, Race, and Macdonald (2009) investigated the effect of reading experience on adults’ processing of ARCs and TRCs. Half of the participants were
exposed to 80 ARCs and 80 TRCs along with fillers, and the other half was exposed to 160 items that were also complex but did not contain RCs. When the participants’ reading times between the pretest and the posttest were compared, the reading times on TRCs reduced in the group that was exposed to RCs during the experimental sessions. Although the reading times for ARCs were also shorter in the posttest, the experience session had a greater effect on the TRCs.

This suggests that the difficulty associated with TRCs is influenced by the frequency of different types of RCs in the input we receive. Following Kim & O’Grady (2015), I refer to this hypothesis as the Frequency Hypothesis.

### 1.1.5 Semantic Prominence

There have also been semantic accounts of this subject-object asymmetry. In the previous section, we saw that the animacy of the RC head can influence the difficulty of TRCs. Mak, Vonk & Schriefers (2006, 2008) claimed that it is the interplay of animacy and topichood, rather than animacy itself, that influences RC processing. For example, in the following examples taken from Mak et al. (2006, p. 469), both the subject and the object of the RCs are inanimate. Consequently, both the ARC in (18) and the TRC in (19) have an inanimate head. Therefore, the animacy information itself cannot lead the readers to correct interpretation of the RC head. The auxiliary has a number marking, which disambiguates the semantic role of the head noun.

(18) ARC with an inanimate subject (head) and an inanimate object (RC-internal)
Volgens de folder moet de gel, [die _ de lekkages verhelpt ],
According-to the brochure must the gel that the leakages remedies in één keer werken.
in one time work.
‘According to the brochure the gel, [that _ remedies the leakages], should work at once.’

(Mak et al., 2006, p. 469)

(19) TRC with an inanimate object (head) and an inanimate subject (RC-internal)
Volgens de folder moeten de lekkages, [die de gel _ verhelpt ],
According-to the brochure must the leakages, that the gel remedies in één keer verdwenen zijn.
in one time disappeared be.
‘According to the brochure the leakages, [that the gel remedies _ ], should disappear at once.’

(Mak et al., 2006, p. 469)
The animacy of the head does not differ, and although the previous study by Mak et al. (2002) found that a TRC with an inanimate head is read faster, a self-paced reading task found that the ARC in (18) is read faster than the TRC in (19).

In order to explain these results, they proposed the Topichood Hypothesis (Mak et al., 2008), which states that the most topicworthy entity is chosen as the syntactic subject. In the case of the relative clauses, the head of the relative clause is more “topicworthy” than the RC-internal NP, because the relative clause is always about the head (Kuno, 1976; Van Valin, 1996). This is why there is a preference for the head of RC to be the subject. In the case of (19), the participant first interpret the head as the subject, which needs to be re-analyzed as the object later when they encounter the auxiliary, which is why the reading times are longer. However, animacy is also one of the factors that contribute to topic-worthiness (cf. Van Valin & Wilkins 1996).

In the following examples taken from Mak et al. (2006, p. 473), RCs in (20) have an animate subject and an inanimate object, RCs in (21) have an inanimate subject and an animate object.

(20) a. ARC with an animate subject (head) and an inanimate object (RC-internal)
   In het dorp zijn de wandelaars, [die _ de rots weggerold
   In the town are the hikers that the rock rolled-away hebben ], het gesprek van de dag.
   have the talk of the day
   ‘In the town the hikers, [that _ have rolled away the rock, are the talk of the day.’
   (Mak et al., 2006, p. 473)

   b. TRC with an inanimate object (head) and an animate subject (RC-internal)
   In het dorp is de rots, [die de wandelaars _ weggerold
   In the town is the rock that the hikers rolled-away hebben ], het gesprek van de dag.
   have the talk of the day
   ‘In the town the rock, [that the hikers have rolled away _ ], is the talk of the day.’
   (Mak et al., 2006, p. 473)

(21) a. ARC with an inanimate subject (head) and an animate object (RC-internal)
   In het dorp is de rots, [die _ de wandelaars verpletterd heft ],
   In the town is the rock, that the hikers crushed has het gesprek van de dag.
   the talk of the day
   ‘In the town the rock, [that _ has crushed the hikers], is the talk of the day.’
   (Mak et al., 2006, p. 473)
b. TRC with an animate object (head) and an inanimate subject (RC-internal)

In het dorp zijn de wandelaars, [die de rots _ verpletterd
In the town are the hikers that the rock crushed
heft ], het gesprek van de dag.
has the talk of the day

‘In the town the hikers, [that the rock has crushed _ ], are the talk of the day.’
(Mak et al., 2006, p. 473)

In their 2006 study, their self-paced reading and eye-tracking experiments found no difference between the ARC in (20a) and the TRC in (20b), but found that the ARC in (21a) was read significantly faster than the TRC in (22b). In the ARC (20a), both the animacy and topicality are in agreement that the head *hiker* should be interpreted as the subject. In the TRC (20b), the animacy and topicality contradict with each other, as the head *rock* is inanimate; therefore, the readers do not assign the subject and object functions until they encounter the verb or the auxiliary. In the ARC (21a), much like the TRC (20b), the interpretation of the head *the rock* is postponed because the animacy and topicality contradict with each other. However, in (21b), both the animacy and the topicality misguide the readers to interpret the RC head *the hikers* as the subject. However, when they get to the verb, they have to reanalyze their interpretation, which is reflected on the longer reading times.


(22) The prominence factor

The ease with which the processor establishes an aboutness relationship with a nominal is proportional to the prominence of that nominal’s referent within the relative clause. (A referent functioning as subject within the relative clause is most prominent, a referent functioning as direct object is next most prominent, and so on.)

(O’Grady, 2011)
That is, when the head noun of a relative clause refers to a more prominent entity, the relative clause is easier to process. Following Kim (2013), I will refer to this approach as the Semantic Prominence Hypothesis.\textsuperscript{10}

The semantic prominence can be influenced by multiple factors, such as animacy and topicality as previously discussed. Another way of thinking about the semantic prominence is in terms of the thematic roles. It has been suggested that some thematic roles are more prominent than the others. In particular, agents (i.e. transitive subject) are considered to be more prominent than themes (i.e. direct object). (e.g., Dik & Hengeveld, 1997, p. 267; Fillmore, 1967, p. 33). Therefore, ARCs are easier than TRCs because an ARC is about the agent, the more prominent entity, and a TRC is about the theme, the less prominent entity.

1.1.6 Headedness

These five different hypotheses based on the linear distance, word order difference, structural distance, frequency, and semantic prominence all make the same prediction for head-final RCs as in English—an ARC is less difficult than a TRC. However, this is not the case for languages with head-initial relative clauses. RCs in languages such as Japanese, Korean, and Mandarin Chinese are all head-initial, and thus each hypothesis makes a different prediction. Among these, Mandarin Chinese has SVO word order, and Japanese and Korean has SOV word order. Consider the Chinese examples in (23) and (24), taken from Hsu, Hermon, & Zukowski (2009, p. 329). The linear distance between the head and the gap is longer in the ARC (23), compared to the TRC in (24). This means that the Linear Distance Hypothesis would predict the TRCs to be easier than ARCs.\textsuperscript{11}

\textsuperscript{10} Kim and O'Grady (2015) addressed all the five hypotheses by testing children’s production of subject RCs vs. indirect object RCs as well as direct object RCs vs. oblique RCs in English and Korean. The Semantic Prominence Hypothesis best explains their findings.

\textsuperscript{11} There is another view on the linear distance that says Japanese and Korean should have no difference between ARCs and TRCs (Gibson & Wu, 2013). This is because, in both types of relative clauses, the information of NPs is integrated at the verb, and the verb is right next to the head noun. However, this view still predicts TRCs to be more difficult in Mandarin Chinese.
Much like Mandarin Chinese, the Linear Distance Hypothesis predicts a TRC advantage for SOV languages like Japanese and Korean. Consider the Japanese examples in (25) and (26).

(25) [ _ inu-o mi-ta] kodomo  
    dog-ACC see-PST child  
    ‘the child that saw the dog’

(26) [ kodomo-ga _ mi-ta ] inu  
    child-NOM see-PST dog  
    ‘the dog that the child saw’

The Canonical Word Order Hypothesis makes the same prediction as the Linear Distance Hypothesis for Mandarin Chinese, as the word order of the ARC in (27) is non-canonical VOS, while the TRC in (28) follows canonical SVO word order.

(27) [ _ kànjiàn xiáogōu dē] nà-ge nánhái  
    see dog REL that-CL boy  
    V O S  
    ‘the boy that saw the dog’

(28) [nánhái kànjiàn _ dē] nà-zhī xiáogōu  
    boy see REL that-CL dog  
    S V O  
    ‘the dog that the boy saw’

---

12 All the tone marks in the Chinese examples hereafter are added by me.
The Word Order Distance Hypothesis offers no clear prediction for Japanese Korean, SOV languages with head-final RCs, as neither ARCs nor TRCs follow the canonical word order.

(29) [ _ inu-o mi-ta] kodomo
dog-ACC see-PST child
O V S
‘the child that ate the apple’

(30) [ kodomo-ga _ mi-ta] inu
child-NOM see-PST dog
S V O
‘the dog that the child saw’

However, the Structural Distance Hypothesis makes the same prediction as the head-initial RCs. As seen in (31) and (32), there are more syntactic nodes intervening between the gap and the head in the TRC in (32), predicting that, much like English, TRCs should be more difficult in these languages.

(31) [s _ kànjiàn xiáogōu dè] nà-ge nánhái
see dog REL that-CL boy  
‘the boy that saw the dog’

(32) [s nánhái [vp kànjiàn _ dè]] nà-zhī xiáogōu
boy see REL that-CL dog  
‘the dog that the boy saw’

(33) [s _ inu-o mi-ta] kodomo
dog-ACC see-PST child
ARC = 1 node

(34) [s kodomo-ga [vp _ mi-ta]] inu
child-NOM see-PST dog
TRC = 2 nodes
The Frequency Hypothesis makes different predictions for Mandarin Chinese and Japanese. In Mandarin Chinese, corpus studies show that ARCs are more frequent than TRCs (e.g. Hsiao & Gibson, 2003). However, in Japanese, different types of relative clauses appear in caretaker speech at similar frequency (Ozeki & Shirai, 2007). Therefore, while the Frequency Hypothesis predicts an ARC advantage in Mandarin Chinese, we would expect no difference between ARCs and TRCs in Japanese.

The Semantic Prominence Hypothesis also predicts an ARC advantage in these languages.

(35) [ _ kànjìànsìxiáogǒudè] nà-ge nánhái ARC
     see dog REL that-CL boy
     ‘the boy that saw the dog’        ↑
agent ... more prominent
     (Hsu et al., 2009, p. 329)

(36) [nánháikànjìnàdè] nà-zhǐ xiáogǒu TRC
     boy see REL that-CL dog
     ‘the dog that the boy saw’        ↑
theme ... less prominent
     (Hsu et al., 2009, p. 329)

Multiple studies have reported that the ARC advantage is found in languages with head-final RCs. Hsu, Hermon, & Zukowski (2009) conducted an elicited production task with 23 children (mean age 4;8) as well as ten adults, all monolingual native speakers of Mandarin Chinese (Table 5). Both children and adults produced more target responses in the ARC condition (adults 95%; children 86.8%) than in the TRC condition (adults 82.5%; children 38.7%). Participants were more likely to recast TRCs as ARCs (adults 13.75%; children 6.1%) than vice versa (adults 0%; children 1.8%). Moreover, children were more likely to produce ungrammatical RCs in response to items designed to elicit TRCs (19.6%) than ARCs (2.4%), and were more likely to avoid producing RCs in the TRC (29.5%) condition than the ARC condition (6%).
Table 5. Summary of Hsu et al. (2009).

| Participants | Native monolingual child speakers of Mandarin Chinese (age 4;3-4;9, mean 4;7, N=21)  
|              | Native monolingual adults (N=10) |
| Sentences   | ARC  
|             | [ _ xǐhuān xiáogǒude] nǔhái  
|             |  like   dog   REL  girl  
|             | 'the girl that likes the dog'  
|             | TRC  
|             | [nǔhái xǐhuān _ de] xiáogǒu  
|             |  girl   like   REL  dog  
|             | 'the dog that the girl likes'  
| Tasks       | Elicited production task  
|             | Participants saw a sequence of two pictures and answered the questions asked  
|             | by the researchers, such as “Which girl turned blue?” and “Which girl is the  
|             | mouse watching?”  
|             | a. Base picture  
|             | b. Question picture  

| Results | Target gap condition and participant group  
|         | Adults | Children |
|         | ARC | TRC | ARC | TRC |
| Response |     |     |     |     |
| ARC   | 95% | 13.75% | 86.8% | 6.1% |
| TRC   | 0%  | 82.5%  | 1.8%  | 38.7% |
| Ungrammatical RC | 0% | 3.75% | 2.4% | 19.6% |
| Others | 0%  | 0%    | 6%    | 29.5% |

Higher target rate in ARCs compared to TRCs  
TRCs were converted to ARCs more frequently than vice versa  

Similar results were reported in an adult processing study on Mandarin Chinese (Vasishth, Chen, Li, & Guo, 2013), studies on children’s comprehension and production of Japanese
(Kawashima, 1980), adults’ processing of Japanese (Ishizuka, 2005; Miyamoto & Nakamura, 2003), children’s spontaneous production of Korean (Y.-J. Kim, 1987), children’s comprehension and elicited production of Korean (Cho, 1999), processing of Korean by adults (Kwon, Kluender, Kutas, & Polinsky, 2013), and spontaneous production of Turkish (Slobin, 1986). However, other studies report the lack of such an asymmetry in Japanese children’s naturalistic data (Ozeki & Shirai, 2007), and some studies even reported a TRC advantage in Cantonese naturalistic data by Cantonese-English bilingual children (Yip & Matthews, 2007), Cantonese-speaking children’s comprehension (Chan et al. 2011), Japanese-speaking children’s comprehension (Hakuta, 1981) and Mandarin Chinese-speaking adults’ processing data (Gibson & Wu, 2013; Hsiao & Gibson, 2003).


| Participants | 46 adult native speakers of Mandarin Chinese (spoken in Taiwan) |
| Sentences | Doubly-embedded ARC |
| | [ _ yāoqǐng [ _ gōujié fāguăn de] fūháo de ] guānyuán |
| | invite conspire REL tycoon REL official |
| | xīnhuáibùguǐ |
| | have bad intentions |
| | ‘The official [who invited the tycoon [who conspired with the judge]] has bad intentions.’ |
| Doubly-embedded TRC | |
| | [ [ fūháo yāoqǐng _ de] faguan gojie _ de ] guānyuán |
| | tycoon invite REL judge conspire REL official |
| | xīnhuáibùguǐ |
| | have bad intentions |
| | ‘The official [who the judge [who the tycoon invited] conspired with] has bad intentions.’ |
| Tasks | Self-paced reading task |
| Results | TRCs read faster than ARCs |

These conflicting results may be due to the temporary ambiguity associated with comprehension tasks in these languages. Because the head noun comes after the RCs, the comprehenders do not realize they are reading an RC until they get to the disambiguating region. Furthermore, these languages allow pro-drop, as illustrated in the example of a Mandarin Chinese ARC in (37). As a
result, a listener or reader may initially postulate a null subject as in (38), and not realize that a relative clause is in play until encountering the relativizer de.

(37) Laoshi renshi [ _ yāoqí g nánhái de ] nǔhái. 
teacher know invite boy REL girl 
‘The teacher knows the girl who invites the boy.’ (ARC as the matrix object) 
(Jäger, Chen, Li, Lin, & Vasishth, 2015, p. 38)

(38) Laoshi renshi [ pro yāoqí g nánhái ... 
teacher know invite boy 
‘The teacher knows that pro invites the boy…’ (ARC as matrix object) 
(Jäger et al., 2015, p. 38)

The situation is no better in the case of TRCs. In (39), where a TRC is the matrix object, the listener or reader may experience a garden path effect, because the NP nánhái ‘boy’ may initially be interpreted as the direct object of the matrix verb renshi ‘know,’ as shown in (40). Upon encountering either the embedded verb yāoqíng ‘invite’ or the relativizer de, the sentence needs to be reanalyzed, which leads to increased processing difficulty.

(39) Laoshi renshi [ nánhái yāoqí g _ de ] nǔhái. 
teacher know invite boy REL girl 
‘The teacher knows the girl who the boy invites.’ (ARC as the matrix object) 

(40) Laoshi renshi nánhái… 
teacher know boy … 
‘The teacher knows the boy…’

In either case, there needs to be a significant reanalysis at the head noun, which may be why there have not been straightforward results from these languages, especially in comprehension.

There are two ways to address this issue. Jäger et al. (2015) used types of relative clauses that are less likely to have such local ambiguity. For example, as seen in (41) and (42), the relative clauses are always introduced with the sequence of a determiner and a nominal classifier nà-ge ‘that-CL’, which helps the readers predict that an NP is coming up.

(41) … nà-ge [ _ shàn gèyuè yāoqí g-le nánhái jǐ-cí de ] nǔhái … 
DET-CL last.month invite-ASP boy several-CL REL girl 
‘…the girl who invited the boy several times last month…’ (ARC)
With the possibility of local ambiguity eliminated, an ARC advantage emerged in the results of a self-paced reading task and an eye-tracking task, suggesting that the previously reported cases of a TRC advantage is due to the temporary ambiguity in comprehending RCs.

The other solution is to look at production instead of comprehension. Interestingly, studies that used an elicited production task report a subject advantage in Korean (Cho, 1999) and Mandarin Chinese (Hsu et al., 2009). See the summary of previous studies on languages with head-initial RCs in Table 7.

**Table 7. Summary of studies on languages with head-initial RCs.**

<table>
<thead>
<tr>
<th>Language</th>
<th>Task</th>
<th>Population</th>
<th>Results</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cantonese</strong></td>
<td>act out</td>
<td>children (4;0-6;1)</td>
<td>A &gt; T</td>
<td>Lau (2006)</td>
</tr>
<tr>
<td></td>
<td>elicited imitation</td>
<td>children (4;0-6;1)</td>
<td>A &gt; T</td>
<td>Lau (2006)</td>
</tr>
<tr>
<td></td>
<td>elicited imitation</td>
<td>children (4;3-4;9)</td>
<td>n.s.</td>
<td>Chan et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>naturalspeech</td>
<td>Cantonese-dominant bilinguals (1;3-4;6)</td>
<td>A &gt; T</td>
<td>Yip &amp; Matthews (2007)</td>
</tr>
<tr>
<td></td>
<td>reference selection</td>
<td>children (4;3-4;9)</td>
<td>T &gt; A</td>
<td>Chan et al. (2011)</td>
</tr>
<tr>
<td><strong>Korean</strong></td>
<td>naturalspeech</td>
<td>children (1;6-3;5)</td>
<td>A &gt; T</td>
<td>Kim (1987)</td>
</tr>
<tr>
<td></td>
<td>natural speech</td>
<td>children (1;4-3;9)</td>
<td>A &gt; T</td>
<td>Lee (1991)</td>
</tr>
<tr>
<td></td>
<td>picture selection</td>
<td>children (3-6; M=6;0)</td>
<td>A &gt; T</td>
<td>Cho (1999)</td>
</tr>
<tr>
<td></td>
<td>elicited production</td>
<td>children (4-7; M=6;0)</td>
<td>A &gt; T</td>
<td>Cho (1999)</td>
</tr>
<tr>
<td></td>
<td>self-paced reading</td>
<td>Adults</td>
<td>A &gt; T</td>
<td>Kwon et al. (2013)</td>
</tr>
<tr>
<td><strong>Japanese</strong></td>
<td>act out</td>
<td>children (5;0-9;0)</td>
<td>S &gt; O</td>
<td>Kawashima (1980)</td>
</tr>
<tr>
<td></td>
<td>imitation</td>
<td>children (5;0-9;0)</td>
<td>S &gt; O</td>
<td>Kawashima (1980)</td>
</tr>
<tr>
<td></td>
<td>act out</td>
<td>children (5;3-6;2)</td>
<td>O &gt; S</td>
<td>Hakuta (1981)</td>
</tr>
<tr>
<td></td>
<td>natural speech</td>
<td>children (0;0-3;11)</td>
<td>S = O</td>
<td>Ozeki &amp; Shirai (2007)</td>
</tr>
<tr>
<td><strong>Mandarin</strong></td>
<td>self-paced reading</td>
<td>adults</td>
<td>O &gt; S</td>
<td>Hsiao &amp; Gibson (2003)</td>
</tr>
<tr>
<td></td>
<td>elicited production</td>
<td>children (5;0-6;5)</td>
<td>n.s.</td>
<td>Su (2004)</td>
</tr>
<tr>
<td></td>
<td>elicited production</td>
<td>children (M=4;8)</td>
<td>S &gt; O</td>
<td>Hsu et al. (2009)</td>
</tr>
<tr>
<td></td>
<td>picture pointing</td>
<td>children</td>
<td>S &gt; O</td>
<td>Chan et al. (2011)</td>
</tr>
<tr>
<td></td>
<td>self-paced reading</td>
<td>adults</td>
<td>O &gt; S</td>
<td>Gibson &amp; Wu (2013)</td>
</tr>
<tr>
<td></td>
<td>self-paced reading</td>
<td>adults</td>
<td>S &gt; O</td>
<td>Vasisht et al. (2013)</td>
</tr>
<tr>
<td></td>
<td>eye tracking</td>
<td>adults</td>
<td>S &gt; O</td>
<td>Jäger et al. (2015)</td>
</tr>
<tr>
<td><strong>Turkish</strong></td>
<td>natural speech</td>
<td>children</td>
<td>S &gt; O</td>
<td>Slobin (1986)</td>
</tr>
</tbody>
</table>
A particularly interesting study involved Chamorro, a VSO language that allows both head-initial and head-final RCs (Borja, Chung, & Wagers, 2016), as illustrated below.

(43) **Head-initial ARC**

\[
\begin{align*}
\text{Hu ågang atyu i } & \text{[ha kadididak } \_ \text{ i biha]} \text{ na påtgun.} \\
& \text{AGR call that the AGR tickle.PROG the old.lady L child} \\
\text{‘I called that child who was tickling the old woman.’}
\end{align*}
\]

(44) **Head-initial TRC**

\[
\begin{align*}
\text{Hu ågang atyu i } & \text{[ha kadididak i biha } \_ \text{]} \text{ na påtgun.} \\
& \text{AGR call that the AGR tickle.PROG the old.lady L child} \\
\text{‘I called that child who the old woman was tickling.’}
\end{align*}
\]

(45) **Head-final ARC**

\[
\begin{align*}
\text{Hu ågang atyu na påtgun } & \text{[i ha kadididak } \_ \text{ i biha].} \\
& \text{AGR call that L child C AGR tickle.PROG the old.lady} \\
\text{‘I called that child who was tickling the old woman.’}
\end{align*}
\]

(46) **Head-final TRC**

\[
\begin{align*}
\text{Hu ågang atyu na påtgun } & \text{[i ha kadididak i biha } \_ \text{].} \\
& \text{AGR call that L child C AGR tickle.PROG the old.lady} \\
\text{‘I called that child who the old woman was tickling.’}
\end{align*}
\]

A key feature of these patterns is that they are all potentially ambiguous: because the position of the gap cannot be unequivocally determined, each clause can in principle be interpreted as either an ARC or a TRC. The properties of Chamorro allowed Borja et al. (2016) to investigate whether the interpretation of the RCs are influenced by relative clause ordering. They conducted a picture-selection task, in which participants were presented with a panel of two pictures that depict reversed events (Table 8) and were asked to select the picture (but not the character\(^{13}\)) that matched the auditory description. They tested 135 adult speakers of Chamorro and found that 94% of the ambiguous

---

\(^{13}\) A picture-selection task would help us determine whether the children understand what they hear; however, it does not determine whether the children understand what they hear as the relative clause. This is why we employ a referent-selection task in our study, and in fact, children make a lot of mistakes identifying the referent even when they identify the correct picture, as seen below.
head-final RCs were interpreted as ARCs, with minimal variation among speakers. On the other hand, only 43% of ambiguous head-initial RCs were interpreted as ARCs, and the interpretation showed large variation among speaker groups—more specifically, which Chamorro-speaking island the participants were from. One of the speaker groups even preferred the TRC interpretation for head-initial RCs.

Table 8. Summary of Borja et al. (2016).

<table>
<thead>
<tr>
<th>Participants</th>
<th>Native adult speakers of Chamorro (N=135)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences</td>
<td>Ambiguous RCs—head-initial/head-final</td>
</tr>
<tr>
<td></td>
<td>Head-final example:</td>
</tr>
<tr>
<td></td>
<td>atyu na biha [i ha papaini i palåo’an]</td>
</tr>
<tr>
<td></td>
<td>that L old.lady C AGR comb.PROG the woman</td>
</tr>
<tr>
<td></td>
<td>‘that old woman who is combing the woman / who the woman is combing’</td>
</tr>
<tr>
<td>Tasks</td>
<td>Picture-selection task</td>
</tr>
<tr>
<td></td>
<td>Participants were asked to select the picture that matches the given auditory description.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th>ARC interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head-initial</td>
</tr>
<tr>
<td></td>
<td>Saipan</td>
</tr>
<tr>
<td></td>
<td>Tinian</td>
</tr>
<tr>
<td></td>
<td>Rota</td>
</tr>
<tr>
<td></td>
<td>Head-final</td>
</tr>
</tbody>
</table>

Head-initial RCs:
large variation: reduced ARC preference or TRC preference

Head-final RCs:
minimal variation: ARC > TRC
1.1.7 Alignment

With the exception of Chamorro, the languages that have been mentioned so far have a nominative-accusative alignment. In these languages, intransitive subject (S) and transitive subject (A) are treated the same—as nominatives—and direct object (O) is treated differently—as accusative. See the Japanese examples in (47)-(48), in which the S in (47) and the A in (48) take the nominative case marker -ga, and the O in (48) take the accusative case marker -o.

(47) Kodomo-ga hasit-ta.
    child-NOM run-PST
    ‘The child ran.’

(48) Kodomo-ga ringo-o tabe-ta.
    child-NOM apple-ACC eat-PST
    ‘The child ate an apple.’

However, there are ergative-absolutive languages that treat S and O alike, differentiating them in the same way from A. Ergativity can be manifested in different ways, but among different kinds of ergative languages, only a handful have been studied with attention to the acquisition and processing of their relative clauses. These languages can be classified into either of the following two types: morphologically ergative languages and syntactically ergative languages. Both types of languages give us further insight into the nature of the subject advantage in a way nominative-accusative languages cannot.

1.1.7.1 Morphologically ergative languages

Studies on morphologically ergative languages have demonstrated the role of morphology in the acquisition and processing of relative clauses. Basque, a morphologically ergative language with SOV word order, group S and O as the unmarked category—absolutive—and treat A as a marked category. See the Basque example in (49).

(49) Zuk am-a-ri liburu-a-Ø eman d-i-o-zu.
    you-ERG mother-the-DAT book-the-ABS give 3ABS-AUX-3DAT-2ERG
    ‘You have given mother the book.’ (Gutierrez-Mangado, 2011, p. 179)
Carreiras, Duñabeitia, Vergara, de la Cruz-Pavía, & Laka (2010) conducted a self-paced reading task and also investigated event related potentials (ERPs) with adult speakers of Basque. They found that ARCs cause more difficulty than TRCs in this language. (Note that Basque RCs are head-initial like Mandarin Chinese and Japanese.)

(50) **ARC**
Hau da [ _ amona-Ø muxukatzen duen] neska-Ø.
this is grandmother-ABS kiss-IPFV AUX-REL girl-ABS
‘This is the girl who is kissing the grandmother.’
(Gutierrez-Mangado, 2011, p. 180)

(51) **TRC**
Hau da [amona-k _ muxukatzen duen] neska-Ø.
this is grandmother-ERG kiss-IPFV AUX-REL girl-ABS
‘This is the girl who the grandmother is kissing.’
(Gutierrez-Mangado, 2011, p. 180)

According to Carreiras et al. (2010), ARCs are more difficult than TRCs in Basque because of the added complexity in case marking—ergative A has a marking but the absolutive O is zero-marked. Gutierrez-Mangado (2011) also found that Basque-speaking 4-year-olds (mean age 4;02.15, N=14) and 6-year-olds (mean age 6;01.07, N=14) comprehended TRCs better (4-year-olds 58%; 6-year-olds 79.3%) than ARCs (4-year-olds 75.7%; 6-year-olds 87.85%) in a picture-sentence matching task.

Polinsky, Gallo, Graff, & Kravtchenko (2012) conducted a self-paced reading task with Avar, another morphologically ergative language with SOV word order and head-initial RCs, to test the role of the morphological cues. In Avar, much like Basque, absolutive NPs are zero-marked, while the ergative subject is overtly marked, as shown below.

(52) wasː-asː šiša-∅ b-ek-ana.
boy-ERG bottle-ABS III-break-PST
‘The boy broke a/the bottle.’
(Polinsky et al., 2012, p. 269)

(53) was-∅ ruqʾ:o-w-e ‘-an-ila
boy-ABS home-I-LAT go-PST-EVID
‘The boy went home.’
(Polinsky et al., 2012, p. 270)
The suffix-marked ergative subject in (52) signals that there is an absolutive NP in the clause. Furthermore, the verb agrees in noun class with the absolutive NP. In (52), the prefix b- in the verb agrees in noun class (indicated in the gloss as III) with the absolutive NP ‘bottle’. Therefore, the verb morphology also serves as a cue for the existence and identity of an absolutive NP. However, in terms of grammatical functions, it is the ergative subject that behaves as the pivot in binding, control structures, etc. Conveniently, it is possible to relativize both the ergative NPs (transitive subject) and absolutive NPs (either intransitive subject or direct object) with a gap, as shown in (54)-(56).

(54) Ergative subject gap (ARC)
[ _i ʃoloqana-y yas-∅ repetici-yal-de y-ač:-un y-ač -ara-y ]
unmarried- II girl-ABS rehearsal-OBL-LOC II-bring-GER II-come-PRTCP- II
artistka-∅ bercina-y y-igo
actress-ABS beautiful- II II-AUX
‘The actress that brought the young girl to the rehearsal is pretty.’
(Polinsky et al., 2012, p. 271)

(55) Absolutive object gap (TRC)
[ xalq’iya-y artistka-yał _i repetici-yal-de y-ač -un
people’s-II actress-ERG rehearsal-OBL-LOC II-bring-GER
y-ač -ara-y] yasi-∅ bercina-y y-igo
II-come-PRTCP- II girl-ABS beautiful-II II-AUX
‘The girl that the distinguished actress brought to the rehearsal is pretty.’
(Polinsky et al., 2012, p. 271)

(56) Absolutive subject gap (ARC)
[ _i xalq’iya-y artistka-yal-da-ask’o-y repetici-yal-de c’ u-n
people’s- II actress-OBL-LOC-near-II rehearsal-OBL-LOC standing-GER
y-ik’-ara-y] yas,-∅ best’ala-y y-igo
II-be-PRTCP- II girl-ABS orphaned- II II-AUX
‘The girl that stood next to the distinguished actress at the rehearsal is an orphan.’
(Polinsky et al., 2012, p. 272)

If there is a universal subject advantage, the pattern in (54) should be the easiest of the three. However, if the morphology serves as a useful cue for identifying the gap, then the pattern in (55) is predicted to be the easier. In (55) the ergative subject appears early in the sentence, which signals the existence of an absolutive NP later in the sentence, and if it is missing, it means that
there is a gap. Such expectation (for an absolutive NP) may facilitate the processing of the relative clause. The results from their moving-window self-paced reading task showed no significant difference between the pattern in (54) and the pattern in (55). Polinsky et al. interpret this result in an intriguing way: they suggest that Avar in fact has a subject (i.e. A-argument) advantage, which is obscured by the morphological advantage for absolutive (i.e. O-argument)—suppressing the subject-object asymmetry.

Under this approach, it is possible to say that a subject advantage was in fact present for Basque as well, but that it was overridden by the morphological cues that help identify a direct object gap. Interestingly, another Basque study (Gutierrez-Mangado & Ezeizabarrena, 2012) compared children’s production and comprehension and found the subject-object asymmetry in a different direction in the two tasks. In this study, 4-year-olds (mean age 4.1; N=13) and 6-year-olds (mean age 6.2; N=9) comprehended TRCs with more accuracy than ARCs, supporting the results of Gutierrez-Mangado (2011); however, the production results from the same participants as well as a different group of participants (mean age 5.6, N=20) showed that children were better at producing ARCs (4-year-olds 82.6%; 5-year-olds 87.05%; 6-year-olds 92.5%) compared to TRCs (4-year-olds 56%; 5-year-olds 54.3%; 6-year-olds 74.4%). Moreover, a processing study of head-final RCs in Ch’ol found advantages in ARCs in terms of accuracy rates as well as response times (Clemens et al., n.d.). It was also reported that, when the RCs are ambiguous, participants are more likely to interpret them as ARCs. The lack of a subject advantage in Basque and Avar might be because of the head-initial RCs. In Ch’ol, the matrix predicate as well as the head of the RC appears early in the sentence and facilitates parsing; on the other hand, the head of the RC appears later in both Basque and Avar, and the predicate also does not appear until later in the sentence in Avar. Because of the lack of information from the RC head and, for Avar, the predicate, the comprehender relies more on the information from morphology, which may compete with the subject advantage more strongly in these languages compared to Ch’ol. Morphologically ergative languages therefore uncovered that morphology can be a strong factor in understanding the acquisition and processing of relative clauses.

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1.1.7.2 Syntactically ergative languages

In syntactically ergative languages, unlike morphologically ergative languages, ergativity has syntactic consequences in that relativization is restricted to absolutive arguments. Essentially, then, these languages can only relativize absolutes (S and O), but ergatives (A) cannot be relativized (unless a special construction is used). See the following examples in Q’anjob’al Mayan, a syntactically ergative language. As you can see in (58), the absolutive O can be relativized directly, while the relativization of the ergative A is ungrammatical, as seen in (59).

In order to relativize the A-argument, it is necessary to use a special construction usually referred to as “Agent Focus” (AF). Although AF makes the verb intransitive, this is treated differently from a true antipassive. In AF, the absolutive O is retained, while in antipassive, the relativized S is marked absolute, and the O becomes oblique.

(57) Transitive clause
Max-Ø y-uk’ ix ix kapey.
Pfv-3.abs 3.erg-drink det woman coffee
‘The woman drank coffee.’

(58) TRC
Max jay ix ix [max h-el-a’ _ ]
Pfv arrive det woman pfv 2.erg-see-tr
‘The woman who you saw arrived.’

(59) Ungrammatical ARC
* Max jay ix ix [max-ach y-il-a’ _ ]
Pfv arrive det woman pfv-2.abs 3.erg-see-tr
(intended: ‘The woman who saw you arrived.’)

(60) Grammatical ARC
Max jay ix ix [max-ach il-on-i _ ]
Pfv arrive det woman pfv-2.abs see-AF-intr
‘The woman who you arrived.’

In a production task in Q’anjob’al Mayan, Gagliardi, Mateo Pedro, & Polinsky (2013) found no significant difference between ARCs and TRCs in children (age 2;8-6;2) and adults. The lack of a clear difference between the patterns is explained as the result of competition between the patterns.

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14 This parallels Tagalog’s constraints on relativization in §1.2.4. However, Keenan & Comrie (1977) interpreted this as a case in which only the subject is relativizable, following the NPAH.
grammatical system that disprefer the extraction of the A-argument\textsuperscript{15} and the processing preference for the A-argument extraction. On the other hand, Clemens et al. (n.d.) tested adult speakers of Q’anjob’al Mayan using a sentence-picture matching task, and found an ARC advantage over TRCs.\textsuperscript{16}

Although it is hard to draw conclusions about these languages, especially because there are only a handful of studies, they seem to show that there is a subject advantage for ergative-absolutive languages as well. However, this may be weakened or overridden by the position of RCs with respect to the head noun (pre-nominal or post-nominal), morphological complexity (giving an advantage to absolutes in morphologically ergative languages) and grammatical factors (disfavoring extraction of ergatives in syntactically ergative languages). Table 9 summarizes previous studies on ergative-absolutive languages with pre-nominal or post-nominal RCs.

Table 9. Summary of previous studies on ergative-absolutive languages.

<table>
<thead>
<tr>
<th>Language</th>
<th>Ergativity</th>
<th>RC type</th>
<th>Task</th>
<th>Population</th>
<th>Results</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avar</td>
<td>morphological</td>
<td>head-initial</td>
<td>self-paced reading</td>
<td>adults</td>
<td>A = T</td>
<td>Polinsky et al. (2012)</td>
</tr>
<tr>
<td>Basque</td>
<td>morphological</td>
<td>head-initial</td>
<td>self-paced reading</td>
<td>adults</td>
<td>T &lt; A</td>
<td>Carreiras et al. (2010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ERPs comprehension</td>
<td>adults</td>
<td>T &lt; A</td>
<td>Carreiras et al. (2010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>elicited production</td>
<td>children/adults</td>
<td>A &gt; T</td>
<td>Gutierrez-Mangado (2011)</td>
</tr>
<tr>
<td>Ch’ol</td>
<td>morphological</td>
<td>head-final</td>
<td>sentence-picture matching</td>
<td>adults</td>
<td>A &gt; T</td>
<td>Gutierrez-Mangado &amp; Ezeizabarrena (2012)</td>
</tr>
<tr>
<td>Q’anjob’al Mayan</td>
<td>syntactic</td>
<td>head-final</td>
<td>sentence-picture matching</td>
<td>adults</td>
<td>A &gt; T</td>
<td>Clemens et al. (n.d.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>elicited production</td>
<td>adults</td>
<td>A = T</td>
<td>Gagliardi et al. (2013)</td>
</tr>
</tbody>
</table>

1.1.8 Summary

To summarize, there are several competing accounts for the subject-object asymmetry in RCs:

\textsuperscript{15} Fox (1987) revised Keenan and Comrie’s (1977) hierarchy and claimed that it is not the subjects (S and A) that are the most relativizable, but rather the absolutes (S and O).

\textsuperscript{16} Heaton, O’Grady, & Deen (n.d.) also found an ARC advantage in elicited production from adult speakers of Kaqchikel, a syntactically ergative language. However, this was used as an evidence to claim that this language does not exhibit syntactic ergativity in relative clauses. In the production of \textit{wh}-questions, on the other hand, this language showed a strong evidence of syntactic ergativity.
These hypotheses are all equally successful for languages such as English with head-final RCs. However, research on head-initial RCs such as Mandarin Chinese has questioned the validity of the Linear Distance Hypothesis and Word Order Canonicity Hypothesis. There are other factors that may influence which type of RCs is easier to process, such as morphological complexity. It would be ideal to have a language that can neutralize these additional factors, and yet offer a new piece of data that test these hypotheses. In this study, I use Tagalog to address these issues. The next section gives an overview of Tagalog morphosyntax and explains how Tagalog can help us further research on the subject-object asymmetry.

1.2 Tagalog

Tagalog, one of the 182 languages spoken in the Philippines, has 21.5 million native speakers (Lewis, Simons, & Fennig, 2015). It is spoken in the Central to Southern Luzon region as well as on Palawan, including the two locations in which my experiments were conducted: Quezon City in the National Capital Region and the City of Bacoor in the Province of Cavite. In addition, the majority of the population in the Philippines speak Tagalog (under the name of Filipino), as it is one of the official languages of the Philippines.

Because of the linguistic diversity in the country as well as the official status of English, it is extremely difficult to find a native monolingual speaker of Tagalog. For this reason, as shown below, this study included a language background survey in order to ensure that Tagalog was the dominant language of each of our participants.

In subsequent sections, I provide an overview of Tagalog morphosyntax as well as of previous studies on the acquisition of Tagalog.
1.2.1 Focus system

Tagalog uses a predicate-initial word order. The ordering of post-predicate NPs is flexible and is sensitive to different morphophonological, syntactic, and discourse factors. The canonical word order is unclear: some claim that the preferred word order has the primary syntactic argument (PSA, see below) in the clause-final position (Bloomfield, 1917, p. 153; Bowen, 1965, pp. 151–2), while others claim that the canonical word order is Verb-Agent-Theme (Bautista, 1983; Naylor, 1975). However, the template for a transitive Tagalog sentence can be summarized as (66).

(66) Verb (with focus and aspect morphology) Argument 1 (non PSA/Agent) Argument 2 (PSA/Theme)
Chapter 2 provides additional discussion of Tagalog word order, drawing on data from a production experiment.

A signature feature of Tagalog grammar is its Philippine-type focus system (also known as a trigger or voice system), also seen in other Philippine languages, in Formosan languages, and in a few other Austronesian languages. It is characterized by the presence of a verbal affix that indicates the thematic role of the PSA, which in turn is marked by the case prefix (hereafter focus marker) \( aŋ \).

Tagalog has five focus patterns (discussed in more detail below): agent focus (AF), theme focus (TF), locative/goal focus (LF), benefactive focus (BF), and instrumental focus (IF). Each focus pattern is signaled by different verbal affixes, which in turn indicate the thematic role of the \( aŋ \)-marked PSA. The PSA is a unique element in a clause—there can be only one \( aŋ \)-marked NP. Other NPs are marked by the non-focus marker \( naŋ \) (which marks the agent in TF, and the theme in other focus patterns) or by \( sa \) (marking location, recipient, goal, source, etc., and optionally a definite theme in AF).

Various analyses have been proposed regarding what \( aŋ \) marks. Some researchers have argued that it marks a subject (Guilfoyle, Hung, & Travis, 1992), while others have proposed that it signals a sentential topic (Schachter & Otanes, 1972), a discourse topic (Cooreman, Fox, & Givón, 1984; Katagiri, 2006), an absolutive (Aldridge, 2004), or a definite NP (Reid & Liao, 2004). However, in accordance with the common practice, I employ the theory-neutral term PSA.

1.2.1.1 Agent Focus
Agent focus is typically indicated by the verbal infix -\textit{um}- or the prefix mag- and mang-, whose use coincides with the appearance of the focus marker \( aŋ \) on the agent argument. The PSA in an AF pattern is the sole argument of a monadic verb, as well as the agent of a dyadic verb. Instead of ‘intransitive’ and ‘transitive,’ I employ the term ‘monadic’ and ‘dyadic’ here, as some claim that agent focus is structurally intransitive, where the agent is realized as the sole argument and the theme is realized as oblique (Aldridge, 2012; Reid & Liao, 2004).

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17 For personal proper nouns, the nominative marker \( si \) is used instead of \( aŋ \).
18 Not all verbs are compatible with all five focus patterns.
19 The categorization and labeling of each focus pattern also differs among researchers. I refer to each focus pattern based on the thematic role of the PSA.
20 Instead of ‘intransitive’ and ‘transitive,’ I employ the term ‘monadic’ and ‘dyadic’ here, as some claim that agent focus is structurally intransitive, where the agent is realized as the sole argument and the theme is realized as oblique (Aldridge, 2012; Reid & Liao, 2004).
The -\textit{um}- infix in the dyadic verb ‘buy’ in (69) indicates that the PSA, marked by \textit{aŋ}, is the agent.

(69) Agent focus
\begin{verbatim}
B<\textit{um}>ili \textit{aŋ} lalake \textit{naŋ} mangga.
<\textit{AF.PFV}> buy FOC man NFOC mango
\end{verbatim}
‘The man bought a/the mango.’

The interpretation of the PSA is obligatorily specific/definite, as indicated in the interpretation of the agent \textit{lalake} ‘man’.\footnote{The selection of PSA may be influenced by different factors such as definiteness (Foley & Van Valin, 1984; Reid & Liao, 2004), specificity (Maclachlan & Nakamura, 1997; Rackowski, 2002), genericity, referentiality, topicality (Carrier-Duncan, 1985), and agentivity (Saclot, 2006).} The theme \textit{mangga} ‘mango’ marked with \textit{naŋ} can be, but need not be, specific/definite.

1.2.1.2 Theme Focus

Theme focus is typically indicated by the verbal affix -\textit{in}-\footnote{This affix is usually realized as infix -\textit{in}- in perfective and imperfective, and as suffix -\textit{in} in infinitive and contemplated (prospective).}, the suffix -\textit{an}, or the prefix \textit{i-}, depending on the verb. In contrast to AF patterns, the PSA is the undergoer and is therefore marked with the focus marker \textit{aŋ}. The agent in a TF sentence is marked with the non-focus marker \textit{naŋ}. In the example in (70), the infix -\textit{in}- indicates that the \textit{aŋ}-marked PSA is the theme.

(70) Theme focus
\begin{verbatim}
B<\textit{in}>ili \textit{naŋ} lalake \textit{aŋ} mangga.
<\textit{TF.PFV}> buy NFOC man FOC Mango
\end{verbatim}
‘A/The man bought the mango.’
1.2.1.3 Locative Focus

Locative focus is indicated by the verbal suffix -an or the circumfix pag--an. The PSA is the location or goal/recipient, marked with the focus marker aŋ. The agent and the theme are marked with the non-focus marker naŋ. In the example in (71), the suffix -an (realized as its allomorph -han) indicates that the PSA is the locative.

(71) Locative focus
B<in>il-han naŋ lalake naŋ mangga aŋ palengke.
B<in>ili-an naŋ lalake naŋ mangga aŋ palengke.
<PFV>buy-LF NFOC man NFOC mango FOC market
‘A/The man bought a/the mango at the market.’

Note that in (71) the locative is the only aŋ-marked nominal in the sentence, and that both the other two arguments (the agent and the theme) are naŋ-marked. In the following example, the PSA in the locative focus sentence is the recipient. The agent and the theme are marked with the non-focus marker naŋ.

(72) Locative focus
B<in>igy-an naŋ lalake naŋ mangga aŋ babae.
B<in>igay-an naŋ lalake naŋ mangga aŋ babae.
<PFV>give-LF NFOC man NFOC mango FOC woman
‘A/The man gave a/the mango to the woman.’

1.2.1.4 Benefactive Focus

Benefactive focus is indicated by the prefix i- and ipag-, and the beneficiary is marked as the PSA (73).24

(73) Benefactive focus
I-b<in>ili naŋ lalake naŋ mangga aŋ babae.
<PFV>buy NFOC man NFOC mango FOC woman
‘A/The man bought a/the mango for the woman.’

1.2.1.5 Instrumental Focus

Instrumental focus is indicated by the verbal prefix ipag-, with the instrument marked as the PSA, as shown in (74).

---

24 In colloquial Manilan Tagalog, benefactive focus can be merged with locative focus.
In this dissertation, I focus on the contrast between AF and TF.

### 1.2.2 Analyticals of the Tagalog focus system

Previous studies have analyzed the Tagalog focus system as essentially one marking alignment (nominative-accusative or ergative-absolutive). Some have argued that Tagalog has (i) a nominative-accusative system in which the AF pattern is active and transitive, and the TF pattern is passive (Guilfoyle et al., 1992; Rackowski & Richards, 2005), while others have proposed that Tagalog has (ii) an ergative-absolutive system, which the TF pattern is the active transitive and AF pattern is the antipassive (e.g., Aldridge, 2004; De Guzman, 1988; Liao, 2004). Finally, Foley (1998) argues that Tagalog has (iii) a symmetrical voice system in which both the AF and TF patterns are transitive, and neither is derived from the other.

If we were to adopt a nominative-accusative analysis of Tagalog focus, in which the AF is active and the TF is a passive, more appropriate glosses for (69) and (70) would be the ones in (75) and (76), respectively.

(75) B<um>ili naŋ mangga aŋ lalake.  
<TR.PFV>buy NFOC mango FOC man  
‘The man bought a/the mango.’

(76) B<in>ili naŋ lalake aŋ mangga.  
<PASS.PFV>buy NFOC man NOM mango  
‘The mango was bought by a/the man.’

On the other hand, if we were to adopt an ergative-absolutive analysis of Tagalog focus, in which the TF is an active transitive and the AF is an antipassive, the gloss for (70) should be reformulated as follows.

(77) B<in>ili naŋ lalake aŋ mangga.  
<TR.PFV>buy ERG man ABS mango  
‘A/The man bought the mango.’
Under this approach, AF patterns are considered intransitives/antipassives, in which aŋ marks the absolutive and naŋ marks the oblique, as demonstrated in (78).

(78) B<um>ili aŋ lalake naŋ mangga.  
    <<INTR.PFV>buy ABS man OBL mango  
    ‘The woman bought a/the mango.’

Because there is no consensus among linguists, I do not commit to any of these theoretical views in this dissertation. Instead, I will present my findings in a theory-neutral way that maximizes their relevance to a general understanding of how Tagalog RCs work—this is why I avoid the terms such as “subject relative clause” and “object relative clause”, and instead use “agent relative clause” and “them relative clause”. I will describe the Tagalog RCs in §1.2.4, but first, I will provide a review of previous acquisition studies on Tagalog in the next section.

1.2.3 Acquisition of Tagalog focus system

A few studies have investigated the acquisition of Tagalog focus patterns. Tucker (1971) tested children’s mastery of all focus patterns using two tasks: an imitation task and a sentence completion task. In the imitation task, 48 child native speakers of Tagalog (mean age 10;8, age range not given) were asked to repeat the sentences read by the researchers. In the sentence completion task, they were given a sentence in a certain focus pattern, such as the TF in (79), and were prompted to turn the sentence into another focus pattern, by changing the sentence into one that starts with an NP given by the researcher.

(79) K<in>ain naŋ bata aŋ saging.  
    <TF.PFV>eat NFOC child FOC banana  
    ‘A/The child ate the banana.’

25 Antipassives are seen among ergative languages. The agent is realized as the absolutive—the syntactically prominent argument—and the theme as the oblique (Dixon, 1979). Because antipassive clauses are morphologically intransitive, it is possible to think of the absolutive agent as the intransitive subject (Schachter, 1994) and the theme downgraded to oblique.

26 This requires children to produce a sentence in NP-initial word order, which is possible (as long as the first NP is in focus) but not canonical in Tagalog.
For example, participants might be asked to turn the TF sentence in (79) into the one that starts with the agent, as illustrated in (80).

\[
(80) \quad \text{Aŋ bata ay } ___ \text{ naŋ sagiŋ.} \\
\text{FOC child TOP NFOC banana} \\
\text{‘The child } ____ \text{ a/the banana.’}
\]

Table 10. Summary of Tucker (1971).

<table>
<thead>
<tr>
<th>Participants</th>
<th>48 child native speakers of Tagalog (mean age 10;8, range not given)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tasks</td>
<td>Imitation task</td>
</tr>
<tr>
<td></td>
<td>Children were asked to repeat the sentences read by the researchers.</td>
</tr>
<tr>
<td></td>
<td>Sentence completion task</td>
</tr>
<tr>
<td></td>
<td>Children were given a sentence in a certain focus pattern, and had to turn the sentence into another focus pattern by providing a correct form of the verb that follows the sentence-initial NP given by the researcher.</td>
</tr>
<tr>
<td>Results</td>
<td>Error rates</td>
</tr>
<tr>
<td>Verb types</td>
<td>Tasks</td>
</tr>
<tr>
<td>Real verbs</td>
<td>Imitation</td>
</tr>
<tr>
<td></td>
<td>Completion</td>
</tr>
<tr>
<td>Nonse verbs</td>
<td>Imitation</td>
</tr>
<tr>
<td></td>
<td>Completion</td>
</tr>
</tbody>
</table>

(Because the actual numbers were not reported, visual estimates were made from the graph based)

In Tagalog, only PSA can be fronted (the same restriction applies to relativization, as discussed in §1.2.4). Therefore, in order for participants to produce a grammatical sentence, the verb they supplied had to be in a correct form based on what NP was given as the sentence-initial element by the researcher. In the case of (80), the correct verb form that follows the fronted agent is the AF form—k<um>ain. Tucker (1971) used 12 actual Tagalog verbs and 12 nonce verbs. The

---

27 The marker ay (glossed as the topic marker here) is analyzed differently in the previous literature, where it is taken to signal the fronting of a PSA.

28 Tucker (1971) also tested the relative difficulty of locative focus, directional focus, referential focus, and causative focus. Of these, locative focus and directional focus were explained in §0 as a single category. Referential focus and causative focus were not mentioned in this dissertation. The difficulty ordering in his original terminology is as follows, with the leftmost being the easiest and the rightmost being the most difficult:

Object Focus > Referential Focus > Locative Focus > Directional Focus > Actor Focus > Causative Focus

37
results from both tasks showed that TF was easier than AF for the children to produce. The summary of this study is given in Table 10.

Segalowitz and Galang (1978) conducted an elicited production task, in which 30 child native speakers of Tagalog (ten children aged 3;1-3;11, mean 3;6; ten children aged 5;1-5;9, mean 5;6; and ten children aged 7;1-7;5, mean 7;4) were asked to describe pictures following the prompt given by the researcher. The results showed that children, regardless of age, did equally well in both AF and TF. Segalowitz & Galang also conducted a comprehension task, in which children were asked to select an appropriate picture based on the sentence they had heard. When the sentence was produced in an NP-initial word order, children did equally well in both AF and TF; however, when the sentence had a canonical, verb-initial word order, they performed better when the sentence was in a TF pattern. The summary of this study is given in Table 11.

<table>
<thead>
<tr>
<th>Participants</th>
<th>30 child L1 speakers of Tagalog</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3-year-olds (aged 3;1-3;11, mean 3;6; n = 10)</td>
</tr>
<tr>
<td></td>
<td>5-year-olds (aged 5;1-5;9, mean 5;6; n = 10)</td>
</tr>
<tr>
<td></td>
<td>7-year-olds (aged 7;1-7;5, mean 7;4; n = 10)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Comprehension task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The children were presented two pictures portraying reversible actions (e.g., dog biting duck, duck biting dog), and had to point to the correct picture. The sentences were all given in verb-initial, PSA-final word order; however, a follow-up experiment was done with the subset of the participants using PSA-initial sentences.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th>Comprehension task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age group</td>
</tr>
<tr>
<td>verb-initial 3-year-olds</td>
<td>38%</td>
</tr>
<tr>
<td>verb-initial 5-year-olds</td>
<td>34%</td>
</tr>
<tr>
<td>verb-initial 7-year-olds</td>
<td>31%</td>
</tr>
<tr>
<td>PSA-initial 5- &amp; 7-year-olds</td>
<td>95%</td>
</tr>
</tbody>
</table>

No significant age effect

<table>
<thead>
<tr>
<th></th>
<th>Production task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age group</td>
</tr>
<tr>
<td>PSA-initial 3-year-olds</td>
<td>71%</td>
</tr>
<tr>
<td>PSA-initial 5-year-olds</td>
<td>90%</td>
</tr>
<tr>
<td>PSA-initial 7-year-olds</td>
<td>93%</td>
</tr>
</tbody>
</table>

(The actual numbers were not reported in the paper and thus retrieved from the graph based on visual estimate)

Significant difference only between 3-year-olds and 5-year-olds

29 Segalowitz and Galang (1978) also conducted a comprehension task for aspect, the description of which I omit from this table because it is irrelevant here.

39
Based on a picture-based elicited production task, Bautista (1983) reported that TF was the predominant focus pattern in the speech of Tagalog-dominant children aged 2;2 to 4;6. The dominance of TF is also manifested in a study of text frequency, as shown in Table 12.

Table 12. Text frequency reported by Cooreman et al. (1984).

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF (Verb-initial)</td>
<td>166</td>
<td>59%</td>
</tr>
<tr>
<td>TF (PSA-initial)</td>
<td>47</td>
<td>17%</td>
</tr>
<tr>
<td>AF (Verb-initial)</td>
<td>37</td>
<td>13%</td>
</tr>
<tr>
<td>AF (PSA-initial)</td>
<td>31</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>281</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

More recently, Marzan (2013, p. 129) conducted a far-reaching study of children’s development of Tagalog by collecting longitudinal naturalistic data from five bilingual and trilingual children aged 1;2 to 5;0. Although Marzan did not investigate the emergence of different focus types, she reported the frequency of different verbal affixes in the children’s speech. Overall frequency showed that TF/LF -an (because –an can mark either TF or LF, it is not clear which focus pattern was used) was the most frequent verbal affix in child speech, followed by the TF affix -in, AF prefix mag-, ma-, and TF/BF prefix i- (because i- can mark either TF or BF, it is not clear which focus pattern was used). Of these, the TF affix -in was the most frequent focus marker in the very early stage of children’s production (24 months).

Tanaka et al. (2016) conducted a picture-based elicited production task to test a focus pattern preference in declarative clauses. When animacy and definiteness were controlled (i.e., the agent and the theme were both animate and definite), children aged 4;2 to 5;3 (mean 4;6) and adults were more likely to describe transitive events in TF (adults 96.8%; children 84.2%) than AF.

While these results are far from conclusive, the preponderance of evidence seems to suggest that young children have better mastery of TF that AF, at least in the canonical verb-initial word order.

A wrinkle is added to this picture by work from Garcia, Sekerina, Dery, Roeser, and Höehle (2015), who investigate the interaction of focus patterns (AF versus TF) and word order. As

---

30 Cooreman et al. (1984) refers to TF (Verb-initial) as ergative, TF (PSA-initial) as passive, and AF as antipassive.
31 Note that the data reported are frequency counts and not accuracy.
noted above, the PSA typically occurs at the end of the sentence. This means that when the verb is marked AF, the word order is usually Verb-Theme-Agent, while if the verb is marked TF, the word order is typically Verb-Agent-Theme. Garcia et al. conducted a sentence-picture matching task, crossing focus (agent focus vs. theme focus) and word order (Verb-Agent-Theme vs. Verb-Theme-Agent). They tested 60 Tagalog-speaking children (20 each for three age groups: 3-year-olds, 5-year-olds, and 7-year-olds). They found that irrespective of focus marking on the verb, the Verb-Agent-Theme word order is easier to understand than Verb-Theme-Agent word order for all age groups except for the 3-year-olds, who showed a numerical (but non-siginficant) preference for Verb-Theme-Agent order.

On the other hand, Sauppe, Norcliffe, Konopka, Van Valin, & Levinson (2013) conducted an eye-tracking-during-production study with 53 adult speakers of Tagalog, and found that they produced verb-initial, PSA-final word order more frequently regardless of the focus patterns. However, word order did not have any effect on eye fixation patterns. Instead, the speakers fixated on the agent more than the theme in AF patterns regardless of the word order, but no difference was found between the fixation patterns on the agent and the theme during the production of TF sentences.

1.2.4 Relative clauses in Tagalog

Relative clauses in Tagalog begin with the head noun, which is immediately followed by the “linker” na (–ŋ after a word ending in a vowel).

(81) lalake=ŋ [h<um>a~habol _ naŋ babae]  
man=L <AF>IPFV~chase nfoc woman  
‘the man that is chasing a/the woman’

(82) babae=ŋ [h<in>a~habol naŋ lalake _ ]  
woman=L <TF>IPFV~chase NFOC man  
‘the woman that the man is chasing’

Focus marking in Tagalog is relevant to the syntax of relative clauses as well as various types of extraction. In Tagalog, only the PSA is relativizable—that is, only the agent in the AF clause and the theme in the TF clause can be relativized, as shown in (81) and (82). The relativation of the agent argument of a TF clause is dispreferred or ungrammatical, as seen in (83), and it is not
possible relativize the agent argument of a TF clause or the theme argument of an AF clause, as shown in (84).

(83) Agent extracted from a TF Clause
? lalake=ŋ [h<in>a~habol_ aŋ babae]  
man=L <TF>IPFV~chase FOC woman  
‘the man that is chasing the woman’

(84) Theme extracted from an AF clause
* babae=ŋ [h<um>a~habol aŋ lalake _]  
woman=L <AF>IPFV~chase FOC man  
‘the woman that the man is chasing’

Tanaka et al. (2014) conducted an elicited production study of Tagalog ARCs and TRCs, testing 11 adults and 14 children from age 4;1-5;5 (M = 4;10). The results showed no difference between ARCs and TRCs in adults’ accuracy; however, children were better at producing ARCs compared to TRCs. Although there was a large variation among children, the overall results showed that children were more successful at producing ARCs than TRCs. Error analysis also showed that more TRCs were turned into ARCs than vice versa, pointing to an ARC advantage.
Table 13. Summary of Tanaka et al. (2014).

| Participants | 14 child speakers of Tagalog (age 4;1-5;5, M=4;10)  
|              | 11 adult speakers of Tagalog |
| Tasks | Elicited production task  
|       | Children saw pictures depicting two transitive actions and described the character that was pointed by an arrow. |
|       | ARC prompt: A boy is hugging a girl. Another boy is hugging a monkey. Who has the arrow? |
|       | TRC prompt: A boy is hugging a girl. A monkey is hugging another girl. Who has the arrow? |

| Results | Accuracy | ARC | TRC |
|         |          | Children | Adults |
|         |          | 69.0% | 100% |
|         |          | 34.6% | 97% |
|         | Children produced more targeted ARCs than TRCs  
|         | Reversal errors turned more TRCs into ARCs than vice versa |

Pizarro-Guevara (2014) conducted a comprehension study of Tagalog RCs, testing adults and 3 groups of children (age 4-7, age 7-9, and age 10-14) (Table 14).

<table>
<thead>
<tr>
<th>Participants</th>
<th>31 child native speakers of Tagalog (age 4-14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Three groups: 4-6 (mean 5;0), 7-9 (mean 8;27), 10-14 (mean 11;11)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Sentence-picture matching task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Children saw pictures depicting two reversed actions and point at the character that matches the auditory prompt.</td>
</tr>
</tbody>
</table>

Agent relative Prompt: Where is the visitor who was giving me a present?
Non-agent relative Prompt: Where is the visitor who I was giving a present to?

<table>
<thead>
<tr>
<th>Results</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>agent</td>
</tr>
<tr>
<td>4 to 6</td>
<td>50.00%</td>
</tr>
<tr>
<td>7 to 9</td>
<td>80.00%</td>
</tr>
<tr>
<td>10 to 14</td>
<td>85.19%</td>
</tr>
<tr>
<td>Adults</td>
<td>88.00%</td>
</tr>
</tbody>
</table>

7 to 9-year-olds performed adult-like in ARC
10 to 14-year-olds did not perform adult-like in TRC

<table>
<thead>
<tr>
<th>Results</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>agent</td>
</tr>
<tr>
<td>4 to 6</td>
<td>3306 ms</td>
</tr>
<tr>
<td>7 to 9</td>
<td>1979 ms</td>
</tr>
<tr>
<td>10 to 14</td>
<td>1263 ms</td>
</tr>
<tr>
<td>Adults</td>
<td>1201 ms</td>
</tr>
</tbody>
</table>

10 to 14-year-olds responded as quickly as adults
7 to 9-year-olds responded as quickly as adults

He tested ARCs and what he refers to as “non-agent” RCs, which include TRCs and relativization of the recipient (e.g., ‘the visitor who I was giving a present to’). The results of the
reference-selection task\textsuperscript{32} showed that children were generally better with ARCs than non-agent RCs, with respect to the accuracy rate and reaction times. Moreover, while children aged 7-9 years already manifested adult-like performance on ARCs, albeit with slower reaction times than adults, children aged 10-14 years were still not adult-like with non-agent RCs. This study showed a subject advantage; however, his “non-agent” RC condition did not distinguish relativization of themes from relativization recipient argument, it did not provide a direct comparison between ARCs and TRCs.\textsuperscript{33}

1.3 Research questions and rationale of the study

In the current study, I investigate whether a subject-object asymmetry arises in the production and comprehension of relative clauses by adult and child speakers of Tagalog. There are two research questions:

1. Are ARCs easier to comprehend than TRCs for child and adult speakers of Tagalog? (Experiment 2)
2. Are ARCs easier to produce than TRCs for child and adult speakers of Tagalog? (Experiments 3 & 4)

Tagalog RCs may give us a novel insight into the nature of the subject-object asymmetry. As we saw in §1.1, there are five competing accounts for the subject-object asymmetry: Linear Distance Hypothesis, Canonical Word Order Hypothesis, Structural Distance Hypothesis, Frequency Hypothesis, and Semantic Prominence Hypothesis. As discussed in the following sections, different outcomes can be predicted for Tagalog relative clauses based on these different hypotheses.

\textsuperscript{32} Unlike a sentence-picture matching task, a reference-selection task requires the participant to identify the correct character, not just the picture, based on what they hear.
\textsuperscript{33} Studies of relativization in non-Philippine languages with a Philippine-type focus system are rare. Borja et al.’s (2016) study Charmorro, which is a language with a similar system, but do not directly test the relative difficulty of ARC and TRC.
1.3.1 Linear Distance Hypothesis in Tagalog

The Linear Distance Hypothesis states a relative clause is more difficult when the linear distance between the head and the gap is greater (see the discussion in §1.1.1). However, because the default word order of Tagalog is unknown, we cannot make a specific prediction based on this hypothesis. If we assume the preferred word order in Tagalog is Verb-Agent-Theme (Bautista, 1983; Garcia et al., 2015; Naylor, 1975), then, ARCs should be easier than TRCs much like English.

(85) \[ \text{lalake}=ŋ [h<um>a-habol \_ naŋ babae ] \quad \text{ARC} \]
\[ \text{man}=L \quad <\text{AF}>\text{IPV}\sim\text{chase} \quad \text{NFOC woman} \]
‘the man that is chasing a/the woman’

(86) \[ \text{lalake}=ŋ [h<in>a-habol naŋ babae \_ ] \quad \text{TRC} \]
\[ \text{man}=L \quad <\text{TF}>\text{IPV}\sim\text{chase} \quad \text{NFOC woman} \]
‘the man that a/the woman is chasing’

However, if we assume the default word order is predicate-initial and PSA-final (Bloomfield, 1917, p. 153; Bowen, 1965, pp. 151–152; Sauppe et al., 2013), the Linear Distance Hypothesis predicts no differences between ARCs and TRCs.

(87) \[ \text{lalake}=ŋ [h<um>a-habol naŋ babae \_ ] \quad \text{ARC} \]
\[ \text{man}=L \quad <\text{AF}>\text{IPV}\sim\text{chase} \quad \text{NFOC woman} \]
‘the man that is chasing a/the woman’

(88) \[ \text{lalake}=ŋ [h<in>a-habol naŋ babae \_ ] \quad \text{TRC} \]
\[ \text{man}=L \quad <\text{TF}>\text{IPV}\sim\text{chase} \quad \text{NFOC woman} \]
‘the man that a/the woman is chasing’

1.3.2 Canonical Word Order Hypothesis

The Canonical Word Order Hypothesis predicts that non-canonical word order contributes to the difficulty of a relative clause (see the discussion in §1.1.2). Although it may be unclear what the
canonical word order is, it is certain that the order NP V NP, which characterizes both ARCs nor TRCs can the default order for the language, which is uncontrovertially predicate-initial.

\[
\begin{array}{ccc}
 & A & V \\
(89) & \text{lalake} = \eta & [h<um>a~\text{habol} & _ & \text{na} \eta & \text{babae}] & \text{ARC} \\
 & \text{man} = \text{L} & <\text{AF}> \text{IPV} \sim \text{chase} & \text{NFOC} & \text{girl} \\
& \text{‘the man that is chasing a/the woman’} & \\
\end{array}
\]

\[
\begin{array}{ccc}
 & T & V \\
(90) & \text{lalake} = \eta & [h<in>a~\text{habol} & \text{na} \eta & \text{babae} & _] & \text{TRC} \\
 & \text{man} = \text{L} & <\text{TF}> \text{IPV} \sim \text{chase} & \text{NFOC} & \text{woman} \\
& \text{‘the man that a/the woman is chasing’} & \\
\end{array}
\]

The Canonical Word Order Hypothesis therefore predicts no difference between ARCs and TRCs.

Although non-canonical, PSA-initial word order is possible in Tagalog in topicalization constructions.\(^3^4\) However, we would still predict no difference between the two RC types. As shown in Table 12, Cooreman et al. (1984) reported that AF sentences with Agent-Verb-Theme word order (11\%) are as frequent as TF sentences with Theme-Verb-Agent word order (17\%). Furthermore, the results from Segalowitz and Galang (1978) suggest that children understand PSA-initial AF sentences and PSA-initial TF sentences equally well. Therefore, the frequency or the ease of PSA-initial word order does not change our prediction based on the Canonical Word Order Hypothesis.

1.3.3 Structural Distance Hypothesis

The Structural Distance Hypothesis states that a relative clause is more difficult when the gap is more deeply embedded in the tree (see the discussion in §1.1.3).

Regardless of the analysis of the Tagalog grammatical system, the structural depth of gap between ARCs and TRCs should not differ if the depth is based on the surface structure. In all analyses, the PSA is in the highest specifier position for both AF and TF. For example, in the nominative-accusative analysis of Tagalog AF and TF proposed by Guilfoyle et al. (1992) and illustrated in (91) and (92), the PSA moves to the [Spec, IP] position, regardless of whether it is

\(^3^4\) This is also subject to the same PSA-only constraint as relativization, in that only the PSA can be fronted.
agent or theme. In both focus patterns, the PSA is in the highest position in the surface structure prior to relativization, ensuring that the gap associated with this operation has the same structural depth in both ARCs and TRCs.

(91) Tree structure of AF based on Guilfoyle et al.’s (1992) analysis

(92) Tree structure of TF based on Guilfoyle et al.’s (1992) analysis

Rackowski and Richards (2005) propose another nominative-accusative analysis, in which the PSA receives an obligatorily specific interpretation in the highest specifier position of vP (at
the edge of \( vP \)). In the case of TF, the PSA theme goes through “object shift”\(^{35} \) (Chomsky, 2001), in which the theme moves to the [Spec, \( vP \)] position to receive a specific reading as shown in (93).

\[(93) \quad \text{Tree structure of TF based on Rackowski and Richard’s (2005) analysis} \]

\[\begin{array}{c}
\text{vP} \\
\text{Theme} \\
\text{[specific]} \\
\text{Agent} \\
\text{v} \\
\text{VP} \\
\text{V} \\
\text{NP} \\
\text{t} \\
\text{Theme}
\end{array}\]

In the case of AF, in contrast there is no such shift as the agent already occupies the highest position within \( vP \).

\[(94) \quad \text{Tree structure of AF based on Rackowski and Richard’s (2005) analysis} \]

\[\begin{array}{c}
\text{vP} \\
\text{Agent} \\
\text{[specific]} \\
\text{v} \\
\text{VP} \\
\text{V} \\
\text{NP} \\
\text{t} \\
\text{Theme}
\end{array}\]

\(^{35}\) According to Chomsky (2001), the object shift is allowed (and required) by an EPP-feature on \( v \), which can only be assigned only if that has a semantic outcome. In this case, the EPP position of \( v \) is assigned a specific interpretation, and therefore has a semantic outcome (Rackowski & Richards, 2005).
Once again, the gap left by relativization in both ARCs and TRCs is in the same position. The Structural Distance Hypothesis again predicts no difference between ARCs and TRCs.

The same prediction can be derived from the ergative-absolutive analysis by Aldridge (2004) and illustrated in (95) and (96).³⁶

(95)  Tree structure for AF based on Aldridge’s (2004) analysis

(96)  Tree structure for TF based on Aldridge’s (2004) analysis

³⁶ Although the original tree diagrams had verb raising (V to v to T movement), the diagrams in (95) and (96) do not depict this operation for the sake of simplicity.
Under this analysis, TF is considered to be the basic transitive sentence, with an ergative agent and an absolutive theme; in contrast, AF is treated as an antipassive, in which the verb is intransitive and the agent is oblique. In either focus pattern, the gap left by relativization of PSA is in the [Spec, vP] position. Therefore, the ergative-absolutive analysis does not predict any difference in structural depth either.\(^\text{37}\)

In sum, then, the Structural Distance Hypothesis does not predict any difference between ARC and TRC in Tagalog, regardless of the analysis on its syntactic structure.\(^\text{38}\)

### 1.3.4 Frequency Hypothesis

The frequency hypothesis predicts that the difficulty associated with TRCs is influenced by the frequency of different types of RCs in the input we receive. Unfortunately, I do not have a corpus data to show what types of RCs are frequent in Tagalog. However, previous studies on declarative clauses help us make some predictions.

First, as the previous studies suggest, TF is a far more frequent pattern in Tagalog compared to AF (Bautista, 1983; Cooreman et al., 1984; Tanaka et al., 2016). If the distribution of declarative clauses affects the difficulty of RCs, TRCs are expected to be easier than ARCs.

However, Cooreman et al. (1984) also showed there was no large frequency difference between AF sentences and TF sentences in the PSA-initial patterns. If the distribution of RCs is similar to topicalized sentences, it is also possible that there is no frequency difference between ARCs and TRCs, predicting no difference between the two.

---

\(^{37}\) Even if Tagalog is an ergative language, ARCs and TRCs are equally marked in regards to morphology; therefore, neither form should exhibit effects of morphological complexity.

\(^{38}\) There is another way to look at structural distance: AF and TF differ in terms of the preparatory movement of PSA prior to relativization. In Guilfoyle et al.’s (1992) analysis, the PSA moves in both AF and TF, but the distance of the movement is greater in the case of TF. In the analyses by Rackowski and Richard (2005) and Aldridge (2004), on the other hand, the PSA agent does not move in AF, but the PSA theme moves in TF. This means that there is an extra operation involved in TF. These contrasts might point to an increased difficulty in TRC compared to ARC. However, this added complexity is in the pre-RC operations, and if there is an effect in RCs, we might expect to see the same effect in declaratives, in which an increased difficulty is associated with TF compared to AF. Yet no such effect has ever been observed.
1.3.5 Semantic Prominence Hypothesis

The Semantic Prominence Hypothesis states that RCs are easier to process when the head refers to a prominent entity. Assuming that agents are more prominent than themes (see the discussion in §1.1.5), this hypothesis predicts that Tagalog ARCs are easier than TRCs.

\[ \text{agent … more prominent} \]
\[ \downarrow \]
\[ (97) \quad \text{lalake}=\eta \quad [h<um>a~habol \ _ \ na\eta \ babae \ ] \]
\[ \text{man}=L \quad <\text{AF}>\text{IPV}~\text{chase} \quad \text{NFOC} \quad \text{woman} \]
\[ \text{‘the man that is chasing a/the woman’} \]

\[ \text{theme … less prominent} \]
\[ \downarrow \]
\[ (98) \quad \text{lalake}=\eta \quad [h<in>a~habol \ na\eta \ babae \ _] \]
\[ \text{man}=L \quad <\text{TF}>\text{IPV}~\text{chase} \quad \text{NFOC} \quad \text{woman} \]
\[ \text{‘the man that a/the woman is chasing’} \]

In sum, if an ARC advantage is found in Tagalog, the results could be interpreted as support for the Semantic Prominence Hypothesis. If a TRC advantage is observed, then it may support the Frequency Hypothesis, although we cannot be sure until we obtain the frequency data on Tagalog RCs. If no difference is found between ARCs and TRCs, then, we are left with two possibilities: the Canonical Word Order Hypothesis or the Structural Distance Hypothesis. Table 15 summarizes the predictions on Tagalog RCs based on the five hypotheses.

<table>
<thead>
<tr>
<th>Predictions</th>
<th>Linear distance</th>
<th>Word order canonicity</th>
<th>Structural distance</th>
<th>Frequency</th>
<th>Semantic prominence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCs advantage</td>
<td>No prediction</td>
<td>No difference</td>
<td>No difference</td>
<td>TRC advantage or no difference</td>
<td>ARC advantage</td>
</tr>
</tbody>
</table>

Although data from Tagalog alone may not be sufficient to distinguish among these five hypotheses, it may complement previous findings from other languages in identifying the source of the subject advantage. We will come back to this discussion in Chapter 6 for conclusion and discussion.
1.3.6 Experimental Designs

In the subsequent chapters, I report the results from a production task on declarative clauses, a comprehension task on RCs, an elicited imitation task on RCs, and an elicited production task on RCs. Although the results will be reported in this order, they were conducted in the either of the following two orders to minimize task effects:

(99) RC production, RC imitation, RC comprehension, and declarative production
(100) RC production, RC comprehension, declarative production, and RC imitation.

Of these, the order in (99) was followed to our best capacity. Adults participated in all four experiments in one session, and for children, the four experiments were divided into two sessions with an interval ranging from 1-8 days. They participated in the RC production task and the RC imitation task in one session, and the RC comprehension task and the declarative production task in the second session. However, because the RC production task was the longest and the most demanding task, some of the children were not able to continue with the RC imitation task in the first session. For these children, the RC imitation task was conducted at the end of the second session, following the order in (100).

Participants were recruited and tested at two locations in the Philippines: Bacoor City in the Province of Cavite and Quezon City in the National Capital Region. Most of the participants tested in Bacoor City as well as the child participants in Quezon City had grown up locally. However, the adult participants in Quezon City were college students from various Tagalog-speaking areas of the Philippines, and therefore represented a less homogenous demography than the other adult group as well as the children. Although a total of 47 children and 32 adults participated in the study, not all of them participated in all four experiments, which is why the sample size of each experiment varies. I will refer to participants using a participant code that has the testing location information (B for Bacoor City and Q for Quezon City), population information (A for adults and C for children) and a participant number. For example, QA01 means that it is an adult participant from Quezon City who was assigned a participant number 01.

In the subsequent chapters, I report the methodology, results, and discussion for each of the four experiments. Chapter 2 reports the results from the elicited production task of declarative clauses, which I refer to as Experiment 1. This experiment was used to obtain the baseline of focus and word order preferences, as well as to see if some of the children show adult-like
behavior. In Chapter 3, I report the results from Experiment 2, which used a sentence-picture matching task to test the comprehension of the RCs. Chapter 4 reports the results from Experiment 3: the elicited imitation task of RCs and Chapter 5 reports the results from Experiment 4: the elicited production task of RCs, which was built up on Tanaka et al.’s (2014) study. Lastly, Chapter 6 concludes the dissertation with general discussion and conclusion. Table 16 shows the summary of the experiments.

**Table 16.** Summary of experiments.

<table>
<thead>
<tr>
<th>Clause Type</th>
<th>Experiment 1: Elicited production</th>
<th>(Chapter 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative clauses</td>
<td>Experiment 2: Sentence-picture matching</td>
<td>(Chapter 3)</td>
</tr>
<tr>
<td></td>
<td>Experiment 3: Elicited imitation</td>
<td>(Chapter 4)</td>
</tr>
<tr>
<td></td>
<td>Experiment 4: Elicited production</td>
<td>(Chapter 5)</td>
</tr>
</tbody>
</table>
2 Experiment 1: Production of Declarative Clause

This chapter reports the results from an elicited production task that was designed to determine whether child participants know the function of the verb morphology and the case markers in simple declarative sentences and whether they have acquired the same focus pattern preferences as adults.

2.1 Method

2.1.1 Participants
The participants were 25 Tagalog-speaking children (15 female, 10 male) from age 4;1 to 5;9 (M = 4;7). Four of them (2 female, 2 male) were tested in Bacoor City and 21 of them (13 female, 8 male) were tested in Quezon City. Two of the children tested in Quezon City were exposed to languages other than Tagalog and English (Bisaya and Ilokano), but had little proficiency in those languages. Adult controls (N = 9) also participated in this experiment, all of whom were tested in Quezon City.

2.1.2 Materials and Design
Participants were presented with ten test items, each consisting of two pictures: a context picture and a target picture. The items were divided into two conditions: the AF-oriented condition and TF-oriented condition. Both conditions manipulated animacy and definiteness/specificity in a way that maximized the likelihood of the production of AF sentences in one condition, and TF sentences in the other condition.

In my previous work (Tanaka, 2015), I found that the speakers are more likely to produce AF sentences when the agent is animate definite/specific, and the theme is inanimate and indefinite/unspecific. For this reason, the AF condition used semantically non-reversible predicates with an animate agent and an inanimate theme: ‘cut’, ‘eat’, ‘kick’, ‘pick’, and ‘read’. The definiteness/specificity of the animate agent was established with the use of a context picture prior to the presentation of the target picture, but the inanimate theme was not included in the context picture. Error! Reference source not found. presents a sample context picture and a sample target picture from the AF-oriented condition.
On the other hand, my earlier work suggested that speakers almost always produce TF sentences when the agent and theme are both animate and definite/specific (Tanaka et al., 2016). The TF-oriented condition therefore involved semantically reversible predicates with an animate agent and an animate theme: ‘carry’, ‘chase’, ‘hug’, ‘push’, and ‘wet/splash’. The animate agent and animate theme were both included in the context pictures, and therefore were definite and specific. Figure 3 contains a sample context picture and a sample target picture from the TF-oriented condition.
Each condition was presented in a block. Four lists were created, varying the order of stimuli within each block as well as the order of the blocks. The summary of the experiment’s design is presented in Table 17.

Table 17. Summary of the research design.

<table>
<thead>
<tr>
<th></th>
<th>AF-oriented</th>
<th>TF-oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agent Theme</td>
<td>Agent Theme</td>
</tr>
<tr>
<td>Animacy</td>
<td>+animate -animate</td>
<td>+animate +animate</td>
</tr>
<tr>
<td>Definiteness/Specificity</td>
<td>+definite -definite</td>
<td>+definite +definite</td>
</tr>
</tbody>
</table>

2.1.3 Procedure

Participants were each assigned one of the four lists. After seeing a context picture like Figure 2a with a Tagalog auditory prompt such as (101), they were shown a target picture like Figure 2b along with a query such as (102).

(101) May isa=ŋ babae at isa=ŋ lalake.
exist one=LK female CONJ one=LK male
“There are a girl and a boy.”

(102) Ano ang naŋ-ya~yari dito?
what FOC AF-IPFV~happen here
“What is happening here?”

The characters that appear in the target picture had been previously seen in the context picture and were therefore expected to be definite. In this particular case, participants were expected to respond by reporting that the father is carrying the brother, giving us the opportunity to observe a possible preference for either AF or TF in patterns where both arguments are definite.

2.2 Analysis

Participants’ responses were recorded, transcribed, and coded for verb morphology, case markers, and word order. If a participant produced two utterances, each with a different focus, only the first utterance was included in the analysis.
2.3 Results and Discussion

2.3.1 Adults

A total of 90 responses from adults were analyzed. The results from adults confirmed that the manipulation of animacy as well as definiteness/specificity as a strategy for eliciting focus patterns in declarative clauses was successful. As shown in Table 18, adults produced AF sentences 70.00% of the time in the AF-oriented condition, and 100.00% of the time in the TF-oriented condition.

Table 18. Adults’ percentage and frequency of AF and TF sentences per condition.

<table>
<thead>
<tr>
<th></th>
<th>AF</th>
<th>TF</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF-oriented</td>
<td>70.00% (21)</td>
<td>26.67% (8)</td>
<td>3.33% (1)</td>
<td>30</td>
</tr>
<tr>
<td>TF-oriented</td>
<td>0.00% (0)</td>
<td>100.00% (30)</td>
<td>0.00% (0)</td>
<td>30</td>
</tr>
</tbody>
</table>

Individual results in Table 19 show that the AF preference in AF-oriented condition was not uniform among the participants. While some participants (QC15, QC16, and QC21) showed a strong AF preference in the AF-oriented condition, producing at least four AF sentences, others fluctuated between AF and TF, not manifesting a strong preference for either. However, even in such cases, they were more likely to choose AF in the AF-oriented condition compared to the TF-oriented condition, and none of the participants produced AF in the TF-oriented condition.

Table 19. Adults’ individual results.

<table>
<thead>
<tr>
<th>Condition</th>
<th>AF-oriented</th>
<th>TF-oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QA13</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>QA15</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>QA16</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>QA18</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>QA20</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>QA21</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Three of the 9 adult participants produced relative clauses throughout the experiment, using an existential construction such as (103). This may have been because this experiment was conducted after the relative clause experiments reported in the subsequent chapters.
(103) May isaŋ bátaŋ babáe na s<um>i~sípa naŋ bola.
EXIST one=LK child=LK female LK <AF>IPFV~kick NFOC ball
‘There is one girl that is kicking a/the ball.’

However, even in such cases, the distribution of AF-patterns (ARCs) and TF-patterns (TRCs) followed the prediction, although the proportion of AF-patterns is much bigger here (40.00%) compared to the declarative clauses (0.00%), as shown in Table 20.

Table 20. Percentage and frequency of ARCs (AF) and TRCs (TF) per condition.

<table>
<thead>
<tr>
<th></th>
<th>ARC</th>
<th>TRC</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF-oriented</td>
<td>80.00% (12)</td>
<td>13.33% (2)</td>
<td>6.67% (1)</td>
<td>15</td>
</tr>
<tr>
<td>TF-oriented</td>
<td>40.00% (6)</td>
<td>60.00% (9)</td>
<td>0.00% (0)</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 21 shows the frequency of different word order patterns in adults’ responses. The most frequent word order overall was Verb-Agent-Theme (VAT). TF sentences were likely to follow VAT word order, and VAT sentences are most likely to exhibit TF. VTA order occurred in 10 tokens out of 60, and most VTA sentences were in AF. While PSA-final word order (VAT in TF and VTA in AF) was the preferred word order, speakers also seem to prefer placing agents before themes. In addition, the agent appeared preverbally on seven occasions; the theme never occurred in this position.

Table 21. Word order distribution.

<table>
<thead>
<tr>
<th></th>
<th>AF</th>
<th>TF</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb-Agent-Theme</td>
<td>5</td>
<td>34</td>
<td>39</td>
</tr>
<tr>
<td>Verb-Theme-Agent</td>
<td>9</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Verb-Agent</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Agent-Verb-Theme</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>38</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

The theme argument was omitted in three tokens, all of which contained verb *basa* ‘read’, which can be used intransitively as in English.

(104) Nag-bá~basa aŋ bátaŋ laláke.
AF-IPFV~read FOC child=LK male
‘The boy is reading.’
2.3.2 Children

A total of 250 utterances were produced by the child participants. Of these, 26 were excluded from analysis for various reasons, such as unintelligibility, the absence of a transitive verb (such as “they are running” instead of chasing), and so on.

Table 22 shows the relative frequency of AF and TF utterances produced by children. As a group, children behaved much like adults in the TF-oriented condition, showing a larger proportion of TF utterances (75.90%) than AF utterances (19.28%). However, TF utterances were as frequent as AF utterances (both 48.94%) in the AF-oriented condition. Children also used other strategies, such as a partial reduplication the verb (which usually signals future in isolation, but an imperfective aspect in combination with a focus affix) and bare verbs without any focus affixes.

Table 22. Children’s percentage and frequency of AF and TF utterances per condition.

<table>
<thead>
<tr>
<th>AF</th>
<th>TF</th>
<th>Bare</th>
<th>Other affixes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF-oriented</td>
<td>49.56% (56)</td>
<td>47.78% (54)</td>
<td>1.77% (2)</td>
<td>0.00% (1)</td>
</tr>
<tr>
<td>TF-oriented</td>
<td>24.27% (25)</td>
<td>66.99% (69)</td>
<td>3.88% (4)</td>
<td>4.82% (5)</td>
</tr>
</tbody>
</table>

Individual results in Table 23 show that some children behaved like adults, either showing a strong AF preference in the AF-oriented condition and a strong TF preference in the TF-oriented condition (e.g., BC16), or showing a strong TF preference in the TF-oriented condition and a split preference in the AF-oriented condition (e.g., QC02, QC10, QC14, QC28). While most of the children produced both focus patterns, there were four children who produced only AF patterns across conditions (e.g., BC15, QC20, QC21, QC24). It is unclear whether they had acquired the TF affix—an issue that calls for attention in the relative clause experiments.

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39 AF utterances include reduplication without any affixes, which signals agent focus future tense in adult speech, as seen in (v). Although the use of tense/aspect is not quite appropriate, it is clear in the case of (v) that children are using agent focus as the case marking on the NPs indicates. A response was considered erroneous (and hence was included in Table 25) if it contains a reduplicated verb without any focus affix and the theme was marked with the focus marker.

(i) Ka–kain siya naŋ aiskrim.
AF.FUT~eat 3SG.FOC NFOC icecream
‘He will eat ice cream.’ (BC15)
Table 23. Individual results from children (sorted by age).

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>AF</th>
<th>TF</th>
<th>AF</th>
<th>TF</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC24</td>
<td>4;1</td>
<td>3</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>QC17</td>
<td>4;11</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>QC20</td>
<td>4;5</td>
<td>4</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>QC23</td>
<td>4;8</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>QC10</td>
<td>5;0</td>
<td>2</td>
<td>3</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>BC15</td>
<td>5;1</td>
<td>5</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>QC06</td>
<td>5;1</td>
<td>1</td>
<td>4</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>QC08</td>
<td>5;1</td>
<td>1</td>
<td>3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>QC12</td>
<td>5;1</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>QC21</td>
<td>5;1</td>
<td>3</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>QC16</td>
<td>5;2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>QC02</td>
<td>5;3</td>
<td>2</td>
<td>2</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>QC13</td>
<td>5;3</td>
<td>1</td>
<td>4</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>QC03</td>
<td>5;4</td>
<td>1</td>
<td>4</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>QC07</td>
<td>5;5</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>QC04</td>
<td>5;5</td>
<td>1</td>
<td>3</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>QC27</td>
<td>5;6</td>
<td>5</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>QC25</td>
<td>5;7</td>
<td>1</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>QC05</td>
<td>5;8</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>QC26</td>
<td>5;8</td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>QC14</td>
<td>5;9</td>
<td>3</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>QC28</td>
<td>5;9</td>
<td>2</td>
<td>3</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>BC16</td>
<td>NA</td>
<td>5</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>BC17</td>
<td>NA</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>BC18</td>
<td>NA</td>
<td>1</td>
<td>4</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

Table 24 shows the overall frequency of the various word order patterns in children’s responses. Much like adults, Verb-Agent-Theme is the most frequent word order overall in both AF and TF utterances. However, unlike adults, children frequently omitted either or both agent and theme.
Table 24. Children’s word order distribution

<table>
<thead>
<tr>
<th></th>
<th>AF</th>
<th>TF</th>
<th>Bare</th>
<th>Other affixes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb-Agent-Theme</td>
<td>20</td>
<td>57</td>
<td>0</td>
<td>0</td>
<td>77</td>
</tr>
<tr>
<td>Verb-Theme-Agent</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Verb-Agent</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Verb-Theme</td>
<td>27</td>
<td>27</td>
<td>2</td>
<td>2</td>
<td>58</td>
</tr>
<tr>
<td>Agent-Verb-Theme</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Theme-Verb-Agent</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Verb (no NPs)</td>
<td>18</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>75</td>
<td>109</td>
<td>6</td>
<td>3</td>
<td>193</td>
</tr>
</tbody>
</table>

Since some children may be in the stage of telegraphic speech, absence of verb morphology or case marking was not taken to be an indication of errors—in contrast to cases where they produced verb morphology and case marking that were not in congruence; that is, AF sentences with a PSA theme, and TF sentences with a PSA agent, as seen below. Note that, for the 25 utterances that contained only a verb (Table 24), it was not possible to judge whether the children’s speech contained errors.

(105)  a. AF sentence with VA word order and non-PSA agent
       nag-ha~hag  ni\textsuperscript{40}  lalake
       \textlt{<AF>IPFV}~hug  NFOC  male  (QC05)

       b. Target
       nag-ha~hag  aŋ  lalake
       \textlt{<AF>IPFV}~hug  FOC  male
       ‘The boy hugging Ø.’

(106)  a. TF sentence with VT word order and non-PSA theme
       p<in>i~pitas  naŋ  flawə
       \textlt{<TF>IPFV}~pick  NFOC  flower  (BC18)

       b. Target
       p<in>i~pitas  aŋ  flawə
       \textlt{<TF>IPFV}~pick  FOC  flower
       ‘Ø picking the flower.’

\textsuperscript{40} This is a non-focus marker that is used for personal names, overgeneralized here for a common noun.
Twenty-one utterances, produced by 10 children, contained visible errors in case marking and/or agreement, as summarized in Table 25.

Table 25. Frequency of erroneous utterances per condition per children.

<table>
<thead>
<tr>
<th></th>
<th>AF-oriented condition</th>
<th>TF-oriented condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC15</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>BC18</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>QC02</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>QC04</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>QC05</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>QC07</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>QC08</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>QC16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>QC25</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>QC26</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

41 \(yu\eta\) is a colloquial form of the focus marker \(a\eta\), which is derived from a near-hearer demonstrative + linker \(iyo=\eta\). As seen in subsequent sections, children use this form predominantly instead of \(a\eta\).
3 Experiment 2: Comprehension of Relative Clauses

This chapter reports on my comprehension experiment on Tagalog relative clauses, which made use of a sentence-picture matching task. Section 3.1 describes the experiment in detail, including the methodology, participants, materials, and design. Section 3.2 explains how I went about analyzing the results of the experiment. The results themselves are reported in §3.3, followed by a discussion of their import in §3.4.

3.1 Method

3.1.1 Participants

Thirty-seven child speakers of Tagalog participated in the experiment (13 male, 24 female) aged 4;1-5;9 (M = 4;9). Twenty-four of them (10 male, 15 female; mean age 6;0) were tested at the University of the Philippines Child Development Center in Quezon City, and 13 (4 male, 9 female; mean age 5;6) were tested in Bacoor City. All but one of the children were reported to be either less proficient in English than Tagalog, or were equally proficient in both in the language history survey filled out by their parents. Only two children had been exposed to additional languages at home (Bisaya, Ilokano, and Kapampangan), but they had little to no proficiency in them.

Twenty-nine adult speakers also participated as the control group. Adult data were also collected in two locations: Quezon City (n = 23) and Bacoor City (n = 6).

3.1.2 Materials & Design

Two pseudo-randomized lists were created, each containing four practice items and ten test items. Each practice item consisted of two pictures depicting animate agents and inanimate themes. For example, a picture in one practice item depicted a girl picking a flower and the other picture showed a different girl picking a tomato, as illustrated in Figure 4. Although the practice items were themselves relative clauses, they crucially involved non-reversible events, and so were significantly easier to interpret than the actual test items.

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42 However, this child was also reported to have more exposure in Tagalog than in English.
43 One list was created by reversing the order of the presentation of the other list.
Each test item consisted of a panel consisting of two pictures that depict reversible events. Figure 5 shows one of the items that depicted the event of chasing—‘a girl chasing a boy’ and ‘a boy chasing a girl’. The same five verbs used in Experiment 1 were used for both RC types: 

*basa* ‘wet’, *buhat* ‘carry’, *habol* ‘chase’, *tulak* ‘push’, *yakap* ‘hug’. Together, this gave ten items in total. The same five verbs were used in subsequent experiments, allowing for close comparison of results across the various experiments.

The design of the panels allows for testing comprehension of either an ARC or a TRC (see below). The test sentences associated with each panel were varied, and as was the configuration of the characters so as to create variation from item to item.
3.1.3 Procedure

Participants were tested on one or the other of the two lists. With the use of four practice items, participants were first trained to select the character of their choice, and not the whole picture. In each test trial, participants were shown a panel of two pictures like those in Figure 6 and were asked to select a referent that matches the auditory description, which was given in the form of either an ARC or TRC. Consider, for example, Figure 6, which contains a picture of a girl chasing a boy and another picture of a boy chasing a girl.

Figure 6. Target responses for ARC and TRC.

If a participant hears the ARC in (109), the correct response is to select the girl in the picture on the left, as shown by the red box in Figure 6. In contrast, if a participant hears the TRC in (110), he/she should select the girl in the picture on the right, as shown in the blue box in Figure 6.

(109) ARC
babae=ŋ h<um>a~habol naŋ lalake
girl=L <AF>IPFV~chase NFOC boy
‘the girl that is chasing the boy’

(110) TRC
babae=ŋ h<in>a~habol naŋ lalake
girl=L <PF>IPFV~chase NFOC boy
‘the girl that the boy is chasing’
The experiments were carried out with the help of MouseTracker (Freeman & Ambady, 2010), which records the movements of the computer mouse as participants use it to click on the character of their choice. For children, the software was used merely to record where on the screen the children pointed. Because manipulation of the mouse was difficult for the children, they were instructed to simply point at the character of their choice, at which point a research assistant clicked on the location of the child’s finger. The adult participants manipulated the computer mouse on their own, so that mouse movements as well as the reaction times could be analyzed.

3.2 Analysis
Accuracy (i.e., the selection of the correct picture) was measured for adults and children. However, for the reason noted above, reaction times (i.e., how long it takes to move a mouse and how long it takes to click on a character) was measured for adults only.

Participants’ responses were classified with the help of the answer types illustrated in Figure 7 and Figure 8. For the ARC ‘the girl who is chasing the boy’, for instance, the girl on the left in Figure 7 is coded as the target referent—the agent. Choice of the other girl (the theme) was categorized as a reversal error, as the thematic role of the girl is reversed (from agent to theme). Responses that involved pointing to one of the boys were coded as head errors since the head modified by the relative clause must refer to a girl. We coded a head error in the correct picture (the same picture as the target response) and a head error in the wrong picture (the same picture as the reversal error) separately.

\[44\] In the previous version of the task, we asked the children to mark the character with a pencil/crayon. However, sometimes they circled the whole picture. The “pointing” procedure was introduced in order to avoid such responses. The ideal strategy in such case would be to use a laptop or tablet with a touch screen, which should be implemented in future research.
Figure 7. Response types for an ARC ‘the girl who is chasing the boy’.

For TRC items, the girl on the right in Figure 8 was coded as the target referent—the theme argument. Selection of the other girl, who is the agent of the chasing action, was categorized as a reversal error. Selection of a boy was coded as a head error.

Figure 8. Response types for a TRC ‘the girl who the boy is chasing’.

3.3 Results

3.3.1 Adults

Adults by and large showed very high accuracy for both types of RC. They clicked on the target referent 95.2% of the time for ARCs, and 89.0% of the time for TRCs (Figure 9).
The accuracy data were fit to a mixed-effects logistic regression model that included RC
types as fixed effects and location of testing, participants, items, and presentation order as
random effects. There was a significant main effect of RC types ($\beta = -1.65$, se = 0.73, $z = -2.14$,
$p < .05$). However, the predominant portion of the errors had been made by just six
participants, two of which had no target responses in one of the RC types. BA03 got only 2 ARCs
and 0 TRCs correct. BA04 got all the ARCs correct but none of the TRCs. When I take out these
two participants, there was no significant difference between the two RC types ($p = .47$).

![Figure 9](image)

**Figure 9.** Error types in adults’ responses.

Reaction times were calculated based on the target responses only and were measured in two
different ways: how long it took for the participants to initiate mouse movement (initial times)
and how long it took to click after the presentation of the stimuli (end times). The initial times
are at best suggestive, because we cannot be sure whether the mouse movement happened with
the intention of clicking somewhere specific. Participants could easily move the mouse by
mistake, or without any purpose. For this reason, the initial times prior to the verb onset
(measured for each audio file) were excluded as mouse movements during this period were
initiated before any useful information (verb affixes) appeared in the test items. Although we
cannot completely exclude the possibility of random mouse movements in the remaining data,
we at least reduce the likelihood of interference from this confound. As a result, initial time
calculation is based on only 43.79% of the data included in the reaction time analysis. Moreover, because the place in the picture where it was appropriate to click the mouse differed across the items, normalized reaction times were calculated in order to average the distance between the initial location of the mouse and the location of the click. The mean values of these three measurements are shown in Table 26. No significant difference was found in any of these three measurements for either type of relative clauses, and the exclusion of BA03 and BA04 did not change the results.

<table>
<thead>
<tr>
<th>Table 26. Mean reaction times of adults (ms).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent relative clauses</td>
</tr>
<tr>
<td>Initial time</td>
</tr>
<tr>
<td>End time</td>
</tr>
<tr>
<td>Normalized reaction time</td>
</tr>
</tbody>
</table>

### 3.3.2 Children

Figure 10 shows the overall results for the children. The solid dark bars indicate selection of the target character in the target picture, and is therefore the targeted (correct) response.

![Figure 10. Error types in children’s responses](image)

45 Normalized reaction times were calculated as the end time divided by the distance between the initial location of the mouse (which was the same across items—the bottom center of the screen) and the location of the click.
As seen in Figure 10, children exhibit a large advantage for ARCs (48.95%) over TRCs (14.21%), an effect that is significant (effect of relative clause types: $\beta = -1.80$, $se = 0.26$, $z = -6.83$, $p < .001$) when the data were fit to a mixed-effects logistic regression model that included RC types as fixed effects and locations of testing, participants, items, and orders of presentation as random effects. Furthermore, reversals occurred significantly more often in TRCs than ARCs (effect of relative clause types: $\beta = 1.36$, $se = 0.32$, $z = 4.26$, $p < .001$). While Head errors in correct pictures were equally frequent in ARCs and TRCs, head errors in wrong pictures were significantly more frequent in TRCs (effect of relative clause types: $\beta = 0.71$, $se = 0.28$, $z = 2.54$, $p < .05$). Examples of each kind of errors, first provided in Figure 7 and Figure 8, are given with a different item again in Figure 11.

![Figure 11. Response types for a TRC ‘the boy who the girl is hugging’.

The individual results showed large variation, but the majority of the children (26 out of 38) selected the target referent more often with ARCs than TRCs (Table 27).
Table 27. Individuals with more target responses with ARCs than TRCs (sorted by age).

<table>
<thead>
<tr>
<th>Children</th>
<th>Age</th>
<th>Target</th>
<th>Head</th>
<th>Reversal</th>
<th>Head</th>
<th>Target</th>
<th>Head</th>
<th>Reversal</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC23</td>
<td>4;8</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>QC19</td>
<td>4;10</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>QC22</td>
<td>4;10</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>QC10</td>
<td>5;0</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>QC12</td>
<td>5;0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>QC06</td>
<td>5;1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>QC08</td>
<td>5;1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
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<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>QC15</td>
<td>5;2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<td>0</td>
</tr>
<tr>
<td>BC02</td>
<td>5;2</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>QC16</td>
<td>5;2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
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<td>3</td>
</tr>
<tr>
<td>QC13</td>
<td>5;3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>QC03</td>
<td>5;4</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>BC16</td>
<td>5;5</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>QC18</td>
<td>5;6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
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<td>0</td>
</tr>
<tr>
<td>QC07</td>
<td>5;5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>QC05</td>
<td>5;8</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
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</tr>
<tr>
<td>BC07</td>
<td>5;8</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>QC14</td>
<td>5;9</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>BC01</td>
<td>5;9</td>
<td>4</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
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<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>BC04</td>
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<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>BC18</td>
<td>N/A</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Twenty of the children correctly responded to two or more ARC items than TRC items, and 15 of these children accurately comprehended at least three more ARC items than TRC items. Moreover, whereas half of the children (19 out of 38) had three or more target responses in ARC condition, only 2 out of 38 children did so in the TRC condition, and both of these only understood three items correctly.

Six children had more target responses with TRCs than ARCs (Table 28), but the difference between ARCs and TRCs was slight—just one item for five of the children and two for the remaining child (BC13). Another six children comprehended the same number ARCs and TRCs.
but none of these participants understood more than 2 items correctly in either condition.

Table 28. Individuals with more target responses with TRCs than ARCs (sorted by age).

<table>
<thead>
<tr>
<th>Children</th>
<th>Age</th>
<th>Target</th>
<th>Head</th>
<th>Correct picture</th>
<th>Wrong picture</th>
<th>Reversal</th>
<th>Head</th>
<th>Correct picture</th>
<th>Wrong picture</th>
<th>Reversal</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC24</td>
<td>4;1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td>2</td>
<td>0</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>BC03</td>
<td>4;8</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
<td>0</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>QC17</td>
<td>4;11</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>BC12</td>
<td>5;1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td>0</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>BC09</td>
<td>5;8</td>
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<td>2</td>
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<td>0</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>BC13</td>
<td>N/A</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Table 29. Individuals with equal numbers of target responses in ARCs and TRCs (sorted by age).

<table>
<thead>
<tr>
<th>Children</th>
<th>Age</th>
<th>Target</th>
<th>Head</th>
<th>Correct picture</th>
<th>Wrong picture</th>
<th>Reversal</th>
<th>Head</th>
<th>Correct picture</th>
<th>Wrong picture</th>
<th>Reversal</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC20</td>
<td>4;5</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>BC15</td>
<td>5;3</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>QC02</td>
<td>5;3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td>0</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>QC04</td>
<td>5;5</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>QC25</td>
<td>5;7</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>BC17</td>
<td>5;9</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

3.4 Discussion

Experiment 1 found an asymmetry between ARCs and TRCs in relative clause comprehension; both adults and children showed better accuracy in the comprehension of ARCs. Moreover, children’s most common errors were reversals in which they switched the thematic role of the relativized element. This happened more frequently with TRCs, which means that more TRCs were turned into ARCs than vice versa. Individual results also indicated that more children exhibited superior performance on ARCs than on TRCs.

These findings all point to an ARC advantage. However, there are a few remaining issues to consider: the lack of asymmetry in adults, frequent head errors in children, and another interpretation of the ARC advantage. I address these points here.
3.4.1 Lack of asymmetry in adults

When the two adult participants were excluded, the results from adults showed a lack of asymmetry. It is not clear yet whether the results from adults show a genuine symmetry in the comprehension of Tagalog RCs, or whether the task’s dependent variables was not sensitive enough to permit the discovery a difference. In future study, it would be desirable to use more sensitive measurements, such as reading times and eye movements.

3.4.2 Frequent head errors in children

Children frequently selected the wrong head: 37.90% (25.79% in the correct pictures, 12.11% in the wrong pictures) of the ARC responses and 46.84% (24.21% in the correct pictures, 22.64% in the wrong pictures) of the TRC responses were of this type. It is puzzling why this was the case, and various factors calls for attention including an age effect, a task effect, an item effect, and a recency effect. I will address each of these in the following.

The first possibility is that head errors are a manifestation of an age effect—that is, errors of this type are made more often by younger children. To address this possibility, I compared the performance of 5-year-olds (22 children aged 4;8–5;5), and 6-year-olds (10 children aged 5;7–5;9). Two children younger than 4;8 and three children whose ages were unknown were excluded. The results from the younger group (22 children aged 4;8–5;5) are shown in Table 30 and the results from the older group (10 children aged 5;7–5;9) are shown in
Table 31. Both groups show an equally high percentage of head errors in correct pictures. Therefore, it was not the case that the younger children were more likely to make errors of this type.

Table 30. Error types of the 5-year-olds (n=22, 4;8-5;5).

<table>
<thead>
<tr>
<th>Target</th>
<th>Head errors (correct picture)</th>
<th>Reversals</th>
<th>Head errors (wrong picture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC</td>
<td>58 (52.73%)</td>
<td>22 (20.00%)</td>
<td>14 (12.73%)</td>
</tr>
<tr>
<td>TRC</td>
<td>16 (14.55%)</td>
<td>22 (20.00%)</td>
<td>52 (47.27%)</td>
</tr>
</tbody>
</table>

75
Table 31. Error types of the 6-year-olds (n=10, 5;7-5;8).

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Head errors (correct picture)</th>
<th>Reversals</th>
<th>Head errors (wrong picture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC</td>
<td>26 (52.00%)</td>
<td>14 (28.00%)</td>
<td>5 (10.00%)</td>
<td>5 (10.00%)</td>
</tr>
<tr>
<td>TRC</td>
<td>4 (8.00%)</td>
<td>16 (32.00%)</td>
<td>14 (28.00%)</td>
<td>16 (32.00%)</td>
</tr>
</tbody>
</table>

A second possibility is a task effect—that is, children are more likely to make such errors later in the experiment because of interference from the previous items, fatigue, lack of concentration, etc. To address this, I examined the rate of head errors in each trial, shown in Table 32. Although there is some variation here, we see that children were already making head errors at the earliest stage of the experiment, and it is not the case that the rates of head errors increase in the later trials.

Table 32. Rate of head errors (correct picture) per trial.

<table>
<thead>
<tr>
<th></th>
<th>Head errors (correct picture)</th>
<th>Head errors (wrong picture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC</td>
<td>1  25.00%</td>
<td>12.50%</td>
</tr>
<tr>
<td></td>
<td>2  17.24%</td>
<td>13.79%</td>
</tr>
<tr>
<td></td>
<td>3  24.14%</td>
<td>17.24%</td>
</tr>
<tr>
<td></td>
<td>4  33.33%</td>
<td>8.33%</td>
</tr>
<tr>
<td></td>
<td>5  25.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>6  28.57%</td>
<td>14.29%</td>
</tr>
<tr>
<td></td>
<td>7  25.00%</td>
<td>25.00%</td>
</tr>
<tr>
<td></td>
<td>8  28.57%</td>
<td>17.86%</td>
</tr>
<tr>
<td></td>
<td>9  38.46%</td>
<td>15.38%</td>
</tr>
<tr>
<td></td>
<td>10 22.86%</td>
<td>2.86%</td>
</tr>
<tr>
<td>TRC</td>
<td>1  13.33%</td>
<td>20.00%</td>
</tr>
<tr>
<td></td>
<td>2  22.22%</td>
<td>11.11%</td>
</tr>
<tr>
<td></td>
<td>3  33.33%</td>
<td>33.33%</td>
</tr>
<tr>
<td></td>
<td>4  23.08%</td>
<td>23.08%</td>
</tr>
<tr>
<td></td>
<td>5  20.59%</td>
<td>29.41%</td>
</tr>
<tr>
<td></td>
<td>6  30.00%</td>
<td>30.00%</td>
</tr>
<tr>
<td></td>
<td>7  23.53%</td>
<td>20.59%</td>
</tr>
<tr>
<td></td>
<td>8  50.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>9  28.00%</td>
<td>28.00%</td>
</tr>
<tr>
<td></td>
<td>10 33.33%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
A third possibility is an item effect, in which the head errors were frequent for only some of the items. But this also seems unlikely. Although there is some variation in the proportion (10.53% to 28.95%), head errors were made in all the items (Table 33).

Table 33. Error types by item.

<table>
<thead>
<tr>
<th>Target</th>
<th>Head errors (correct picture)</th>
<th>Reversal</th>
<th>Head errors (wrong picture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>carry</td>
<td>44.74%</td>
<td>26.32%</td>
<td>13.16%</td>
</tr>
<tr>
<td>chase</td>
<td>47.37%</td>
<td>23.68%</td>
<td>15.79%</td>
</tr>
<tr>
<td>ARC</td>
<td>head errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hug</td>
<td>60.53%</td>
<td>23.68%</td>
<td>5.26%</td>
</tr>
<tr>
<td>push</td>
<td>50.00%</td>
<td>26.32%</td>
<td>10.53%</td>
</tr>
<tr>
<td>wet</td>
<td>42.11%</td>
<td>28.95%</td>
<td>18.42%</td>
</tr>
<tr>
<td>carry</td>
<td>21.05%</td>
<td>13.16%</td>
<td>36.84%</td>
</tr>
<tr>
<td>chase</td>
<td>13.16%</td>
<td>21.05%</td>
<td>44.74%</td>
</tr>
<tr>
<td>TRC</td>
<td>head errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hug</td>
<td>10.53%</td>
<td>31.58%</td>
<td>42.11%</td>
</tr>
<tr>
<td>push</td>
<td>5.26%</td>
<td>26.32%</td>
<td>42.11%</td>
</tr>
<tr>
<td>wet</td>
<td>21.05%</td>
<td>28.95%</td>
<td>26.32%</td>
</tr>
</tbody>
</table>

The final possibility to consider at this point is recency interference. Are children influenced by the last thing they hear in the test item, sometimes incorrectly picking it as the head? Or are children influenced not by the last thing they *hear* but the last thing they *look at*? We do not have a direct way to examine this with our current data, but one way to test this hypothesis in future would be to use relative clauses without any NPs inside, such as (111) and (112).

(111) \[
\text{baba}=\eta\quad h<\text{um}>a\text{-}\text{habol}\quad \text{girl}=L\quad <\text{AF}>\text{IPFV}\text{-}\text{chase}\quad \text{‘the girl that is chasing’}
\]

(112) \[
\text{baba}=\eta\quad h<\text{in}>a\text{-}\text{habol}\quad \text{girl}=L\quad <\text{PF}>\text{IPFV}\text{-}\text{chase}\quad \text{‘the girl that is being chased’}
\]

If the children are influenced by either the last thing they hear or look at, their accuracy should improve with relative clauses like (111) and (112).
Another possibility is to do an eye-tracking experiment to see whether participants who make head errors are more likely to do so when they have just looked at the referent of the final NP in the sentence.

### 3.4.3 Another interpretation

Although we have tentatively concluded that comprehension of Tagalog relative clauses manifest an agent advantage, there may be another way to explain our results. As noted in Chapter 1, many speakers apparently accept the relative clause pattern in (113), despite claims to the contrary in previous research. That is, it is possible to relativize a non-PSA agent in a theme focus clause (Ceña and Nolasco 2011; Ceña and Nolasco 2012).

\[(113) \quad \text{?? lalake=ŋ } [\text{h<in>a-habol aŋ babae }] \\
\quad \text{man=L } <\text{TF>IPFV}\sim\text{chase FOC woman} \\
\quad \text{‘(the) man who is chasing the girl’}\]

Crucially, though, it is not possible to relativize a non-PSA theme in an agent focus clause. The following example repeats (114).

\[(114) \quad * \text{babae=ŋ } [\text{h<um>a-habol aŋ lalake }] \\
\quad \text{woman=L } <\text{AF>IPFV}\sim\text{chase FOC man} \\
\quad \text{‘(the) woman who the man is chasing’}\]

This means that whereas the agent focus affix is an early and unambiguous cue of the thematic role of the relativized element (the ‘head’) of a relative clause, this is not true for the theme focus affix: relative clauses of this type could have a relativized agent (as in 115a) or a relativized theme (as in 115b). In order to interpret these patterns, participants would have to wait until they encounter the other argument within the relative clause before determining (from its case) whether it is the agent or the theme: an *aŋ* - marked nominal within the relative clause would indicate a theme, and that the relativized nominal must be interpreted as an agent, while a *nay*-marked nominal would indicate an agent, and that the relativized nominal must therefore be the theme). This means that in order to determine the role of the relativized element, listeners must

---

46 I thank Henrison Hsieh, Aldrin Lee, and Chris Sundita for bringing this to our attention.
wait until they encounter the argument within the relative clause and engage in this process of elimination.

\[(115) \quad a. \text{NP } [\text{RC } V_{\text{theme focus}} \ldots \text{aŋ NP} \ldots ] \]
\[\text{head theme (the relativized argument must be the agent)}\]

\[\quad b. \text{NP } [\text{RC } V_{\text{theme focus}} \ldots \text{naŋ NP} \ldots ] \]
\[\text{head agent (the relativized argument must be the theme)}\]

This is obviously a costly procedure and it is tempting to think that it might help explain children’s difficulty with relative clauses whose verb carries theme focus.

It is important to recognize that there is no direct evidence that the participants in our experiment have actually been exposed to a variety of Tagalog in which theme-focus verbs permit relativization of their agent argument. One possible avenue to further investigate this possibility is to investigate what adults and children do in the production of relative clauses. When speakers are producing RCs, the status of the head noun is known to the speaker from the outset, so there is no danger of confusion. Therefore, if the production results also show an ARC advantage, it is possible to discount this alternative interpretation of the ARC advantage. We turn to a production task in the next chapter.
Experiment 3: Imitation of Relative Clauses

In this chapter, I report on the results from the elicited imitation task. Section 4.1 describes the research design and §4.2 explains how I went about analyzing the results of the experiment. The results themselves are reported in §4.3, followed by a discussion of their import in §4.4.

4.1 Method

4.1.1 Participants

Participants were 15 Tagalog-speaking children (10 female, 5 male) from age 4;1 to 5;9 (M = 4;11). Four (2 female, 2 male) were tested in Bacoor City and 11 (9 female, 3 male) were tested in Quezon City. One child tested in Bacoor City and one child tested in Quezon City were exposed to languages other than Tagalog and English (Bisaya and Kapampangan), but had little proficiency in those languages.

4.1.2 Materials

Test items contained relative clauses in isolation. Twenty test items were constructed: five for each of the two relative clause types in each of the two animacy conditions. Two animacy conditions were made by keeping the animacy of the agent constant and manipulating the animacy of the theme. Therefore, in the reversible condition, all the agents and themes were animate, but in non-reversible conditions, all the agents were animate and all the themes were inanimate. The NPs and verbs used in this experiment differed from the other experiments, in order to minimize a possible task effect.
Table 34 shows sample test items.
Table 34. Sample test sentences for each condition in Experiment 2.

<table>
<thead>
<tr>
<th>Animacy</th>
<th>RC type</th>
<th>Sample RCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reversible</td>
<td>ARC</td>
<td>doktor na k&lt;um&gt;u<del>kurot naŋ artista doctor L &lt;AF&gt;IPFV</del>pinch NFOC actor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘the doctor who is pinching an/the actor’</td>
</tr>
<tr>
<td></td>
<td>TRC</td>
<td>titser na k&lt;in&gt;u<del>kurot naŋ doktor teacher L &lt;TF&gt;IPFV</del>pinch NFOC doctor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘the teacher who a/the doctor is pinching’</td>
</tr>
<tr>
<td>Non-reversible</td>
<td>ARC</td>
<td>doktor na &lt;um&gt;i<del>inom naŋ gatas doctor L &lt;AF&gt;IPFV</del>drink NFOC milk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘the doctor that is drinking milk’</td>
</tr>
<tr>
<td></td>
<td>TRC</td>
<td>dyus na &lt;in&gt;i<del>inom naŋ doktor juice L &lt;TF&gt;IPFV</del>drink NFOC doctor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘the juice that a/the doctor is drinking’</td>
</tr>
</tbody>
</table>

4.1.3 Procedure

Participants were asked to help a puppet learn Tagalog. Participants heard the relative clauses with a pair of headphones, and then repeated what they heard to the puppet, who could not hear the sentences. They first practiced with three items such as (116) and (117), which involve adjectives rather than relative clauses. Adjectival modification also requires a linker (like RCs), but not a verbal focus morphology.

(116) ibo(n)=ŋ  malaki
bird=LK  big
‘a/the big bird’

(117) kotse=ŋ  maliit
car=LK  small
‘a/the small car’

The first block after the practice items presented the animate theme condition with ARCs and TRCs pseudo-randomized, and the second block presented the inanimate theme condition. Participants’ responses were audio-recorded and transcribed for later analysis.

4.2 Analysis

The analysis of the responses followed the method employed by Diessel and Tomasello (2005). However, I also classified the responses into different categories in order to make the results comparable to the ones from the elicited production task.
A response was considered a target response if the participants repeated the correct head of the RC, the correct verb forms, the correct RC-internal NP, and the correct case marking on any NPs inside the RC.

Minor mistakes, such as lexical substitutions (e.g., changing the verb to a semantically and structurally comparable one, such as *tinda* ‘sell’ to *benta* ‘sell’), affix substitutions (e.g., changing the AF affix from *-um-* to *mag-*), or minor grammatical errors (e.g., missing linker), were noted, but these responses were still considered to be target responses.

A response was treated as a reversal error if the correct head is produced, but its thematic role is changed from agent to theme or vice versa. In the following example, the relative clause is restructured in a way that changes the thematic role of *the boy* from theme to agent, as shown in (118).

(118)  

a. Target (TRC)  
\[
\text{titser} \ \text{na} \ [k<\text{in}>u-kurot \ naŋ \ doktor \ _]\ \\
\text{TEACHER} \ L \ <\text{TF}>>IPFV~\text{pinch} \ \text{NFOC} \ \text{doctor} \\
\text{‘the teacher [that the doctor is pinching _]’}
\]

b. Response (TRC)  
\[
\text{titser} \ \text{na} \ [k<\text{um}>u-kurot \ naŋ \ doktor \ _]\ \\
\text{TEACHER} \ L \ <\text{AF}>>IPFV~\text{pinch} \ \text{NFOC} \ \text{doctor} \\
\text{‘the teacher [that _ is pinching the doctor]’}
\]

Responses which were ungrammatical or in which the structure or the meaning of the RC was changed were also classified as errors.

4.3 Results  

A total of 280 responses were obtained from the children and were classified into response types, as summarized in Table 35. The data were fit to a mixed-effects logistic regression model that included RC types and animacy as fixed effects and location of testing, participants, items, and presentation order as random effects.

There was a significant main effect of RC types ($\beta = -1.13$, $se = 0.32$, $z = -3.55$, $p < .001$), but no main effect of animacy ($p = .12$).
Table 35. Types of responses from all the children

<table>
<thead>
<tr>
<th></th>
<th>Animate</th>
<th></th>
<th>Inanimate</th>
<th></th>
<th>Overall</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
<td>TRC</td>
</tr>
<tr>
<td>Target</td>
<td>54</td>
<td>77.14%</td>
<td>45</td>
<td>64.29%</td>
<td>63</td>
<td>90.00%</td>
</tr>
<tr>
<td>Reversal</td>
<td>6</td>
<td>8.57%</td>
<td>21</td>
<td>30.00%</td>
<td>4</td>
<td>5.71%</td>
</tr>
<tr>
<td>Other errors</td>
<td>5</td>
<td>7.14%</td>
<td>3</td>
<td>4.29%</td>
<td>2</td>
<td>2.86%</td>
</tr>
<tr>
<td>Unintelligible answers</td>
<td>5</td>
<td>7.14%</td>
<td>1</td>
<td>1.43%</td>
<td>1</td>
<td>1.43%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
<td>70</td>
<td>100%</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.3.1 Error Analysis

The most common errors in children’s responses involved reversals. In (119), the thematic role of the head *the teacher* is changed from agent to theme, and in (120), the thematic role of the head *the actor* is changed from theme to agent.

(119) a. Target (ARC)

```
titser na [ nag-su~sulat _ naŋ libro ]
TEACHER L <AF>IPFV~write NFOC book
```

‘the teacher [that _ is writing the book ]’

b. Response (TRC)

```
titser na [ s<in>u~sulat naŋ libro _ ]
TEACHER L <TF>IPFV~write NFOC book
```

‘the teacher [that the book is writing _ ]’

(120) a. Target (TRC)

```
artista=ŋ [ h<in>a~hanap naŋ titser _ ]
ACTOR=L <TF>IPFV~search NFOC teacher
```

‘the actor [that the teacher is looking for _ ]’

b. Response (ARC)

```
artista=ŋ [ nag-ha~hanap naŋ titser _ ]
ACTOR=L AF-IPFV~search NFOC teacher
```

‘the actor [that _ is looking for the teacher ]’

Reversal errors were more frequent with TRCs (28.57%) than ARCs (7.14%). As a result, more TRCs were turned into ARCs than vice versa.
4.4 Discussion

The results from the elicited imitation task point toward an ARC advantage. Children were more successful in repeating ARCs than TRCs, and the types of errors they made were more likely to convert TRCs into ARCs than vice versa.
5 Experiment 4: Production of Relative Clauses

This chapter reports on my production experiment on Tagalog relative clauses, which made use of a picture-based elicited production task. Section §5.1 describes the experiment in detail, including the methodology, participants, materials, and design. Section 5.2 describes how I went about analyzing the results of the experiment. The results themselves are reported in §5.3, followed by a discussion of their import in §5.4.

5.1 Method

5.1.1 Participants

The participants were 24 Tagalog-speaking children (17 female, 7 male) from age 4;1 to 5;9 (M = 5;3). Eight (6 female, 2 male) were tested in Bacoor City and 16 (11 female, 5 male) were tested in Quezon City. Two of the children tested in Quezon City were exposed to languages other than Tagalog and English (Bisaya, Kapampangan, and Ilokano), but had little proficiency in those languages. An additional 19 children participated, but did not complete the experiment for various reasons.

Twenty-seven adults also participated in this experiment as a control group, six of whom were tested in Bacoor City and the rest in Quezon City. All six of the participants tested in Bacoor City had grown up locally, but the adult participants in Quezon City were college students from various Tagalog-speaking areas of the Philippines, and therefore represented a less homogenous demography than the other adult group as well as the children.

5.1.2 Materials

Following the methodology used in previous studies (Hsu et al., 2009; C.-E. Kim & O’Grady, 2015; C.-E. Kim, 2013; Zukowski, 2009), pictures and a brief prompt were used to elicit relative clause patterns. Participants were presented sequentially with 23 pairs of pictures, each of which was accompanied by a Tagalog auditory prompt. There were three practice items as well as 20 test items depicting transitive events.

The test items included five reversible events with an animate agent and an animate theme (‘carry’, ‘chase’, ‘hug’, ‘pull’, and ‘wet’) and five non-reversible events with an animate agent and an inanimate theme (‘cut’, ‘eat’, ‘kick’, ‘pick’, ‘read’). Each animacy condition was crossed
with two RC conditions: an ARC condition and a TRC condition. Figure 12 and Figure 13 present sample test items for ARCs and TRCs with an animate agent and an animate theme.

![Figure 12](image1.png)

**Figure 12.** Sample item used to elicit an ARC (reversible).

![Figure 13](image2.png)

**Figure 13.** Sample item used to elicit a TRC (reversible).

As these figures illustrate, participants saw a two-panel picture in which each panel depicted two characters engaged in a transitive event (in this case, chasing). The participants were requested to describe the character above whom the arrow appears for the benefit of an experimenter who could not see the pictures. Because two characters of the same kind appear in the pictures (two girls in Figure 12, and two boys in Figure 13), it would be uninformative to respond with, for example, “the girl” (for Figure 12) or “the boy” (for Figure 13). Moreover, because the action (chasing) is the same in both pictures, it would likewise be uninformative to respond with “the

---

The use of monkeys is not ideal, as it might be perceived as less animate than human beings. However, the third category (besides boys and girls) was needed to make the two panels contrastive, which is why monkeys were selected.

---

47 The use of monkeys is not ideal, as it might be perceived as less animate than human beings. However, the third category (besides boys and girls) was needed to make the two panels contrastive, which is why monkeys were selected.
“chaser.” Only a relative clause pattern such as “the boy that is chasing the girl” would be genuinely informative.

5.1.3 Procedure

Participants first practiced with items involving adjectives rather than relative clauses, using pictures like in Figure 14, which is designed to elicit *pusa=ŋ maliit* ‘cat=ʟ small.’ After participants learned to describe the character above whom the arrow appears (e.g, *pusa=ŋ maliit* ‘the small cat’, they proceeded to the test items.

![Figure 14](image)

**Figure 14.** Sample practice item that is designed to elicit *pusa=ŋ maliit* ‘cat=ʟ small.’

The first block after the practice items presented the animate theme condition with ARCs and TRCs pseudo-randomized, and the second block presented the inanimate theme condition.

Each item was accompanied by an auditory contextual prompt in Tagalog describing the event in the picture. For example, in the case of the ARC item in Figure 12, participants heard, “A girl is chasing a monkey. Another girl is chasing a boy. Who has the arrow?” After the prompt, an arrow appeared, accompanied by a beep sound, pointing to one of the characters or entities in the pictures. Participants had to describe who or what the arrow was pointed by the arrow to an experimenter who had the same panel of pictures, but could not see the arrow. For Figure 12, for example, the target answer would be “the girl that is chasing the boy.” Similarly, the presentation of the TRC item in Figure 13 was accompanied by the auditory prompt, “A monkey is chasing a boy. A girl is chasing another boy. Who has the arrow?” The target response in this case is “the boy that the girl is chasing.” Participants’ responses were audio-recorded and transcribed for later analysis.
Because the choice of RCs could in principle be influenced by the type of focus marking used in the contextual prompts that precedes the actual test item, we divided the participants into two groups: one that was given AF prompts, and the other one with TF prompts.

5.2 Analysis

A response was considered a target response if the participants produce the correct head of the RC, the correct verb forms, and the correct case marking on any NP that appeared inside the RC. The absence of the linker =ŋ was not considered an error, as many of the children—and sometimes adults—did not produce it.

In addition to postnominal (head-initial) RCs such as (121), prenominal (head-final) RCs such as (122), on which I concentrate in this dissertation, head-internal RCs such as (123), as well as free RCs such as (124) were all considered to be target responses.

(121) Head-initial RC
   aŋ lalake=ŋ [ y<um>a~yakap _ ng/sa babae ]
   FOC male=LK <AF>IPFV~hug NFOC/OBL female
   ‘the boy that is hugging the girl’

(122) Head-final RC
   [ y<um>a~yakap _ ng babae ] na lalake
   <AF>IPFV~hug NFOC female LK male
   ‘the boy that is hugging the girl’

(123) Head-internal RC
   aŋ [ y<um>ayakap na lalake sa babae ]
   FOC <AF>IPFV~hug LNK male OBL female
   ‘the boy that is hugging the girl’

(124) Free RC
   aŋ [ y<um>ayakap _ ng babae ]
   FOC <AF>IPFV~hug NFOC female
   ‘the one that is hugging the girl’

I also considered ARCs with TF on the verb, as in 0, as target responses, in accordance with the discussion in §1.2.4.
Furthermore, in addition patterns with verbs carrying an AF affix (*mag-, *man*- and *um*) and a TF affix (*-in-* and *-an*), the following RC patterns were also considered acceptable, as they are allowed by native speakers.

(126) Stative with the use of *naka*- prefix (instead of AF)

\[
\text{aŋ } \text{lalake}=ŋ \ [ \text{naka-yakap } sa \text{ babae } ] \\
\text{FOC male=LK STAT-hug OBL female}
\]

‘the boy that is hugging the girl’

(127) Stative with the use of an existential and a bare verb (instead of AF)

\[
\text{aŋ } \text{lalake}=ŋ \ [ \text{may buhat } sa \text{ babae } ] \\
\text{FOC male=LK EXIST carry OBL female}
\]

‘the boy that is carrying the girl’

(128) Stative with the use of a bare verb (instead of TF)\(^{48}\)

\[
\text{aŋ } \text{lalake}=ŋ \ [ \text{yakap } naŋ \text{ babae } ] \\
\text{FOC male=LK hug NFOC female}
\]

‘the boy that the girl is hugging’

(129) Stative with the use of a full reduplication (instead of TF)

\[
\text{aŋ } \text{lalake}=ŋ \ [ \text{yakap-yakap } naŋ \text{ babae } ] \\
\text{FOC female=LK carry-carry NFOC female}
\]

‘the boy that the girl is hugging’

Other grammatically and semantically appropriate responses that did not include a verb, such as an NP with a genitive (e.g., ‘the book of the boy’), an NP with an adjective (e.g., ‘the girl with a long hair’), an NP with a locative (e.g., ‘the boy at the tree’), etc., were assigned to a separate category called “other NP modifications”.

A response was treated as a reversal error if the correct head is produced, but its thematic role is changed from agent to theme or vice versa. In the following example, the relative clause is

\(^{48}\) It is however unclear whether a root can be considered a verb without the verbal affixes. See Kaufman (2009) and Foley (1998) for discussion on the category of the root.
restructured in a way that changes the thematic role of the boy from theme to agent, as shown in (130).

(130)  a. Target (TRC)
   anŋ lalake=ŋ [h<in>a~habol naŋ babae _ ]
   FOC male=L <TF>IPFV~chase NFOC female
   ‘the boy [that the girl is chasing]’

   b. Response (ARC)
   anŋ lalake=ŋ [h<um>a~habol _ naŋ babae]  
   FOC male=L <AF>IPFV~chase NFOC female
   ‘the boy [that is chasing the girl]’

A response was classified as a head error if the referent of the head was changed. In the following example, the target head is the girl in (131a), but the response selects the boy as the head in (131b).

(131)  a. Target (TRC)
   anŋ lalake=ŋ [h<in>a~habol naŋ babae _ ]
   FOC male=L <TF>IPFV~chase NFOC female
   ‘the boy [that the girl is chasing]’

   b. Response (TRC)
   anŋ babae=ŋ [h<in>a~habol naŋ babae]  
   FOC female=L <AF>IPFV~chase NFOC female
   ‘the girl [that the boy is chasing]’

A response was classified as a head error with reversal if the referent of the head was changed, along with its thematic role. In the following example, the target head is the boy (the theme) in (132a), but the response selects the girl (the agent) as head in (132b), and further the verb bears the AF infix -um- instead of the TF infix -in-. These changes are different from reversal errors or head errors in that they preserve the event: in both the target and the response, a girl is chasing a boy.

(132)  a. Target (TRC)
   anŋ lalake=ŋ [h<in>a~habol naŋ babae _ ]
   FOC male=L <PF>IPFV~chase NFOC male  
   ‘the boy [that the girl is chasing]’
b. Response (ARC)
\[
\text{aŋ } \text{babae}=\eta \ [h<\text{um}>a\text{-habol } na\text{ŋ} \ lalake] \\
\text{FOC female}=\text{L} <\text{AF}>\text{IPFV}\sim\text{chase} \text{ NFOC male} \\
\text{‘the girl [that is chasing the boy]’}
\]

A response was classified as a resumptive error if a resumptive pronoun was used instead of a gap.

\(
(133) \quad \text{a. Target (TRC)} \\
\text{aŋ} \ lalake=\eta \ [h<\text{in}>a\text{-habol naŋ} \ babae _] \\
\text{FOC male}=\text{L} <\text{PF}>	ext{IPFV}\sim\text{chase} \text{ NFOC male} \\
\text{‘the boy [that the girl is chasing]’}
\)

b. Response (TRC)
\[
\text{aŋ} \ lalake=\eta \ [h<\text{in}>a\text{-habol siya naŋ} \ lalake] \\
\text{FOC male}=\text{L} <\text{TF}>	ext{IPFV}\sim\text{chase} \text{ 3SG.FOC NFOC male} \\
\text{‘the boy [that the girl is chasing him]’}
\]

A response was classified as a case marking error if the RC-internal NP of the ARC was marked with the focus marker \textit{ang} instead of a non-focus marker, as shown in (134). This could be simply an error of case marking, or it could be an error of extraction, in which the theme was extracted from an AF clause, which is not grammatical as discussed in §1.2.4.

\[
(134) \quad * \text{aŋ babae}=\eta \ [h<\text{um}>a\text{-habol } aŋ \ lalake] \\
\text{FOC female}=\text{L} <\text{AF}>\text{IPFV}\sim\text{chase} \text{ FOC male} \\
\text{Intended: ‘the girl [that is chasing the boy]’ or ‘the girl [that the boy is chasing]’}
\]

A response without the RC-internal NP, such as (135), was also classified as an error. This RC is a well-formed RC, and it indicates that speakers know how to form an RC. However, such a response is not appropriate in the context of this experiment, as ‘the girl that is chasing’ does not specify which girl the arrow is pointing at.

\[
(135) \quad \text{aŋ babae}=\eta \ [h<\text{um}>a\text{-habol } _] \\
\text{FOC female}=\text{L} <\text{AF}>\text{IPFV}\sim\text{chase} \\
\text{‘the girl [that is chasing]’}
\]

In addition to accuracy, reaction times were also measured for adult participants. Because the presentation of the arrow was signaled by the beep sound, I measure the duration between the beep sound and the onset of the speech in the recordings to examine how long it takes for participants to respond to each item.
5.3 Results
A total of 540 responses from adults and 480 responses from children were obtained in the experiment. The results from adults were analyzed in terms of accuracy and reaction times, and results from children were analyzed for accuracy. I will first report on the findings from adults in §4.3.1, looking at accuracy, types of errors, and reaction times. In §4.3.2, I will report on the results from children.

5.3.1 Adults
5.3.1.1 Accuracy
A total of 540 responses from adults was analyzed. Table 36 shows the frequency and percentage of different response types from all the adult participants.

<table>
<thead>
<tr>
<th>Types of responses</th>
<th>ARC</th>
<th>81.85%</th>
<th>TRC</th>
<th>75.56%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target responses</td>
<td>221</td>
<td>81.85%</td>
<td>204</td>
<td>75.56%</td>
</tr>
<tr>
<td>Other acceptable RCs</td>
<td>9</td>
<td>3.33%</td>
<td>4</td>
<td>1.48%</td>
</tr>
<tr>
<td>Other NP modifications</td>
<td>1</td>
<td>0.37%</td>
<td>3</td>
<td>1.11%</td>
</tr>
<tr>
<td>Errors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reversal</td>
<td>5</td>
<td>1.85%</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Head</td>
<td>0</td>
<td>0.00%</td>
<td>1</td>
<td>0.00%</td>
</tr>
<tr>
<td>Head + reversal</td>
<td>3</td>
<td>1.11%</td>
<td>29</td>
<td>10.74%</td>
</tr>
<tr>
<td>Resumptive</td>
<td>3</td>
<td>1.11%</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Case marking</td>
<td>1</td>
<td>0.37%</td>
<td>1</td>
<td>0.37%</td>
</tr>
<tr>
<td>No RC-internal NP</td>
<td>1</td>
<td>0.37%</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>0.37%</td>
<td>1</td>
<td>0.37%</td>
</tr>
<tr>
<td>Non-RCs</td>
<td>22</td>
<td>8.15%</td>
<td>24</td>
<td>8.89%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.11%</td>
<td>4</td>
<td>1.48%</td>
</tr>
<tr>
<td>Total</td>
<td>270</td>
<td>100%</td>
<td>270</td>
<td>100%</td>
</tr>
</tbody>
</table>

Non-RC responses include pseudo-clefts such as (136) as well as declarative clauses. Even in cases where these sentences are grammatical, they are not appropriate responses to a question “Who has the arrow?” and thus were not considered to be target responses.
Three participants (QA08, QA13, and QA17) produced non-RC responses for more than half of the 20 transitive RC items, suggesting that they did not understand the protocol of the experiment. Table 37 summarizes the responses of adults other than these three participants;
Table 38 shows the same results by animacy condition. The participants’ overall accuracy rate was 88.3% for ARC and 84.17% for TRC. In the animate theme condition, 79.17% of the ARC responses and 85.00% of the TRC responses were target. If we include other acceptable RCs, adults produced 85.84% grammatical ARC and 88.33% grammatical TRC in the animate theme condition. In the inanimate theme condition, the accuracy rate for ARC was 97.50% and TRC 83.33%.

Table 37. Types of responses from adults that were included in the analysis (N = 24)

<table>
<thead>
<tr>
<th></th>
<th>ARC</th>
<th>TRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target responses</td>
<td>212</td>
<td>202</td>
</tr>
<tr>
<td>Other acceptable RCs</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Other NP modifications</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reversal</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Head</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Head + reversal</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Resumptive</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Case marking</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>No RC-internal NP</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Non-RCs</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>240</td>
</tr>
</tbody>
</table>
The accuracy data were fit to a mixed-effects logistic regression model that included RC types and animacy as fixed effects and location of testing, participants, items, and types of prompts as random effects. There was no effect of RC types ($p = .21$); however, there was a main effect of animacy ($\beta = 2.80$, se = 0.73, $z = 3.86$, $p < .001$) as well as the interaction between RC types and animacy ($\beta = -2.99$, se = 0.77, $z = -3.88$, $p < .001$). When the two animacy conditions were analyzed separately, there was no difference between ARC and TRC in the animate theme condition, but participants produced significantly more target ARCs than TRCs in the inanimate theme condition ($\beta = -2.94$, se = 0.81, $z = -3.64$, $p < .001$).

The majority of the RC responses—either target or non-target—were head-initial RCs. Among 222 target responses for ARC, 2 responses were head-internal RCs, 3 responses were free RCs, and 24 responses were ARCs with TF, as illustrated with the help of the actual examples in (137)–(139). Among 204 targeted responses for TRC, only 5 were free RCs.

(137) Head-internal RC

\[
\begin{array}{l}
\text{yuŋ [ t<um>u-} \text{tulak na lalake sa unggoy ]} \\
\text{FOC <AF>IPFV~push LNK male OBL monkey} \\
\text{‘the one that is pushing the monkey’ (BA07)}
\end{array}
\]
(138) Free RC
yuŋ [ t<um>u~tulak _ sa unggoy ]
FOC <AF>IPFV~push OBL monkey
‘the one that is pushing the monkey’ (QA05)

(139) ARC with TF
yuŋ babae=ŋ [ b<in>a~basa _ aŋ lalake ]
FOC female=LK <AF>IPFV~hug FOC male
‘The girl who the boy is hugging.’ (QA15)

The category of “other acceptable RCs” includes the following actual responses.

(140) Stative with the use of naka- prefix (instead of AF)
aŋ lalake=ŋ [ naka-yakap _ sa unggoy ]
FOC male=LK STAT-hug OBL monkey
‘The boy that is hugging the monkey’ (QA03)

(141) Stative with the use of an existential and a bare verb (instead of AF)
yuŋ lalake=ŋ [ may buhat _ sa unggoy ]
FOC male=LKEXIST carry OBL monkey
‘the boy that is carrying the monkey’ (BA07)

(142) Stative with the use of a bare verb (instead of TF)
aŋ babae=ŋ [ buhat naŋ unggoy _ ]
FOC female=LK carry NFOC monkey
‘the girl that is carrying the monkey’ (BA07)

(143) Stative with the use of a full reduplication (instead of TF)
aŋ babae=ŋ [ buhat-buhat naŋ unggoy _ ]
FOC female=LK carry-carry NFOC monkey
‘the girl that is carrying the monkey’ (QA09)

5.3.1.2 Error analysis

The most common mistakes made by adults were head + reversal errors. Three errors of this kind were made for ARCs, and 24 were for TRCs. More TRCs were turned into ARCs (reversal and head + reversal) than vice versa.

The following examples demonstrate the kinds of errors that were produced by adults.
a. Target (ARC)

\[
\text{aŋ lalake=ŋ [b<um>u~buhat naŋ babae]}
\]

FOC male=L <AF>IPFV~carry NFOC female

‘the boy [that is carrying the girl]’

b. Reversal error (TRC)

\[
\text{lalake=ŋ [b<in>u~buhat naŋ babae]}
\]

male=L <TF>IPFV~carry NFOC female

‘boy [that the girl is carrying]’ (BA01)

(154) a. Target (TRC)

\[
\text{aŋ babae=ŋ [b<in>u~buhat naŋ unggoy]}
\]

FOC female=L <TF>IPFV~carry NFOC monkey

‘the girl [that the monkey is carrying]’

b. Head error (TRC)

\[
\text{unggoy na [b<in>u~buhat naŋ babae]}
\]

MONKEY=L LK <TF>IPFV~carry NFOC female

‘the monkey [that the girl is carrying]’ (BA01)

(155) a. Target (TRC)

\[
\text{aŋ babae=ŋ [ ni-ya~yakap naŋ unggoy]}
\]

FOC female=L TF-IPFV~hug NFOC monkey

‘the girl [that the monkey is hugging]’

b. Head + reversal error (ARC)

\[
\text{aŋ unggoy na [y<um>a~yakap sa babae ]}
\]

FOC monkey L <AF>IPFV~hug OBL FEMALE

‘the monkey [that is carrying the girl]’ (QA16)

(156) a. Target (ARC with TF)

\[
\text{aŋ lalake=ŋ [b<in>u~buhat aŋ babae]}
\]

FOC male=L <TF>IPFV~carry FOC female

‘the boy [that is carrying the girl]’

b. Resumptive error (ARC with TF)

\[
\text{aŋ laláke=ŋ [b<in>u~búhat niya yuŋ babae]}
\]

FOC male=L <TF>IPFV~carry 3SG.NFOC FOC female

‘the boy [that he is carrying the girl]’ (BA06)

5.3.1.3 Reaction times

As discussed in §5.2, reaction time data were obtained by measuring the duration between the beep sound, which signals the presentation of the arrow, and the onset of the speech. Table 39
shows the results of the analysis of reaction times, which was performed only on target responses. Participants produced ARCs significantly faster than the TRCs ($\beta = 75.86, \text{se} = 31.18, t = 2.43, p < .05$) and also responded faster to items in the inanimate theme condition than the animate theme condition ($\beta = -163.23, \text{se} = 57.48, t = -2.840, p < .05$). There was no interaction of RC types and animacy. This means that ARCs are produced faster than TRCs regardless of the theme animacy, and both ARCs and TRCs are produced faster in the non-reversible condition than the reversible condition.

**Table 39.** Reaction times per RC type and animacy condition

<table>
<thead>
<tr>
<th></th>
<th>ARC</th>
<th>TRC</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reversible</td>
<td>1223</td>
<td>1265</td>
<td>1245</td>
</tr>
<tr>
<td>Non-reversible</td>
<td>1022</td>
<td>1163</td>
<td>1087</td>
</tr>
<tr>
<td>Overall</td>
<td>1112</td>
<td>1215</td>
<td></td>
</tr>
</tbody>
</table>

**5.3.2 Children**

**5.3.2.1 Accuracy**

A total of 480 responses were obtained from children. Table 40 summarizes the various response types; Table 41 shows the same results by animacy condition.

**Table 40.** Types of responses from all the children

<table>
<thead>
<tr>
<th></th>
<th>ARC</th>
<th>TRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target responses</td>
<td>90</td>
<td>60</td>
</tr>
<tr>
<td>Other acceptable RCs</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Other NP modifications</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reversal</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>Head</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Head + reversal</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>Resumptive</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>No RC-internal NP</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Combination of multiple errors</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Coordination patterns</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Non-RCs</td>
<td>21</td>
<td>12</td>
</tr>
<tr>
<td>Others</td>
<td>69</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>240</td>
</tr>
</tbody>
</table>
Table 41. Types of responses from children per RC type and animacy condition

<table>
<thead>
<tr>
<th></th>
<th>Reversible</th>
<th></th>
<th>Non-reversible</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
<td>TRC</td>
</tr>
<tr>
<td>Target responses</td>
<td>31</td>
<td>38</td>
<td>31.67%</td>
<td>59</td>
</tr>
<tr>
<td>Other acceptable RCs</td>
<td>10</td>
<td>7</td>
<td>5.83%</td>
<td>2</td>
</tr>
<tr>
<td>Other NP modifications</td>
<td>4</td>
<td>2</td>
<td>1.67%</td>
<td>4</td>
</tr>
<tr>
<td>Errors</td>
<td>Reversal</td>
<td>8</td>
<td>6.67%</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Head</td>
<td>0</td>
<td>0.00%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Head + reversal</td>
<td>0</td>
<td>0.00%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Resumptive</td>
<td>5</td>
<td>4.17%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>No RC-internal NP</td>
<td>1</td>
<td>0.83%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Combination of errors</td>
<td>0</td>
<td>0.00%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>1</td>
<td>0.83%</td>
<td>0</td>
</tr>
<tr>
<td>Coordination patterns</td>
<td>2</td>
<td>1.67%</td>
<td>3</td>
<td>2.50%</td>
</tr>
<tr>
<td>Non-RCs</td>
<td>7</td>
<td>5.83%</td>
<td>8</td>
<td>6.67%</td>
</tr>
<tr>
<td>Others</td>
<td>51</td>
<td>42.50%</td>
<td>38</td>
<td>31.67%</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>100%</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

Children’s overall accuracy was 37.50% in the ARC condition and 25.00% in the TRC condition. In the reversible condition, 25.83% of the ARC responses and 31.67% of the TRC responses were target. If we include other acceptable RCs, children produced 34.16% grammatical ARCs and 37.50% grammatical TRCs in the animate theme condition. In the non-reversible condition, the accuracy rate was 49.17% for ARCs and 18.33% for TRCs. Combined with other acceptable RCs, the children produced 50.84% grammatical ARCs and 19.16% grammatical TRCs in the animate theme condition.

Children’s accuracy data were fit to a mixed-effects logistic regression model that included RC types and animacy as fixed effects and location of testing, participants, items, and types of prompts as random effects. There was no effect of RC type ($p = .22$), but there was a main effect of animacy ($\beta = 1.22$, se = 0.30, $z = 4.05$, $p < .001$) as well as the interaction between RC type and animacy ($\beta = -2.09$, se = 0.45, $z = -4.69$, $p < .001$). When the two animacy conditions were analyzed separately, there was no difference between ARC and TRC in the animate theme condition, but participants produced significantly more target ARCs than TRCs in the inanimate theme condition ($\beta = -1.71$, se = 0.33, $z = -5.18$, $p < .001$).
Like adults, the majority of the RC responses—either target or non-target—were head-initial RCs. Among 69 target responses for ARC, there were one head-final RC, one head-internal RC, 9 free RCs, and 26 ARCs with a TF verb. Among 52 target responses for TRC, there were 3 head-final RCs and 10 free RCs. Examples with actual responses from children are shown below.

(148) Head-final RC
\[
yuŋ \ [ k<\text{in}>a-kain \ naŋ \ lalake ]na \ aiskrim\]
FOC \ (<TF>IPFV~eat) \ NFOC \ male \ LK \ ice.cream
\]
‘the ice cream that the boy is eating’ (QC27, 5;6)

(149) Head-internal RC
\[
yuŋ \ [ s<\text{um}>i-sipa \ na \ lalake \ sa \ ano \ lata\]
FOC \ (<AF>IPFV~kick) \ LK \ male \ OBL \ what \ can
\]
‘the boy that is kicking the, what, can’ (BC18)

(150) Free RC
\[
yuŋ \ [ h<\text{in}>a-habol \ naŋ \ babae ]\]
FOC \ (<TF>IPFV~chase) \ NFOC \ female
\]
‘the one that the girl is chasing’ (BC18)

(151) ARC with TF
\[
yuŋ \ lalake=ŋ \ [ t<\text{in}>u-tulak \ _ \ yuŋ \ unggoy ]\]
FOC \ male=LK \ (<TF>IPFV~push) \ FOC \ monkey
\]
‘the boy that is pushing the monkey’ (QC14. 5;9)

### 5.3.2.2 Error analysis

The most common mistakes made by children, like adults, were head + reversal errors, which involve a change of the referent of the head along with its thematic role.

(152) a. Target (TRC)
\[
αŋ \ bola=ŋ \ [ s<\text{in}>i-sipa \ naŋ \ babae _ ]\]
FOC \ ball=L \ (<TF>IPFV~kick) \ NFOC \ female
\]
‘the ball [that the girl is kicking]’

b. Head + reversal error (ARC)
\[
yuŋ \ babae=ŋ \ [ s<\text{um}>i-sipa \ _ \ naŋ \ bola ]\]
FOC \ female=L \ (<AF>IPFV~kick) \ NFOC \ ball
\]
‘the girl [that is kicking the ball]’ (QC28, 5;9)

In the example (152), the target head is the ball (the theme) in (a), but the response selects the girl (the agent) as head in (b), and further the verb bears the AF infix -um- instead of the TF infix
There were a total of 36 head + reversal errors, 35 of which occurred in the inanimate TRC condition.

The children also made 32 reversal errors in total, 19 on ARCs and 13 on TRCs. In example (153), the relative clause is restructured in a way that changes the thematic role of the boy from agent to theme while maintain the correct head noun.

(153)  
  a. Target (TRC)  
  aŋ  lalake=ŋ [ni-ya~yakap naŋ unggoy _ ]  
  FOC  male=L  TF-IPFV~hug NFOC monkey  
  ‘the boy [that the monkey is hugging]’

  b. Reversal error (ARC)  
  aŋ  lalake=ŋ [y<um>a~yakap _ naŋ unggoy]  
  FOC  male=L  <TF>IPFV~hug NFOC monkey  
  ‘the boy [that is hugging the monkey]’ (QC27, 5;6)

Overall, with a frequent number of reversal errors and head + reversal errors, more TRCs were turned into ARCs than vice versa.

Children also frequently produced a resumptive pronoun or a resumptive NP in place of a gap (10 in ARCs and 9 in TRCs), as demonstrated in the following examples.

(154)  
  a. Target (ARC with TF)  
  aŋ  lalake=ŋ [t<in>u~tulak _ aŋ unggoy]  
  FOC  male=L  <TF>IPFV~carry FOC female  
  ‘the boy [that is pushing the monkey]’

  b. Resumptive pronoun (ARC with TF)  
  yuŋ  lalake=ŋ [t<in>u~tulak niya po yuŋ unggoy]  
  FOC  male=L  <TF>IPFV~carry 3SG.NFOC HON FOC monkey  
  ‘the boy [that he is pushing the monkey]’ (BC03, 4;8)

(155)Target (TF)  
  a. aŋ  babae=ŋ [ni-ya~yakap naŋ unggoy _ ]  
  FOC  female=L  <TF>IPFV~carry FOC female  
  ‘the girl [that the monkey is pushing]’

  b. Resumptive NP (TF)  
  babae [ni-ya~yakap naŋ unggoy yuŋ babae ]  
  female  <TF>IPFV~carry NFOC MONKEY FOC female  
  ‘the girl [that the monkey is pushing the girl]’
Other kinds of errors made by children include a head error, in which the referent of the head was changed. In the following example (156), the target head is *the girl* in (a), but the response selects *the boy* as the head in (b).

(156) a. Target (TRC)
\[
\begin{array}{c}
\alphaŋ \text{ babae}=\eta \ [ p<\text{um}>i\text{-}\text{pitas} \ _ \ \eta \text{ bulaklak} ] \\
\text{FOC} \quad \text{female}=\eta \quad <\text{AF}>\text{IPFV} \quad \eta \text{ pick} \quad \text{NFOC} \quad \text{flower}
\end{array}
\]
‘the girl [that is picking the flower]’

b. Head error (TRC)
\[
\begin{array}{c}
\alphaŋ \text{ bulaklak} \ [ p<\text{um}>i\text{-}\text{pitas} \ _ \ \eta \text{ babae} ] \\
\text{FOC} \quad \text{flower} \quad <\text{AF}>\text{IPFV} \quad \eta \text{ pick} \quad \text{NFOC} \quad \text{female}
\end{array}
\]
‘the flower [that is picking the girl]’ (BC18)

Children sometimes used other NP modification patterns as shown in (157) and (158) in place of relative clauses, as well as coordination patterns as illustrated in (159) and (160).

(157) a. Target (TRC)
\[
\begin{array}{c}
\alphaŋ \text{ bola}=\eta \ [ s<\text{in}>i\text{-}\text{sipa} \ _ \ \eta \text{ babae} \ _ ] \\
\text{FOC} \quad \text{ball}=\eta \quad <\text{TF}>\text{IPFV} \quad \eta \text{ kick} \quad \text{NFOC} \quad \text{female}
\end{array}
\]
‘the ball [that the girl is kicking]’

b. Response with genitive
\[
\begin{array}{c}
\text{yuŋ} \text{ bola} \ _ \ \eta \text{ babae} \\
\text{FOC} \quad \text{ball} \quad \text{GEN} \quad \text{female}
\end{array}
\]
‘the ball of the girl’

(158) a. Target (TRC)
\[
\begin{array}{c}
\alphaŋ \text{ babae}=\eta \ [ p<\text{um}>i\text{-}\text{pitas} \ _ \ \eta \text{ bulaklak} ] \\
\text{FOC} \quad \text{female}=\eta \quad <\text{AF}>\text{IPFV} \quad \eta \text{ pick} \quad \text{NFOC} \quad \text{flower}
\end{array}
\]
‘the girl [that is picking the flower]’

b. Response with RC with existential
\[
\begin{array}{c}
\text{yuŋ} \ [ \text{may} \quad \text{flower} \ _ ] \ _ \ \text{na} \ _ \ \text{girl} \\
\text{FOC} \quad \text{EXIST} \quad \eta \text{ LK}
\end{array}
\]
‘the girl that has the flower’

(159) a. Target (ARC)
\[
\begin{array}{c}
\alphaŋ \text{ lalake}=\eta \ [ s<\text{um}>i\text{-}\text{sipa} \ _ \ \eta \text{ lata} ] \\
\text{FOC} \quad \text{male}=\eta \quad <\text{AF}>\text{IPFV} \quad \eta \text{ kick} \quad \text{NFOC} \quad \text{can}
\end{array}
\]
‘the boy that is kicking the can’
b. Response with a coordination pattern

yuŋ boy kasi nag-si–sipa siya ng trash can

FOC because AF–IPFV–kick 3SG.FOC NFOC

‘the boy because he is kicking the trash can’

(160) a. Target (ARC with TF)

aŋ babae=ŋ [ b<in>a–basa _ aŋ lalake ]

FOC female= L <TF> IPFV–wet FOC male

‘the ball [that the girl is kicking]’

b. yuŋ babae tapos b<in>a–basa yuŋ lalake

FOC female then <TF> IPFV–wet FOC male

‘the girl and then the boy is being splashed’

5.3.2.3 Others

A hundred and forty-one responses were placed in the “others” category. Responses of these types include unintelligible utterances and single NP responses. Ninety of these responses have a RC-type structure, but were not considered to be target responses, as children produced them bit by bit in response to prompting by the researcher. An example of such interaction is shown in (161).

(161) a. Target

aŋ babae=ŋ [ ni-ya–yakap naŋ unggoy _ ]

FOC female= L <TF> IPFV–carry FOC female

‘the girl [that the monkey is pushing]’

b. BC02: yuŋ babae

FOC female

‘the girl’

Researcher: Mm. Pero may dalawa=ŋ babae, no?

but EXIST two= LK girl Q

‘Mm. But there are two girls, aren’t they?’

Sino aŋ may arrow diyan?

who FOC EXIST arrow there

‘Who has the arrow there?’

BC02: ni-ya–yakap naŋ unggoy _

TF–IPFV–hug NFOC monkey

‘the monkey is hugging _’
In (161), BC02 supplies a transitive clause in response to the researcher’s question, but the clause is missing the theme, which corresponds to the single NP produced by the child in his or her initial response. Therefore, it is possible that the child was completing his or her own sentence, ultimately ending up with a relative clause. However, this is speculative, as we saw in §2.3.2 that NP ellipsis is frequent in children’s speech. However, as shown in Table 42, a large portion of these utterances follow the relative clause pattern—that is, the NP produce at the outset corresponds to the gap in the transitive clause that is subsequently produced. It is therefore possible that the children could not produce a whole RC on their own, even though they were aware of how to go about doing so.

Table 42. Reanalysis of the 90 responses in “others”

<table>
<thead>
<tr>
<th></th>
<th>Animate</th>
<th></th>
<th>Inanimate</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
<td>TRC</td>
</tr>
<tr>
<td>target</td>
<td>24</td>
<td>61.54%</td>
<td>12</td>
<td>60.00%</td>
</tr>
<tr>
<td>reversal</td>
<td>7</td>
<td>17.95%</td>
<td>4</td>
<td>20.00%</td>
</tr>
<tr>
<td>head + reversal</td>
<td>0</td>
<td>0.00%</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>resumptive</td>
<td>3</td>
<td>7.69%</td>
<td>1</td>
<td>5.00%</td>
</tr>
<tr>
<td>case marking</td>
<td>1</td>
<td>2.56%</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>others</td>
<td>4</td>
<td>10.26%</td>
<td>3</td>
<td>15.00%</td>
</tr>
</tbody>
</table>

Total                  | 39          | 100.00%      | 20          | 100.00%      |

5.3.2.4 Individual results

As was the case in the comprehension task, the individual results showed large variation, but the majority of the children (17 out of 24) produced more target ARCs than TRCs (Table 43). Three children had more target responses with TRCs than SRCs (Table 44) and four children produced the same number ARCs and TRCs (Table 45).
Table 43. Individuals with more target responses with ARCs than TRCs (sorted by age).

<table>
<thead>
<tr>
<th></th>
<th>Animate</th>
<th>Inanimate</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
</tr>
<tr>
<td>QC28</td>
<td>5;9</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>QC14</td>
<td>5;9</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>BC01</td>
<td>5;9</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>BC07</td>
<td>5;8</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>QC05</td>
<td>5;8</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>QC27</td>
<td>5;6</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>QC07</td>
<td>5;6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>QC13</td>
<td>5;3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>QC09</td>
<td>5;4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>BC02</td>
<td>5;2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>QC08</td>
<td>5;1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>QC12</td>
<td>5;1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>QC21</td>
<td>5;1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BC12</td>
<td>5;1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>QC17</td>
<td>4;11</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BC13</td>
<td>N/A</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>BC18</td>
<td>N/A</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 44. Individuals with more target responses with TRCs than ARCs (sorted by age).

<table>
<thead>
<tr>
<th></th>
<th>Animate</th>
<th>Inanimate</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
</tr>
<tr>
<td>QC25</td>
<td>5;7</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>QC04</td>
<td>5;5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>QC16</td>
<td>5;2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 45. Individuals with equal numbers of target responses in ARCs and TRCs (sorted by age).

<table>
<thead>
<tr>
<th></th>
<th>Animate</th>
<th>Inanimate</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
</tr>
<tr>
<td>BC17</td>
<td>5;9</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>QC02</td>
<td>5;3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>QC10</td>
<td>5;0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BC03</td>
<td>4;8</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

However, as the overall results showed, there seems to be an animacy effect: fourteen children produced more ARCs in the inanimate theme condition than the animate theme condition.
5.4 Discussion

Table 46 summarizes findings from the elicited production task. As illustrated here, the reaction time results for adults showed that they produced ARCs faster than TRCs. Moreover, in the inanimate theme condition, both adults and children produced more target responses in ARCs than TRCs.

Table 46. Summary of the findings

<table>
<thead>
<tr>
<th></th>
<th>Reversible</th>
<th>Non-reversible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>No difference</td>
<td>ARC advantage</td>
</tr>
<tr>
<td>Reaction times</td>
<td>ARC advantage</td>
<td>ARC advantage</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>No difference</td>
<td>ARC advantage</td>
</tr>
</tbody>
</table>

There are at least three possible explanations for why ARCs were easier to produce in the non-reversible condition than the reversible condition. One possibility, discussed in Chapter 2, is that the use of AF increases when the agent is animate and the theme is inanimate. This may be why we saw a clear advantage for ARCs in the inanimate theme conditions from both groups. However, this does not explain why adults showed an ARC advantage in reaction times across the two animacy conditions.

The second possible explanation is that it is not the case that non-reversible condition made ARCs easier, but that it made TRCs more difficult. In this condition, the head of the TRC is an inanimate theme, which might have increased the difficulty because the RC head is low in prominence in terms of two semantic prominence factors. This difficulty also manifests in the high percentage of head + reversal errors like (162).

(162) a. Target (TRC)

\[
\begin{array}{l}
\text{aŋ bola=ŋ } [\text{ } s<\text{i-sipa } naŋ babae } _{\text{.}}] \\
\text{FOC ball=L } <\text{TF}>\text{iPFV~kick } \text{NFOC female} \\
\text{‘the ball [that the girl is kicking]’}
\end{array}
\]

b. Head + reversal error (ARC)

\[
\begin{array}{l}
yuŋ babae=ŋ [\text{ } s<\text{um}>\text{i-sipa } _{\text{.}} naŋ bola ] \\
yuŋ babae=ŋ [\text{ } s<\text{um}>\text{i-sipa } _{\text{.}} naŋ bola ] \\
\text{FOC female=L } <\text{TF}>\text{iPFV~kick } \text{NFOC ball} \\
\text{‘the girl [that is kicking the ball]’ (QC28, 5;9)}
\end{array}
\]
Participants were still describing the same event, but instead of making the RC about the inanimate theme, they produce RCs about the animate agent. Although reversals and head errors also happened in this condition, that would make the event implausible, as shown in 105(163)—it is not possible for the ball to kick the girl. Therefore, head + reversal errors were the only way for them to produce an easier RC without describing an implausible event.

(163) a. Reversal error of (162a)
\[
\text{aŋ} \text{ bola=}\text{ŋ} \quad [\text{s}^{<\text{um}>}\text{i}^\text{=sipa} \quad \text{naŋ} \quad \text{babae}] \\
\text{FOC} \quad \text{ball=}\text{L} \quad \text{<AF>IPFV~kick} \quad \text{NFOC} \quad \text{female} \\
\text{‘the ball [that _ is kicking the girl]’}
\]

b. Head error of (162a)
\[
\text{aŋ} \text{ babae=}\text{ŋ} \quad [\text{s}^{<\text{in}>}\text{i}^\text{=sipa} \quad \text{naŋ} \quad \text{bola} \quad _] \\
\text{FOC} \quad \text{female=}\text{L} \quad \text{<TF>IPFV~kick} \quad \text{NFOC} \quad \text{ball} \\
\text{‘the girl [that the ball is kicking _ ]’}
\]

The third possible explanation is that, the ARC advantage is there in both conditions, but it is somehow masked in the reversible condition. As demonstrated in Experiment 1 (Chapter 2), when both the agent and the theme are animate, speakers are more likely to produce TF sentences. On this view, the lack of ARC advantage in the animate theme condition reflects an interaction between the semantic prominence, which favors ARC, and a language-specific focus preference, which favors TF. This may also explain the participants’ frequent production of ARCs with a TF verb, despite the fact it is not as felicitous as ARCs with an AF verb.

Children had an overall low accuracy in the production of relative clauses, which may have also contributed to the lack of an asymmetry in the animate theme condition. Table 47 compared the results from the elicited imitation task and the elicited production task for 10 children who participated in both experiments. While most of the children did fairly well on the imitation task (except for QC25 who produced only 2 target responses in TRC), they did poorly on the elicited production task. In the previous version of our work, in which we found a subject preference, the panel of pictures already had an arrow from the beginning, and children were able to see the arrow while they heard the prompt explaining the pictures. In contrast, in the current version of the experiment, the arrow did not appear until after the prompt. It is possible that, in the previous version of the experiment, children benefited from the extra time with the arrow to prepare their speech.
Table 47. Comparison between the results from the elicited imitation task and the elicited production task.

<table>
<thead>
<tr>
<th></th>
<th>Imitation</th>
<th></th>
<th>Production</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARC</td>
<td>TRC</td>
<td>ARC</td>
<td>TRC</td>
</tr>
<tr>
<td>BC17</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>BC18</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>QC02</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>QC07</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>QC12</td>
<td>9</td>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>QC13</td>
<td>8</td>
<td>9</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>QC14</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>QC17</td>
<td>9</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>QC25</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>QC27</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>
6 General discussion and conclusion

This dissertation investigated how adult and child speakers of Tagalog comprehend and produce two types of relative clauses in their language: agent relative clauses (ARCs) and theme relative clauses (TRCs). My investigation focused on whether there is an ARC advantage in Tagalog parallel to what have been found in other languages. In this final chapter, I will first summarize the findings reported in the previous chapters and then use those findings to evaluate different hypotheses that have been proposed to explain the ARC advantage in various languages. Section 6.2 discusses the larger implications of my findings and the last section concludes this dissertation by outlining remaining issues and suggestions for future research.

6.1 Summary of findings

The primary issue which I have been concerned with involves the question of whether ARCs like (164) and theme relative clauses like (165) are comprehended and produced with the same degree of success by child and adult speakers of Tagalog.

(164) ARC with AF
lalake=ŋ [ h<um>a~habol _ naŋ babae]
male= L <AF>IPFV~chase NFOC female
‘the man that is chasing a/the woman’

(165) TRC with TF
lalake=ŋ [ h<in>a~habol naŋ babae _]
male= L <TF>IPFV~chase NFOC female
‘the man that the woman is chasing’

For the purpose of this chapter, I assume that these patterns are parallel to the English subject and direct object RC patterns exemplified in (166) and (167).

(166) the boy [that _ is chasing the girl] English ARC
(167) the boy [that the boy _ is chasing] English TRC
In English (and many other languages), ARCs like (166) have been shown to be read faster, produced with higher accuracy, and acquired earlier than TRCs like (167), which is referred to as a subject advantage.

Different hypotheses have been proposed to explain why this is the case, five of which have been considered here: the Linear Distance Hypothesis, the Canonical Word Order Hypothesis, the Structural Distance Hypothesis, the Frequency Hypothesis, and the Semantic Prominence Hypothesis. I will briefly review the claim of each hypothesis.

The Linear Distance Hypothesis predicts that the TRCs are more difficult than ARCs because of the greater distance between the head and the gap (Gibson, 1998, 2000; Hawkins, 1989; Tarallo & Myhill, 1983; Wanner & Maratsos, 1978), as demonstrated in (168) and (169) below.

(168) the boy [that is _ chasing the girl]  ARC

(169) the girl [that the boy is chasing _]  TRC

The Canonical Word Order Hypothesis attributes the difficulty in TRCs to its non-canonical word order. As shown below, while the ARC in (170) has the same SVO word order to the basic declarative sentence in (170), the TRC in (172) has a non-canonical, OSV word order. To the extent that children are better with canonical word order (Bever, 1970; Slobin & Bever, 1982), this factor could contribute to the difficulty in TRCs.

(170) The boy is chasing the girl.  Declarative sentence

(171) the boy [that _ is chasing the girl]  ARC

(172) the girl [that the boy is chasing _]  TRC

The Structural Distance Hypothesis proposes that the key factor is the depth of the gap (Collins, 1994; O’Grady, 1997). As seen in the tree diagrams below, the gap is more deeply
embedded in the TRC (174) than the ARC in (173), yielding a greater structural distance in the former pattern.

The Frequency Hypothesis predicts that frequent forms are easier. On one hand, ARCs are more frequent than TRCs in the input and therefore easier (Roland et al., 2007). On the other hand, with the use of a more frequent type TRCs, it is also possible to make TRCs easier and make the asymmetry between ARCs and TRCs disappear (Fox & Thompson, 1990; Kidd et al., 2007; Mak et al., 2002).

Finally, the Semantic Prominence Hypothesis predicts that the ARCs are easier than TRCs because the head of the RC refers to a more prominent entity (O’Grady, 2011). A number of factors can contribute to the prominence, including animacy and thematic roles. Generally, animate entities are more prominent than inanimate entities, and agents are more prominent than
thematic roles. All things being equal, a subject (an agent) is more prominent than a direct object (a theme), which manifests as a subject advantage (C.-E. Kim & O’Grady, 2015; O’Grady, 2011).

(175) the boy [that _ is chasing the girl]  ARC
↑
agent ... more prominent

(176) the boy [that the boy _ is chasing]  TRC
↑
theme ... less prominent

All four hypotheses make the same predictions about English: ARCs should be easier than TRCs. Data from English can therefore not tease apart these different hypotheses. For that reason, it is necessary to look beyond English and find languages for these hypotheses make different predictions.

Languages like Japanese, Korean, and Chinese have postnominal RCs, unlike English, in which RCs occur prenominally. In these languages, the Linear Distance Hypothesis therefore makes an opposite prediction from English. As illustrated in the examples below, the distance between the head and the gap is actually shorter in the TRC in (178) compared to the ARC in (177).

(177) [ _ onnanoko-o oikake-tei-ru ] otokonoko  ARC
      girl-ACC chase-PROG-NPST boy
‘the girl [that _ is pushing the boy]’

(178) [ onnanoko-ga _ oikake-tei-ru ] otokonoko  TRC
      girl-NOM chase-PROG-NPST boy
‘the girl [that the boy is pushing _]’

The Canonical Word Order Hypothesis makes different predictions for Mandarin Chinese, whose word order is SVO, and Japanese, whose word order is SOV. For the purpose of this chapter, I will only look at Japanese. In Japanese, neither ARCs nor TRCs follow canonical SOV word order. Consider the example of ARC in (179), which has OVS word order, and the TRC in (180), which has SVO word order.
Because neither word order is canonical, this hypothesis makes no specific prediction in Japanese.

The Structural Distance Hypothesis makes the same prediction for Japanese as it does for English. As illustrated in (181) and (182), the gap is more deeply embedded in the TRC compared to the ARC, predicting that TRCs should be more difficult in these languages.

The Frequency Hypothesis claims frequent forms are easier to acquire. However, Ozeki and Shirai (2007) showed that different types of relative clauses appear in Japanese caretaker speech
from early on, and at similar frequency. Therefore, this hypothesis does not predict any
difference between ARCs and TRCs in Japanese.

The Semantic Prominence Hypothesis also predicts an ARC advantage in these languages
because the head noun modified by an ARC is an agent, which is more prominent than the theme
head noun modified by a TRC.

\[(183) \quad [\_ \text{onnanoko-o} \text{oikake-tein-ru}] \text{otokonoko} \quad ARC\]
\[
\begin{align*}
girl-\text{ACC} & \quad \text{chase-PROG-NPST} & \quad \text{boy} \\
\end{align*}
\]
‘the girl [that \_ is chasing the boy]’ ↑
agent ... more prominent

\[(184) \quad [\text{onnanoko-ga} \_ \text{oikake-tein-ru}] \text{otokonoko} \quad TRC\]
\[
\begin{align*}
girl-\text{NOM} & \quad \text{chase-PROG-NPST} & \quad \text{boy} \\
\end{align*}
\]
‘the girl [that the boy is chasing \_]’ ↑
theme ... less prominent

Table 48 summarizes the predictions made by each hypothesis for English and Japanese RCs.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear distance</td>
<td>ARC advantage</td>
<td>TRC advantage</td>
</tr>
<tr>
<td>Canonical Word Order</td>
<td>ARC advantage</td>
<td>No difference</td>
</tr>
<tr>
<td>Structural distance</td>
<td>ARC advantage</td>
<td>ARC advantage</td>
</tr>
<tr>
<td>Frequency</td>
<td>ARC advantage</td>
<td>No difference</td>
</tr>
<tr>
<td>Semantic prominence</td>
<td>ARC advantage</td>
<td>ARC advantage</td>
</tr>
</tbody>
</table>

While many studies report an ARC advantage in English (e.g. Diessel & Tomasello, 2000; King
& Just, 1991; Zukowski, 2009), the picture is less clear in Japanese. Many studies have found an
ARC advantage (Ishizuka, 2005; Kawashima, 1980; Miyamoto & Nakamura, 2003), but some
report the lack of any asymmetry at all (Ozeki & Shirai, 2007) or even a TRC advantage (Hakuta,
1981). However, even if we assume an ARC advantage for Japanese (and other languages with
postnominal RCs), it is still not sufficient for us to choose between the Structural Distance
Hypothesis and the Semantic Prominence Hypothesis.
In order to investigate this matter further, this dissertation made use of data from Tagalog. For this purpose, I conducted one experiment on the production of declarative clauses and three experiments on the production and comprehension of RCs. All three RC experiments showed an ARC advantage for at least one measure. Table 49 summarizes the results from all three RC experiments.

**Table 49. Summary of results of all four experiments**

<table>
<thead>
<tr>
<th></th>
<th>Reversible</th>
<th>Non-reversible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>Child accuracy: ARC advantage</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Adult accuracy: No difference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adult RT: No difference</td>
<td></td>
</tr>
<tr>
<td>Imitation</td>
<td>Child accuracy: ARC advantage</td>
<td>Child accuracy: ARC advantage</td>
</tr>
<tr>
<td>Production</td>
<td>Child accuracy: No difference</td>
<td>Adult accuracy: ARC advantage</td>
</tr>
<tr>
<td></td>
<td>Adult accuracy: No difference</td>
<td>Adult RT: ARC advantage</td>
</tr>
<tr>
<td></td>
<td>Adult RT: ARC advantage</td>
<td></td>
</tr>
</tbody>
</table>

In the comprehension task, which tested RCs denoting reversible events in which the agent and theme are both animate, children showed an ARC advantage for accuracy. In the imitation task, children showed ARC advantage for accuracy regardless of the animacy of the theme argument (i.e., regardless of reversibility). In the production task, reaction times from adults showed an ARC advantage in both animacy conditions. In addition, both adults and children manifested an ARC advantage in accuracy in the non-reversible condition. With these results in mind, let us turn to the four hypotheses about the RC asymmetry.

The canonical word order in Tagalog is either Verb-Agent-Theme or Verb … PSA-final (i.e., Verb-Theme-Agent for AF and Verb-Agent-Theme for TF). Thus, while researchers agree that Verb-Agent-Theme is the canonical word order for TF, there is no consensus about the canonical word order for AF. It is also possible that there are two unmarked word order in AF, as Kroeger (1993) suggested. There is strong supportive evidence from previous studies (Bautista, 1983; Garcia et al., 2015) as well as from the results of the experiments in this dissertation that Verb-Agent-Theme word order is the preferred word order for children. However, this preference need not translate directly to a default word order for the language, and as long as the two word order patterns are interchangeable, it is hard to determine what the canonical word order in Tagalog is and thus hard to generate predictions for hypotheses about the development of RCs that are
based on word order. If we assume Tagalog word order is Verb-Agent-Theme, then, the Linear Distance Hypothesis predicts that ARCs (185) should be easier than TRCs (186), which is compatible with the results from my three RC experiments.

(185) lalake=ŋ [h<um>a~habol _ naŋ babae ]  
man= L  <AF>IPV~chase NFOC woman
‘the man that is chasing a/the woman’

(186) lalake=ŋ [h<in>a~habol naŋ babae _ ]  
man= L  <TF>IPV~chase NFOC woman
‘the man that a/the woman is chasing’

On other hand, if we assume the default word order is predicate-initial and PSA-final (Bowen, 1965), the Linear Distance Hypothesis predicts no differences between ARCs and TRCs.

(187) lalake=ŋ [h<um>a~habol naŋ babae _ ]  
man= L  <AF>IPV~chase NFOC girl
‘the man that is chasing a/the woman’

(188) lalake=ŋ [h<in>a~habol naŋ babae _ ]  
woman= L  <TF>IPV~chase NFOC girl
‘the man that a/the woman is chasing’

The Canonical Word Order Hypothesis predicts that non-canonical word order contributes to the difficulty of a relative clause. Although it may be unclear what the canonical word order is, the default order for the language is uncontroversially predicate-initial. This is significantly different from the order NP V NP, which characterizes both ARCs (189) and TRCs (190) in Tagalog.

(189) lalake=ŋ [h<um>a~habol _ naŋ babae ]  
man= L  <AF>IPV~chase NFOC girl
‘the man that is chasing a/the woman’
Although non-canonical, PSA-initial word order is possible in Tagalog, Cooreman et al. (1984) reported that AF sentences with Agent-Verb-Theme word order (11%) are about as frequent as TF sentences with Theme-Verb-Agent word order (17%). The results from Segalowitz and Galang (1978) also suggest that children understand PSA-initial AF sentences and PSA-initial TF sentences equally well. The Canonical Word Order Hypothesis therefore predicts no difference between ARCs and TRCs in Tagalog.

The Structural Distance Hypothesis also predicts no difference between ARCs and TRCs in Tagalog. Although there are different syntactic analyses of Tagalog, the PSA is commonly taken to be in the same position for both AF and TF—usually the highest specifier position. When the RCs are formed, the position of the gap is wherever the PSA is, so the depth of the gap is essentially the same for ARCs and TRCs.

The Semantic Prominence Hypothesis states that RCs are easier to process when the head refers to a prominent entity. Assuming that agents are more prominent than themes, this hypothesis predicts that Tagalog ARCs are easier than TRCs.

\[\begin{array}{c}
T \\
V \\
A
\end{array}\]

(190) lalake=ŋ [h<in>a-habol naŋ lalake _ ] \( TRC \)
man=Ł <TF>IPV-chase NFOC boy
‘the man that a/the woman is chasing’

The different behavior of participants on reversible and non-reversible RCs also gives us an insight into the prominence effect. In the production task, both adults and children showed a difference in accuracy between ARCs and TRCs only in the non-reversible condition. Moreover, both adults and children produced head + reversal errors quite frequently. In the non-reversible
condition, the heads of ARCs received a boost from both animacy and thematic roles. However, TRCs were the exact opposite—the head was less prominent both in terms of animacy and thematic roles.

![Diagram]

(118) lalake=ŋ [s<um>i~sipa _ naŋ bola] ARC
man=L <AF>IPV~kick NFOC ball
‘the man that is kicking a/the ball’

(119) bola=ŋ [s<in>i~sipa naŋ lalake _] TRC
ball=L <TF>IPV~kick NFOC man
‘the ball that a/the man is chasing’

This is particularly interesting as previous studies suggested that the TRC disadvantage disappears when the head is inanimate (Kidd et al., 2007; Mak et al., 2002). Thus, (120a) is no easier than (120b) for children learning English, as well as for adults.

(120) a. the man [that _ read the book]
    b. the book [that the man read _]

It is possible that language-specific factors are involved here. This matter clearly needs further attention.

Table 50 presents the predictions of all four hypotheses for three languages. Although looking at each language is not sufficient to select from these hypotheses, a cross-linguistic comparison enables us to see which hypothesis is the most compatible with the findings from the different languages.
Table 50. Summary of predictions on English, Japanese, and Tagalog RCs.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>English</th>
<th>Japanese</th>
<th>Tagalog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear distance</td>
<td>ARC advantage</td>
<td>TRC advantage</td>
<td>No prediction</td>
</tr>
<tr>
<td>Canonical Word Order</td>
<td>ARC advantage</td>
<td>No difference</td>
<td>No difference</td>
</tr>
<tr>
<td>Structural distance</td>
<td>ARC advantage</td>
<td>ARC advantage</td>
<td>No difference</td>
</tr>
<tr>
<td>Frequency</td>
<td>ARC advantage</td>
<td>No difference</td>
<td>TRC advantage or no difference</td>
</tr>
<tr>
<td>Semantic prominence</td>
<td>ARC advantage</td>
<td>ARC advantage</td>
<td>ARC advantage</td>
</tr>
</tbody>
</table>

As can be seen here, the only hypothesis of the four that predicts an ARC advantage in all three languages is the Semantic Prominence Hypothesis.

6.2 Implication of the findings

This dissertation is the first-ever study of the production, imitation, and comprehension of RCs by Tagalog-speaking children and adults. The overall results pointed to an ARC advantage in accordance with the predictions of the Semantic Prominence Hypothesis.

6.2.1 Experimental work in a fieldwork setting

I would like to address some of the problems specific to this type of research, mainly in regards to (1) the experimental setting and (2) the participants’ language experience. First, although the ideal setting for experimental work is a carefully controlled environment—a quiet room with necessary equipment where participants can work alone without distraction—this creates a challenge for field psycholinguistics. Although I tried to look for a place that is relatively quiet, it was impossible to avoid noises and other kinds of distractions, unlike in a laboratory designed for linguistic experiments. Second, because English is one of the official languages of the Philippines and is used commonly throughout society, all the participants had some exposure to English at home, school, and elsewhere, and some of them were quite proficient bilinguals. Although a language history survey confirmed the participants’ dominance in Tagalog, the possibility of influence from English remains strong and it is nearly impossible to find monolingual speakers of Tagalog in the Philippines. Although monolingual participants are usually thought as the ideal population for this type of research, this is not realistic in some cases.
However, these problems should not discourage researchers from doing experimental work in field research settings. To the contrary, such research should be encouraged so that we can develop new methodologies, as Clemens et al. (2014) suggested. Because research in psycholinguistics and acquisition generally lacks variety in languages and populations (Anand, Chung, & Wagers, 2011), an increase in field-based experimental work will contribute to the cross-linguistic diversity of psycholinguistic and acquisition studies. However, as Clemens et al. (2014) note, we should always be aware of the problem of irregularities and inconsistencies in the data, and, for this reason, collect data from as large a pool as possible. This suggestion applies to the current study as well. Although I was able to conduct some statistical tests on my relatively small sample, it would obviously more desirable to have a larger sample size for the reasons just noted.

6.3 Concluding remarks
This dissertation investigated whether an ARC advantage can be found in production and comprehension of Tagalog RCs by adults and children. The purpose of the dissertation was to study a language that has not been previously investigated in the literature on the acquisition and processing of RCs, and to use some of its unique properties to provide potential insights into why an ARC advantage is so widely observed. The findings from this dissertation found an ARC advantage in Tagalog for comprehension, imitation, and production. These results, combined with what has been found previously for other languages, suggest that semantic prominence is a key and universal determinant of processing difficulty in RCs, and that it can explain the ARC advantage manifested in different languages, including Tagalog.

6.4 Remaining issues and future directions
One of the issues identified in this study was the lack of asymmetry in adults’ RC comprehension. While the production data from adults showed differences between ARCs and TRCs, the comprehension task showed no difference either in accuracy or in reaction times. It is possible that this was a ceiling effect and the tasks were not sensitive enough to uncover a difference. In future research, it will be necessary to explore other experimental techniques, such as self-paced reading and eye-tracking, to measure the production and comprehension of Tagalog RCs by adults.
Another issue calling for further study was the low accuracy in children’s RC production. One way to address this matter would be to include older children in future research. It would also be beneficial to have a wider age range in the participant population in general, as it makes it easier to see the developmental trajectory of RCs.

Lastly, RC patterns other than ARCs and TRCs should be investigated in future research. As discussed in §1.2.2, Tagalog has multiple focus patterns that encode thematic roles in a significantly different way from languages without a focus system. It would be extremely interesting to investigate how these focus patterns are utilized in different types or RCs, such as goal, instrumental and locative RCs.
### Appendix I List of child participants’ age, sex, and the tasks in which they participated

<table>
<thead>
<tr>
<th>PN</th>
<th>Age</th>
<th>Sex</th>
<th>Experiment 1</th>
<th>Experiment 2</th>
<th>Experiment 3</th>
<th>Experiment 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC01</td>
<td>5;9</td>
<td>F</td>
<td>Participated</td>
<td>Participated</td>
<td></td>
<td></td>
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<tr>
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<td>Participated</td>
<td>Participated</td>
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<td>F</td>
<td>Participated</td>
<td>Participated</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>F</td>
<td>Participated</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td>Participated but did not complete</td>
</tr>
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<td>M</td>
<td>Participated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC08</td>
<td>5;9</td>
<td>M</td>
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<td></td>
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<tr>
<td>BC09</td>
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<td>Participated</td>
<td></td>
<td></td>
<td>Participated</td>
</tr>
<tr>
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<td>F</td>
<td>Participated</td>
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<td>Participated</td>
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</tr>
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<tr>
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<td>Participated</td>
<td>Participated</td>
</tr>
<tr>
<td>QC01</td>
<td>4;4</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>QC02</td>
<td>5;3</td>
<td>F</td>
<td>Participated</td>
<td>Participated</td>
<td>Participated</td>
<td>Old one</td>
</tr>
<tr>
<td>QC03</td>
<td>5;4</td>
<td>M</td>
<td>Participated</td>
<td>Participated</td>
<td></td>
<td>Participated but did not complete</td>
</tr>
<tr>
<td>QC04</td>
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<td>M</td>
<td>Participated</td>
<td>Participated</td>
<td></td>
<td>Participated</td>
</tr>
<tr>
<td>QC05</td>
<td>5;8</td>
<td>F</td>
<td>Participated</td>
<td>Participated</td>
<td>Participated</td>
<td>Old one</td>
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<tr>
<td>QC06</td>
<td>5;1</td>
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<td>Participated</td>
<td>Participated</td>
<td>Participated</td>
<td>Participated but did not complete</td>
</tr>
<tr>
<td>QC07</td>
<td>5;5</td>
<td>M</td>
<td>Participated</td>
<td>Participated</td>
<td>Participated</td>
<td>Participated</td>
</tr>
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## Appendix II List of stimuli for Experiment 1

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<td>2</td>
<td><img src="image3" alt="Context Picture 2" /></td>
<td><img src="image4" alt="Target Picture 2" /></td>
</tr>
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<td>3</td>
<td><img src="image5" alt="Context Picture 3" /></td>
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<td><img src="image2" alt="Cutting Bananas" /></td>
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<td>9</td>
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<td><img src="image4" alt="Girl with Flower" /></td>
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<td>10</td>
<td><img src="image5" alt="Boy" /></td>
<td><img src="image6" alt="Boy with Ice Cream" /></td>
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### Appendix III List of stimuli for Experiment 2

<table>
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<tr>
<th></th>
<th>Practice items</th>
<th>Prompts</th>
</tr>
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</table>
| P1 | babae=ŋ p<um>i~pitas naŋ kamatis
woman=L <AF>IPFV~pick NFOC tomato
‘the girl that is picking the tomato’ | |
| P2 | bulaklak na p<in>i~pitas naŋ lalake
flower L <TF>IPFV~pick NFOC man
‘the flower that the boy is picking’ | |
| P3 | babae=ŋ s<um>i~sipa naŋ bola
woman=L <AF>IPFV~kick NFOC ball
‘the girl that is kicking the ball’ | |
| P4 | bola=ŋ s<in>i~sipa naŋ babae
ball=L <TF>IPFV~kick NFOC woman
‘the ball that the girl is kicking’ | |
<table>
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<tr>
<th>Test items</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>![Image](99x561 to 290x705)</td>
<td>lalake=ŋ [b&lt;um&gt;u<del>buhat naŋbabae _] man=L &lt;AF&gt;IFV</del>carry NFOC girl ‘the man that is carrying a/the woman’</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>![Image](99x417 to 290x561)</td>
<td>babae=ŋ [b&lt;in&gt;u<del>buhat naŋlalake _] woman=L &lt;PF&gt;IFV</del>carry NFOC boy ‘the woman that the man is carrying’</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>![Image](99x272 to 290x416)</td>
<td>lalake=ŋ [h&lt;um&gt;a<del>habol naŋbabae _] man=L &lt;AF&gt;IFV</del>chase NFOC girl ‘the man that is chasing a/the woman’</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>![Image](99x128 to 290x272)</td>
<td>babae=ŋ [h&lt;in&gt;a<del>habolnaŋlalake _] woman=L &lt;PF&gt;IFV</del>chase NFOC boy ‘the woman that the man is chasing’</td>
</tr>
</tbody>
</table>
5. man = L  <AF> IFV~hug  NFOC girl
   ‘the man that is hugging a/the woman’

6. woman = L  <PF> IFV~hug  NFOC boy
   ‘the woman that the man is hugging’

7. man = L  <AF> IFV~push  NFOC girl
   ‘the man that is pushing a/the woman’

8. woman = L  <PF> IFV~push  NFOC boy
   ‘the woman that the man is pushing’
9  lalake=ŋ [nag-ba~basa naŋ babaŋ _ ]
man=L <AF>IFV~wet NFOC girl
‘the man that is splashing a/the woman’

10  babaŋ=ŋ [b<in>a~basa naŋ lalake _ ]
woman=L <PF>IFV~wet NFOC boy
‘the woman that the man is splashing’
Appendix IV List of stimuli for Experiment 3

Practice items

1. bata=ŋ maliit
   child=LK small
   ‘a small child’

2. ibo=ŋ malake
   bird=LK big
   ‘a big bird’

3. kotse=ŋ malake
   car=LK big
   ‘a big car’

Test items

1. doktor na nag-ha~hanap naŋ titser
   doctor LK AF-IPFV~search NFOC teacher
   ‘the doctor that is looking for the teacher’

2. artista=ŋ h<in>a~hanap naŋ titser
   artist=LK <TF>IPFV~search NFOC teacher
   ‘the actor that is looking for the teacher’

3. artista=ŋ t<um>a~tawag naŋ doktor
   actor=LK <AF>IPFV~call NFOC teacher
   ‘the doctor that is calling the teacher’

4. doktor na t<in>a~tawag naŋ artista
   doctor LK <TF>IPFV~call NFOC actor
   ‘the doctor that the actor is calling’

5. doktor na k<um>u~kurot naŋ artista
   doctor LK <AF>IPFV~pinch NFOC actor
   ‘the doctor that is pinching the actor’

6. titser na k<in>u~kurot naŋ doktor
   teacher LK <TF>IPFV~pinch NFOC doctor
   ‘the teacher that the doctor is pinching’

7. doktor na nang-hu~huli naŋ titser
   doctor LK AF-IPFV~catch NFOC teacher
   ‘the doctor that is catching the teacher’
8. artista=ŋ  h<in>u–huli  naŋ  doctor
actor=LK  <TF>IPFV~catch  NFOC  doctor
‘the actor that is catching the doctor’

9. titser na nang-hi–hila  naŋ  artista
teacher LK  AF-IPFV~pull  NFOC  actor
‘the teacher that is pulling the actor’

10. titser na  h<in>i–hila  naŋ  artista
teacher LK  <TF>IPFV~pull  NFOC  actor
‘the teacher that the actor is pulling’
11. doktor na um-i-inom naŋ gatas
docotor LK <AF>IPFV~drink NFOC milk
‘the doctor that is drinking the milk’

12. dyus na in-i-inom naŋ doktor
juice LK <TF>IPFV~drink NFOC doctor
‘the juice that the doctor is drinking’

13. titser na nag-su~sulat naŋ libro
teacher LK AF-IPFV~write NFOC book
‘the teacher that is writing the book’

14. libro=ŋ s<in>u~sulat naŋ artista
book=LK <TF>IPFV~write NFOC actor
‘the book that the actor is writing’

15. titser na nag-ti~tinda naŋ kotse
teacher LK AF-IPFV~sell NFOC car
‘the teacher that is selling the car’

16. kendi=ŋ t<in>i~tinda naŋ doktor
candy=LK <TF>IPFV~sell NFOC doctor
‘the candy that the doctor is selling’

17. doktor na nag-lu~luto naŋ adobo
docotor LK AF-IPFV~cook NFOC adobo
‘the doctor that is cooking the adobo’

18. lugaw na ni-lu~luto naŋ titser
porridge LK TF-IPFV~cook NFOC teacher
‘the porridge that the teacher is cooking’

19. titser na nag-li~linis naŋ sahig
teacher LK AF-IPFV~clean NFOC floor
‘the teacher that is cleaning the floor’

20. mesa=ŋ ni-li~linis naŋ doktor
desk=LK TF-IPFV~clean NFOC doctor
‘the desk that the doctor is cleaning’
## Appendix IV List of stimuli for Experiment 4

| Practice | | |
|----------|-----------------|
| **P1**  | One cat is small. Another cat is big. Who is the arrow pointing at? |
| ![Image](image1.png) | ![Image](image2.png) |
| **P2**  | One man is short. Another man is tall. Who is the arrow pointing at? |
| ![Image](image3.png) | ![Image](image4.png) |
| **P3**  | One house is big. Another house is small. Which is the arrow pointing at? |
| ![Image](image5.png) | ![Image](image6.png) |

<p>| Animate-Agent RCs | | |
|-------------------|-----------------|
| <strong>AA1</strong> | A boy is carrying a monkey. Another boy is carrying a girl. Who is the arrow pointing at? |
| <img src="image7.png" alt="Image" /> | <img src="image8.png" alt="Image" /> |
| <strong>AA2</strong> | A girl is chasing a monkey. Another girl is chasing a boy. Who is the arrow pointing at? |
| <img src="image9.png" alt="Image" /> | <img src="image10.png" alt="Image" /> |</p>
<table>
<thead>
<tr>
<th>AA3</th>
<th>A boy is hugging a monkey. Another boy is hugging a girl. Who is the arrow pointing at?</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA4</td>
<td>A boy is pushing a girl. Another boy is pushing a monkey. Who is the arrow pointing at?</td>
</tr>
<tr>
<td>AA5</td>
<td>A girl is splashing a boy. Another girl is splashing a monkey. Who is the arrow pointing at?</td>
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**Animate-Patient RCs**

<table>
<thead>
<tr>
<th>AP1</th>
<th>A boy is carrying a girl. A monkey is carrying another girl. Who is the arrow pointing at?</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP2</td>
<td>A monkey is chasing a boy. A girl is chasing another boy. Who is the arrow pointing at?</td>
</tr>
<tr>
<td>AP3</td>
<td>A boy is hugging a girl. A monkey is carrying another girl. Who is the arrow pointing at?</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>AP4</td>
<td>A monkey is pushing a girl. A boy is pushing another girl. Who is the arrow pointing at?</td>
</tr>
<tr>
<td>AP5</td>
<td>A girl is splashing a boy. A monkey is splashing another boy. Who is the arrow pointing at?</td>
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**Inanimate-Agent RCs**

<table>
<thead>
<tr>
<th>IA1</th>
<th>A boy is cutting a banana tree. Another boy is cutting a coconut tree. Who is the arrow pointing at?</th>
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<tbody>
<tr>
<td>IA2</td>
<td>A boy is eating a pizza. Another boy is eating an ice cream. Who is the arrow pointing at?</td>
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<tr>
<td>IA3</td>
<td>A boy is kicking a ball. Another boy is kicking a can. Who is the arrow pointing at?</td>
</tr>
<tr>
<td>IA4</td>
<td>A girl is reading a book. Another girl is reading a paper. Who is the arrow pointing at?</td>
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<tr>
<td>IA5</td>
<td>A girl is picking a flower. Another girl is picking a tomato. Who is the arrow pointing at?</td>
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<td>Inanimate-Patient RCs</td>
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<tr>
<td>IP1</td>
<td>A girl is cutting a coconut tree. A boy is kicking another coconut tree. Which is the arrow pointing at?</td>
</tr>
<tr>
<td>IP2</td>
<td>A boy is eating an ice cream. A girl is eating another ice cream. Which is the arrow pointing at?</td>
</tr>
<tr>
<td>IP3</td>
<td>A girl is kicking a ball. A boy is kicking another ball. Which is the arrow pointing at?</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------------------</td>
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<tr>
<td>IP4</td>
<td>A boy is picking a flower. A girl is picking another flower. Which is the arrow pointing at?</td>
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<tr>
<td>IP5</td>
<td>A boy is reading a book. A girl is reading another book. Which is the arrow pointing at?</td>
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Appendix VI Children’s performance across all the tasks

Nine children (6 female, 3 male, age 4;11-5;9, M = 4;7) participated in all four experiments.

Table 51. Children’s performance across tasks (reversible)

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<thead>
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<th>AF</th>
<th>TF</th>
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<th>Experiment 2 RC Comprehension</th>
<th>Experiment 3 RC Imitation</th>
<th>Experiment 4 RC Production</th>
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<td>5</td>
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Table 52. Children’s performance across tasks (non-reversible)

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<th>Experiment 3 RC Imitation</th>
<th>Experiment 4 RC Production</th>
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<td>4</td>
<td>4</td>
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<td>3</td>
<td>4</td>
<td>2</td>
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<tr>
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<td>M</td>
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<td>4</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
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<td>M</td>
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<td>0</td>
<td>4</td>
<td>3</td>
<td>1</td>
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<td>4</td>
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<td>4</td>
<td>1</td>
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References


Diachrony, Acquisition, Neuro-cognition, Evolution (pp. 251–276). Amsterdam: John Benjamins.


