ASYMMETRIES IN THE PRODUCTION OF RELATIVE CLAUSES:
FIRST AND SECOND LANGUAGE ACQUISITION

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ABSTRACT
This study examines the factors relevant to RC production in English and Korean. I have
focused on three different pairs of RCs for comparison — (i) subject and indirect object
RCs, (ii) direct object and oblique RCs, and (iii) oblique RCs with short FGDs and those
with long FGDs by English-speaking children, adults, and Korean learners of English, as
exemplified in (1), (2), and (3).

(1) a. Subject RC:
the boy [that _ is giving a bag to a girl]
   
b. Indirect object RC:
the boy [that a girl is giving a bag to _]

(2) a. Direct object RC:
the book [that a boy is putting _ on a box]
   
b. Oblique RC:
the book [that the boy is putting a box on _]

(3) a. Oblique RC-a short FGD
the car [that the boy is walking from _ to a car]
   
b. Oblique RC-a long FGD
the church [that the boy is walking from a car to _]

The results from experiments on L1 English reveal that English-speaking children
have more difficulty producing indirect objects than subject RCs, more difficulty
producing oblique RCs than direct object RCs, and more difficult producing oblique RCs
with long FGDs than oblique RCs with short FGDs. The results from experiments on L2
English show the same asymmetries. For the English data, linear distance effects tend to
be confounded with both the structural distance effects and prominence effects because
the three hypotheses explain asymmetries in the same way.
In contrast, Korean, a language in which RCs precede the noun they modify, allows us to resolve this problem. The structure of RCs is such that a structurally less distant subject gap is linearly more distant from the head, whereas a linearly closer indirect object gap is structurally more distant.

Genuine asymmetries manifested in L1 English, L2 English and L1 Korean are attributed to the topic worthiness of the head, which is highest for subjects and next highest for direct objects. This is discussed in the framework of O’Grady’s (2011) Difficulty Principle, which accounts for the relationship between processing difficulty and developmental path.
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<th>Description</th>
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<td>ACC</td>
<td>Accusative case particle</td>
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<tr>
<td>ASP</td>
<td>Aspect</td>
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<tr>
<td>CL</td>
<td>Classifier</td>
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<tr>
<td>COMP</td>
<td>Complementizer suffix</td>
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<tr>
<td>DAT</td>
<td>Dative case</td>
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<tr>
<td>DECL</td>
<td>Declarative sentence-type suffix</td>
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<tr>
<td>GEN</td>
<td>Genitive particle</td>
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<tr>
<td>NOM</td>
<td>Nominative case particle</td>
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<tr>
<td>NML</td>
<td>Nominalizer</td>
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<tr>
<td>PASS</td>
<td>Passive voice</td>
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<tr>
<td>PL</td>
<td>Plural suffix or particle</td>
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<tr>
<td>PST</td>
<td>Past tense suffix</td>
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<tr>
<td>PROG</td>
<td>Progressive</td>
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<tr>
<td>RL</td>
<td>Relativizer suffix</td>
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<td>REG</td>
<td>Register</td>
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CHAPTER 1
INTRODUCTION

This dissertation examines the acquisition of relative clauses (RCs) in English and Korean, by focusing on asymmetries in the ability of children and adults to produce structures of this type in an experimental setting. In this introductory Chapter, I provide background information on English RCs in general, and I discuss problematic issues identified in previous research. In Chapter 2, I explore the production of RCs by English-speaking children and adults. In Chapter 3, I test Korean-speaking children and adults with RC production data in order to estimate the difficulty associated with producing and processing RCs. In Chapter 4, I explore the production of English RCs by second language learners whose first language is Korean. Finally, Chapter 5 considers several issues that pertain to the findings of previous studies and I seek to interpret those findings from a processing perspective (O’Grady, 2011).

1.1 Relative clauses (RCs)

Relative clauses (RCs) have long been of interest to researchers because of the particular pattern of filler-gap dependencies that they contain. Consider the following subject and object RCs in English exemplified in (1).

(1) a. Subject RC: the musician [that __ saw the director]
   \[\underline{\text{Filler}} \quad \underline{\text{Gap}}\]

   b. Direct object RC: the musician [that the director saw __]
   \[\underline{\text{Filler}} \quad \underline{\text{Gap}}\]

In patterns such as these, the head NP (underlined) is the ‘filler’, while the gap (marked by ‘__’) corresponds to the relativized position within the RC. Fillers and gaps are dependent on each other; the filler’s semantic and grammatical role within the RC is
determined by the position of the gap, while the interpretation of the gap is determined by the filler (Fodor, 1989; Hawkins, 1999).

O’Grady (2011) suggests that RCs have three notable properties. First, they have the internal structure of a clause (i.e., a subject and a VP) and typically denote an event (e.g., pushing) as in (2).

(2) the boy [s that the girl is pushing _]

Second, some component of that event is ‘under-represented’ or unexpressed within the RC. For example, in (2), the direct object of *push* is unexpressed. Third, that under-represented element picks up its interpretation from the nominal the RC is associated with, and it is called ‘head noun’ (e.g., *boy* in example (2)).

Cross-linguistic research has documented systematic constraints on the type of RCs that are permitted in a particular language. Based on data from approximately 50 languages, Keenan and Comrie (1977) offer a highly successful generalization that summarizes these constraints in the form of a relational hierarchy: subject (S) > direct object (DO) > indirect object (IO) > oblique (OBL) > possessor (GEN) > object of comparison (OCOMP). The key observation is that in a given language if a lower position in the hierarchy permits relativization involving a gap, then so must all higher positions.

A major drawback of previous studies of RC production in children is that none was designed specifically to investigate children’s ability to produce RCs other than subject RCs and direct object RCs. The main focus in previous studies is the performance of adults and children on this restricted set of English RCs (i.e., subject and direct object RCs) to test whether one type is more easily processed than the other. The series of
experiments that make up my dissertation was designed to test the hypothesis that mastery of RCs correlates with the position of the RC type in Keenan and Comrie’s noun phrase accessibility hierarchy (NPAH). In particular, the study focuses on monolingual English-speaking children’s ability to produce relativization patterns involving lower positions in the hierarchy (especially indirect object and oblique RCs).¹

1.2 Acquisition of English RCs

Asymmetries in the acquisition of subject RCs and direct object RCs have been observed among child speakers of a variety of languages in experiments using a variety of comprehension and production measures. It has been consistently found that in languages with postnominal RCs, such as English, where the head noun precedes the RC, children have more difficulty with direct object RCs like (3b) than with subject RCs like (3a) (De Villiers et al., 1979; Diessel & Tomasello, 2000, 2005; Goodluck & Stojanovic, 1996; Goodluck & Tavakolian, 1982; Hamburger & Crain, 1982; McKee & McDaniel, 2001; Tavakolian, 1981; Zukowski, 2009).

(3) a. Subject RC: the man [that _ sees the woman]
b. Direct object RC: the man [that the woman sees _]

It is well known in production tasks that English adult speakers are more reluctant to provide direct object RCs than subject RCs and that they often convert targeted direct object RCs into subject RCs with the help of passivization, as shown in (4) (Gennari & MacDonald, 2012; Montag & MacDonald, 2009).

¹ To my knowledge, this is the first time that RCs of this type have been examined in a study involving elicited production. However, they have been examined by Keenan and Hawkins (1987) and by Diessel and Tomasello (2005) using a less demanding imitation task.
What motivates this asymmetry? One hypothesis is that in many cases, speakers make structural choices that make the planning and production process easier (Gennari & MacDonald, 2012; Montag & MacDonald, 2009). A speaker can express the same idea with different sentence structures, as with active or passive sentences. Similar options are available in the production of RCs, where they appear to encourage the production of particular patterns over others (Gennari & MacDonald, 2009, 2012; Montag & MacDonald, 2009).

Previous studies that used elicited production tasks with young English-speaking children also consistently report that the children produced subject RCs more accurately than other types of RCs (McKee & McDaniel, 2001; Zukowski, 2009). Some children in these studies opted to use a passive subject RC (e.g., the one who’s being kissed) when the item was designed to elicit an object RC (e.g., the one who the boy is kissing). Are there other asymmetries of this type? If so, what do they tell us about possible differences in processing difficulty? What causes the familiar asymmetry in the difficulty of acquiring and processing different types of RCs?

1.3 Three hypotheses and their predictions

The difficulty of various RC types for young native speakers (Diessel & Tomasello, 2005; Keenan & Hawkins, 1987) and L2 learners (Eckman et al., 1988; Gass, 1979) seems to parallel the implicational relationships in Keenan and Comrie’s NPAH, which focuses on a hierarchy of grammatical relations concerning RCs in terms of language typology. In order to account for the effect of the hierarchy on processing difficulty,
several hypotheses have been suggested. However, most of them, such as the conjoined-clause (Tavakolian, 1981), parallel function (Sheldon, 1974), and perceptual difficulty hypotheses, attempt to explain the difficulty of RCs embedded in a matrix clause (e.g., *the cow [that hit the pig] kissed the sheep*), which is not within the scope of the current research. This section describes what are arguably the three most widely proposed hypotheses about asymmetries in the difficulty of different RC types: the linear distance hypothesis, the structural distance hypothesis, and the semantic prominence hypothesis.

### 1.3.1 The linear distance hypothesis

According to Gibson’s dependency locality theory (2000), the human processor has to keep a filler (a head noun, in the case of an RC) in working memory until it encounters a gap where the filler can be integrated into the clause. The filler-gap linear distance hypothesis proposes (e.g., Hawkins, 1999; Tarallo & Myhill, 1983) that the greater the linear distance between the gap and the filler, the more processing resources are needed and hence the more difficult the sentence is to process. The distance between the filler and the gap is measured in terms of the number of referential elements—elements introducing new discourse referents—intervening between them. The hypothesis predicts that in languages with postnominal RCs, subject RCs will be easier to process than direct object RCs. This is because the linear distance between the filler and the gap is shorter in subject RCs than in direct object RCs, as shown in (5).

\[(5)\]
\[
\begin{align*}
\text{a. Subject RC: the man [that } & \text{sees the woman]} \\
& \quad 0 \\
\text{b. Direct object RC: the man [that the woman sees ]} & \quad 1 \quad 2
\end{align*}
\]
In (5a), no referential elements intervene between the filler (the man) and the gap in the subject RC, but in (5b) two referential elements (the woman, sees) intervene between the filler (the man) and the gap in the direct object RC.

1.3.2 The structural distance hypothesis

The structural distance hypothesis (Cho, 1999; O’Grady et al., 2001, 2003; Wolfe-Quintero, 1992) attributes difficulty with different types of RCs to the position of the gap in the hierarchical structure. O’Grady (1997, p. 179) suggests that structures with gaps that are more deeply embedded inside the structure are more complex and are thus harder for children. A structure’s complexity increases with the number of XP categories (S, XP, etc.) between a gap and the element with which it is associated. This hypothesis suggests that the structural distance between the head noun and the gap determines the processing load of RCs: the shorter the structural distance, the easier the processing of the RC. Thus, the subject RC in (6a) will be easier than the direct object RC in (6b) because two nodes intervene between the filler and the gap in direct object RCs compared to just one in subject RCs.²

² Some work (e.g., Collins, 1994) counts X’ projections as well as XP projections, but this difference is not addressed here. The syntactic structures used in this dissertation are those employed in Constructive Lexical Functional Grammar (Culicover & Jackendoff, 2005; Dalrymple, 2001; Kaplan & Zaenen, 1995). Culicover and Jackendoff (2006; p. 415) suggest that Simpler Syntax (SS) offers a strong connection between linguistic theory and experimental research on language perception and production. SS is enough to establish a clear relation between knowledge of language and use of that knowledge, and thus more complicated syntactic representations (i.e., a mainstream analysis) are unnecessary.
1.3.3 Semantic prominence hypothesis

Building on work by Givón (1988, p. 138), Hsu et al. (2009), Kuno (1976), MacWhinney (2005), MacWhinney & Bates (1978), Mak et al. (2002, 2006), and Song and Fisher (2007), the semantic prominence hypothesis (O’Grady, 2011) suggests that RCs must be about the referent of the head noun and that the construal of the necessary ‘aboutness’ relationship is facilitated when that referent is most easily construed as the topic of the

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3 Prominence can be affected by contextual factors such as the ordering of constituents (Lambrecht, 1996; MacWhinney, 1978), frequency of earlier mention (Arnold, 1998; Brennan, 1995), previous occurrence of the noun in subject position (Arnold et al., 2000), and prior encoding as pronoun (Song & Fisher, 2007, p. 1962).
sentence—that is, when it has a high degree of topic-worthiness, to use Mak et al.’s (2006) term. Thus, the prototypical RC will be about a referent corresponding to its own subject. The relevant constraint can be stated informally as follows.

(7) The prominence factor (O’Grady, 2011, p. 21)
The ease with which the processor establishes that an aboutness relationship is between a relative clause and the referent of its head noun is proportional to the topic-worthiness of the referent within the relative clause. (Subjects are semantically most topic-worthy, direct objects next most topic-worthy, and so on.)

Hsu et al. (2009) summarize the insight this way: speakers are less likely to use an event as a restrictor if it is internally focused on an entity other than the referent of the head noun. Since the default internal focus of a clause is the subject, this results in a preference for subject RCs (Hsu et al., 2009; Zukowski, 2009).

By this criterion, then, the difficulty of an RC is determined in part by the semantic prominence (i.e., topic-worthiness) of the referent of the head noun. It is easiest to produce and understand RCs when the referent of the head noun corresponds to the constituent of the RC that is most easily construed as topic (i.e., the subject) because the RC is about the referent of the head noun. According to this perspective, the lower the topicality of the relativized element, the more difficult it is for the RC to be about the referent of the head. The topicality hierarchy, from highest to lowest, can be stated as subject > direct object > others (e.g., Givón, 1983, 1988, p. 138; Horn, 1986).

1.4 Research question and rationale of the study
This section is divided into two parts. Section 1.4.1 presents the research question to be addressed through the three experiments reported in this Chapter. Section 1.4.2 examines the motivation for the experiments by critiquing previous studies on RC acquisition and

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4 Givón (1988, p. 138) states that the subject is a primary topic and the direct object is a secondary topic of clauses.
processing. It also describes the predictions of the three different hypotheses—the linear distance hypothesis, the structural distance hypotheses, and the semantic prominence hypothesis—for children’s performance in English.

1.4.1 Research question

This dissertation has two primary goals. First, it critically addresses previously understudied types of RCs, thus providing more reliable information on both adults’ and children’s abilities with respect to performance. Second, it offers an explanation for asymmetries in adults’ and children’s difficulty with RCs that can be elucidated through analysis of production errors. Thus, I propose and carry out a new series of experiments that will consider a set of RC contrasts in both English and Korean that have hitherto been largely ignored in the literature on language acquisition and processing.

1.4.2 Rationale of the study

Despite the overall similar findings in previous studies on English, investigating the issue of a possible subject-object RC asymmetry can be problematic. Traditional work on this question has been plagued by two limitations. First, most work has focused on subject and direct object RCs, which are high on the NHAP. This raises the question of whether the well-documented preference for subject RCs holds when they are compared to other types of RCs as well as the question of whether there are asymmetries among non-subject RCs. Second, the most commonly suggested explanation for the processing and acquisition asymmetries in RCs—the length of the filler-gap dependency—has focused on the contrast exemplified in (8a) and (8b).

(8) a. Subject RC:
    the musician [that _ praised the director]
b. Direct object RC with animate head noun:
   the musician [that the director praised _]

c. Direct object RC with inanimate head noun:
   the music [that the director praised _]

Crucially, however, the vast majority of direct object RCs in actual speech have an inanimate head noun as in (8c). Whereas the unmarked subject in human language is animate/human, the unmarked direct object is inanimate (Aissen, 2003). This raises the possibility that direct object RCs with animate heads are more difficult to process because of failed animacy-related expectations rather than because the filler-gap dependency is longer than in subject RCs (e.g., Kidd et al., 2007). Interestingly, the direct object disadvantage disappears in patterns such as (8c), where the head noun is inanimate and therefore generates an expectation for a direct object RC (Gennari & MacDonald, 2008, 2012; Traxler et al., 2002).

But the animacy hypothesis, too, is difficult to evaluate, as (8c) manifests another factor that differentiates it from (8a) and (8b): it is non-reversible, in that its interpretation can be inferred solely from the meaning of its component words (because directors can praise music, but not vice versa). For this reason, RCs like (8c) may not call upon the full syntactic resources of the language and may therefore not bear directly on the question of syntactic processing per se.

Experiment 1 seeks to tease apart distance and animacy-based expectations by comparing subject and indirect object RCs, exemplified in (9).

(9) a. Subject RC:
   the musician [that _ sent the book to the director]

b. Indirect object RC:
   the musician [that the director sent the book to _]
The advantage of this comparison is that both subjects and indirect objects in such patterns are typically animate. This essentially neutralizes the animacy factor, allowing us to focus on the difference in the distance between filler and gap in the two types of RC. In addition, the patterns in (9) have the advantage of being semantically reversible, in contrast to the pattern in (8c). If linear distance is indeed a crucial factor in determining the production difficulty of an RC, then the subject RC type should be significantly easier to produce than its indirect object counterpart.

Although a preference for subject RCs might appear to support a distance effect, an issue arises with respect to word order. Whereas the subject RC follows a canonical SVX-like word order, as observed by Diessel and Tomasello (2000, 2005), the indirect object RC shows a non-canonical pattern.

(10) a. Subject RC:
the musician [that _ sent the book to the director]
S    V    DO    IO

b. Indirect object RC:
the musician [that the director sent the book to _]
IO    S    V    DO

This suggests a possible alternative explanation for the difficulty of non-subject RCs. In order to address this possibility, I also compare the difficulty of direct object RCs with their oblique counterparts in Experiment 2.

(11) a. Direct object RC:
the book [that the boy put _ on the box]

b. Oblique RC:
the box [that the boy put the book on _]
The advantage of this comparison is that word order canonicity is controlled for in that neither pattern is canonical. In addition, direct object and oblique NPs are typically inanimate, which neutralizes animacy expectations.

(12) a. Direct object RC:
    the book [that the boy put _ on the box]
    DO    S    V    OBL

    b. Oblique RC:
    the box [that the boy put the book on _]
    OBL    S    V    DO

With both animacy and canonicity controlled for, the length factor involving the filler-gap dependency predicts that the direct object RC should be easier to produce than its oblique counterpart. This contrast is useful because both types of RCs tested manifest a non-canonical word order, with a complement preceding the subject. Thus, if one is harder than the other, it’s not because one has canonical word order and the other does not.

However, even if our previous predictions are borne out, a new problem arises, because the predicted results might be attributed to frequency: subject RCs are more frequent than indirect object RCs, and direct object RCs are more common than oblique RCs. In order to control for frequency in Experiment 3, I compare two oblique RCs, both involving a directional prepositional phrase but with different filler-gap dependency (FGD) lengths (see Reali & Christiansen, 2007).

(13) a. Oblique RC with short FGD
    the car [that the boy walked from _ to the church]

    b. Oblique RC with long FGD
    the church [that the boy walked from the car to _]
The advantage of this comparison is that locative oblique NPs are typically inanimate, which neutralizes animacy expectations. In addition, word order canonicity is controlled for, in that neither pattern is completely canonical.

(14) a. Oblique RC with short FGD  
the car [that the boy walked from _ to the church]  
OBL S V OBL

b. Oblique RC with long FGD  
the church [that the boy walked from the car to _]  
OBL S V OBL

Though both patterns are comparably low in frequency in child speech (Diessel & Tomasello, 2000), they differ in the length of the FGD. If linear distance is a crucial factor, oblique RCs with a shorter FGD should be significantly easier to produce than oblique RCs with a longer FGD.

But even this may not be enough, as distance in English is arguably confounded with topic-worthiness. As illustrated below, the length of a filler-gap dependency is correlated with topicality. Subject RCs have the shortest filler-gap dependency and also the most topic-worthy head; in contrast, direct object RCs have a filler-gap dependency of intermediate length, in addition to moderate topicality for the referent of the head noun; and indirect object and oblique RCs have the longest filler-gap dependency, as well as the lowest degree of topic-worthiness for the referent of their head noun, as exemplified in (15).

(15)  
a. Subject relative clause:  
most topic-worthy  
|  
the boy [that _ is giving a bag to a girl]  
|____0__|
b. Direct object RC:

\[ \text{less topic-worthy} \]
\[ \quad \text{the book [that a boy is putting \_ on a box]} \]
\[ \quad \quad \quad 1 \quad 2 \quad 3 \]

c. Indirect object RC:

\[ \text{less topic-worthy} \]
\[ \quad \text{the boy [that a girl is giving a bag to \_]} \]
\[ \quad \quad \quad 1 \quad 2 \quad 3 \]

d. Oblique RC:

\[ \text{least topic-worthy} \]
\[ \quad \text{the book [that the boy is putting a box on \_]} \]
\[ \quad \quad \quad 1 \quad 2 \quad 3 \quad 3 \]

As we will see in due course, it will ultimately be necessary to consider developmental data from Korean in order to fully tease apart the predictions and effects of the various factors that are potentially relevant to the difficulty of relative clauses.
CHAPTER 2
FIRST LANGUAGE ACQUISITION OF ENGLISH RCs

2.1 Subject vs. indirect object RCs in English

2.1.1 Introduction

The current study aims to test the predictions of the three primary hypotheses regarding the source of the asymmetry in relative clause (RC) processing and production that is consistently observed in European languages. I examine these three different accounts of RC processing difficulty by studying young children’s production of postnominal RCs in English and analyzing their errors. Greater difficulty may be manifested in lower rates of production of a targeted structure and, consequently, higher rates of production of alternative responses and higher rates of errors during the production of a targeted structure.

The linear distance hypothesis correctly predicts that in languages with postnominal RCs, subject RCs will be easier to process than indirect object RCs. This is presumably because the linear distance between the filler and the gap is shorter in subject RCs than in indirect object RCs.

(1) a. Subject RC: the musician [that _ sent the book to the director]
   0
   b. Indirect object RC: the musician [that the director sent the book to _]
   1 2 3

Example (1), for example, shows that no referential elements intervene between the filler (the musician) and the gap in a subject RC, but three referential elements (the director, sent, the book) intervene between the filler (the musician) and the gap in an indirect object RC. Hsu et al. (2009) propose that the linear distance between the filler and the
gap could explain children’s performance errors and processing difficulty associated with certain RCs. This hypothesis predicts, therefore, that in English, indirect object RCs will be harder for children than subject RCs will be, because the linear distance between the filler and the gap is longer in the former than in the latter.

The structural distance hypothesis makes the same prediction for English as it does for other languages with postnominal RCs: indirect object RCs will be harder than subject RCs because the indirect object gap is more deeply embedded inside the structure. Example (2a) shows the structure of a postnominal subject RC in English, with one node intervening between the gap and the head noun (S). Example (2b) shows the structure of an indirect object RC, with three nodes intervening between the gap and the head noun (S, VP, PP).

(2)   a. Subject RC:

```
   NP
  /    S'
 /     |
the musician  that
     S
     VP
  /  |
  V  NP
   |
sent the book
     PP
    /  |
    P  NP
     |
to the director
```

Number of nodes between head noun and gap: 1 (S)
b. Indirect object RC:

The semantic prominence hypothesis also predicts that indirect object RCs will be harder than subject RCs. This is because according to the semantic prominence hierarchy (discussed in Chapter 1), the subject position is more prominent (i.e., topic-worthy) than the indirect object position, as in (3).

(3) a. Subject RC:

\[ \text{more topic-worthy} \]
\[ \text{the musician [that } \_ \text{sent the book to the director]} \]

b. Indirect object RC:

\[ \text{less topic-worthy} \]
\[ \text{the musician [that the director sent the book to } \_] \]

My choice of a production task for the experiment has two important advantages. Several early studies that examined children’s performance with postnominal RCs used comprehension tasks (i.e., act-out or picture-selection tasks). Elicited production tasks
typically place more demands on participants than do comprehension tasks, and the resulting errors can provide valuable information as to what makes certain RCs more difficult for children (Lee-Ellis, 2011). The second advantage of using a production task is that cross-linguistic comparisons can be made. In the present study, I used the same task and the same test materials that have been used for the production of Korean prenominal RCs by child native speakers of that language.

**2.1.2 Method**

**Participants.** Twenty-seven adult native speakers of English formed the control group for the experiment, and their responses were compared with L1 child responses. The participants in this study included 21 native English-speaking children (age 5;0 to 6;10, mean = 6;3), recruited at the UH Mānoa Laboratory School in Honolulu, Hawai‘i. There were 12 girls and 9 boys—13 five-year-olds and 8 six-year-olds.

**Materials and design.** I used an elicited production task (Cho, 1999; Goodluck & Stojanovic, 1996; Hsu et al., 2009; Zukowski, 2009) to measure the children’s performance on RCs. The production task was modeled after the one employed by Goodluck and Stojanovic (1996).^5^

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^5 Goodluck and Stojanovic (1996) tested Serbo-Croatian speakers to examine the relativization of subject, direct, indirect object, and oblique positions. An example of their materials, including a stimulus picture, is given below:

*For eliciting direct object relatives (English translation)*

Put the blue sticker on one car and the red on the other.
The girl is driving the car. The girl is washing the car.
Which car has the blue sticker? Which car has the red sticker?
A brief practice session took place before the actual task to help participants understand what was expected of them. A sample interaction between a participant and the experimenter in the practice session is given in (4).

(4) A sample interaction in the practice session:
Experimenter: Today I will show you some sets of pictures. You will hear a recording of a woman’s voice. She will tell you something about each picture and ask you the question “Which person (or thing) has an arrow mark?” You will see an arrow mark over a person (or thing) in each set of pictures. Then I would like you to describe the person (or thing) that has an arrow mark over it. Let’s try a couple of examples. Are you ready?

In the first picture, there is a short boy and a tall girl. In the second picture, there is a tall boy and a short girl. Which one has an arrow mark?
Child: (is expected to say) the boy who is short.

In the actual test items, the question format was not used. Instead, the experimenter simply pointed to the arrow, which sufficed to elicit from the participants a description of the person or thing that it singled out. A sample interaction between a participant and the experimenter in the main test is given in (5).

(5) A sample interaction in the main test:
From now on, the woman is going to tell you something about each picture, but she is not going to ask a question this time. After listening to what she says, you will hear a beep sound and see an arrow mark. I would like you to describe the person (or thing) that has an arrow mark, just like you did before. Can you do it?

Let us consider a concrete example. To elicit a subject RC from the child, the experimenter showed the child a pair of pictures (e.g., Figure 1a) and a recorded voice.

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6 In many previous studies, RCs were elicited as answers to questions such as Which one (who) has a red dot? or Who is wearing orange? for subject RCs or What is red? for direct object RCs. Unfortunately, however, these questions create a potential priming problem, as they are all subject wh-questions and therefore may favor subject RCs (see Özge et al., 2010, for Turkish; Kim, 2012, for Korean). Therefore, in the task that I used, wh-questions (e.g., Which girl/boy/one has an arrow mark?) were used only in the practice session.
described the action in each picture (i.e., “In the first picture, a boy is giving a bag to a girl. In the second picture, a girl is giving a bag to a boy”).

![Figure 2.1a. An initial picture pair used to elicit a subject RC](image)

Then, there was the sound of a beep, and an arrow mark appeared over the boy in the left picture.

![Figure 2.1b. A second picture pair used to elicit a subject RC](image)

This was expected to elicit a subject RC such as “(The arrow mark is on) the boy [that _ is giving a bag to the girl].”

In the elicitation of an indirect object RC, the child heard the same prompt used in the subject RC condition (i.e., “In the first picture, a boy is giving a bag to a girl. In the second picture, a girl is giving a bag to a boy”).
Figure 2.2a. An initial picture pair used to elicit an indirect object RC

An arrow then appeared over the boy in the picture on the right in Figure 2b.

Figure 2.2b. A second picture pair used to elicit an indirect object RC

The targeted response is the indirect object RC “(The arrow mark is on) the boy [that the girl is giving a bag to _ ].”

**Procedure.** The picture stimuli were presented to the participants using PowerPoint on a laptop computer. At the same time that participants were looking at the screen containing two pictures like those in Figures 1a and 2a, they heard a recorded prompt. The audio stimuli were recorded and edited using Audacity 1.2.6. Participants were instructed to respond to the audio stimulus sentence while looking at the pictures. All sound files were
manipulated to end exactly 16 seconds\(^7\) after the picture’s appearance on the screen. I focused on a commonly used measure of processing complexity: production accuracy.

Each child watched 13 test items (3 warm-ups, plus 10 critical items, with only the critical items randomized; see Appendix A). Two types of RCs were used: (1) 5 subject RCs and (2) 5 indirect object RCs. Before the actual test, participants were given 3 practice items. The first and second practice items were NPs containing an adjective, \textit{the big cat} and \textit{the short man}. The last practice item was \textit{the boy who is sleeping}, containing a very simple subject RC consisting of an animate subject and an intransitive verb. The practice items familiarized the participants with the experiment and ensured their understanding of the task before moving on to the actual test.

The two types of RCs were counterbalanced across two lists to minimize item effects. In addition, I controlled for the order of blocks within the experiment. Within each session, the order of the two conditions (subject versus indirect object RCs) was fixed and counterbalanced across participants so as to control the first item effect that may influence the rest of RCs that the participant produces. This was done to avoid introducing a potential response bias. For example, the same type of RC appeared consecutively—half of the participants were shown 5 subject RCs first and 5 indirect object RCs next; the other half saw the two blocks the other way around. Within each of the conditions, the 5 sentences were randomized.

It took approximately ten minutes to finish the task. All test items were semantically reversible, with two animate characters, so as to ensure that the participants could not rely on lexical and pragmatic clues, including real-world knowledge. For

\footnote{\textsuperscript{7} Duration depended on how long the recorded prompt took to be naturally uttered.}
example, a test item such as (6a) is equally plausible pragmatically when the NPs are reversed as in (6b) in that it makes just as much sense for a boy to give a bag to a girl as vice versa (both scenarios are presented in Figures 2.1 and 2.2). When a targeted phrase such as (6a) was being elicited, one of the accompanying pictures depicted the situation in (6a) and the other showed the situation in (6b).

(6)  a. Target response: the boy [that the girl is giving a bag to _]
   b. Reversed: the boy [that _ is giving a bag to the girl]

All verbs in the test items were in the present progressive tense because most of the pictures showed an ongoing action.

Responses. To ensure reliability in transcription, the data were recorded in Audacity, carefully transcribed by the author and one native English speaker—2 transcriptions for each response, and entered onto a spreadsheet for coding and analysis. Following Hsu et al. (2009, p. 336), if more than one answer was given for a particular test item, only the first answer uttered is reported in the results below.

Adult group. Twenty-seven adults yielded a total of 270 (10 × 27) responses, 135 (5 × 27) responses for the subject RC condition and 135 (5 × 27) responses for the indirect object RC condition. All data were included in the statistical analysis.

Child group. Twenty-one participants yielded a total of 210 (10 × 21) responses, 105 (5 × 21) responses for the subject RC condition and 105 (5 × 21) responses for the indirect object RC condition. No response was disregarded, and all were included in the statistical analysis.

Data coding. Coding was done by the author and one native speaker of English, who checked the data coding and helped ensure agreement on all relevant data sets. A
complete list of examples for each type of response in each category is shown in section 2.1.3.

2.1.3 Results

2.1.3.1 Performance on subject RCs vs. indirect object RCs

The RC production task consistently elicited RCs from English native adults and children. In addition to the targeted patterns, i.e., a subject RC and an indirect object RC, a variety of other response types were found, especially in contexts that were designed to elicit an indirect object RC, as illustrated with the help of Figure 2.2b, repeated below.

Figure 2.2b. A second picture pair used to elicit an indirect object RC

(7) Target response (indirect object RC):
the boy [who the girl is giving a bag to _]

Non-targeted responses:
   a. Subject RC using different lexical items
      the boy [who _ is getting the bag from the girl]
   b. Subject RC using a passive structure
      the boy [ _ being given the bag by the girl]
   c. RC involving a reversal in grammatical relations
      (Indirect object RC→ Subject RC)
      the boy [that _ is giving a bag to the girl]
   d. RC involving a head error (choice of wrong NP)
      the girl [that the boy is giving a bag to _]
e. RC involving a head + reversal error
   the girl [that _ is giving a bag to the boy]

f. Resumptive NP
   the boy that the girl is giving a bag to the boy

g. Coordination pattern that avoids an RC
   This is the boy and the girl is giving a bag to the boy.

h. Other error types
   the boy is giving a bag to the girl

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
   by the arrow; the examples in (7a) and (7b) fall into this category, as they both
   accurately describe the right boy by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
   the referent, or both; examples (7c) – (7h) fall into this category.

Tables 2.1 and 2.2 summarize the response types produced by our adult and child
participants in the contexts designed to elicit subject and indirect object RCs.

Table 2.1. Percentages of different types of responses in each category for each RC
condition by adults (N = 27)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Subject RC</th>
<th>Indirect object RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>100% (135/135)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>Subject RC using different lexical items</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td></td>
<td>Subject RC using a passive</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td>RC involving a head error</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td></td>
<td>RC involving a reversal in grammatical relations</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td></td>
<td>RC involving a head + reversal error</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td></td>
<td>Resumptive NP</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td></td>
<td>Other error types</td>
<td>0% (0/135)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100% (135/135)</td>
</tr>
</tbody>
</table>
Table 2.2. Percentages of different types of responses in each category for each RC condition by children (N = 21)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Subject RC</th>
<th>Indirect object RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>94.3% (99/105)</td>
<td>2.9% (3/105)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject RC using different lexical items</td>
<td>0% (0/105)</td>
<td>54.3% (57/105)</td>
</tr>
<tr>
<td>Subject RC using a passive</td>
<td>0% (0/105)</td>
<td>1.9% (2/105)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC involving a head error</td>
<td>0% (0/105)</td>
<td>4.7% (5/105)</td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>0% (0/105)</td>
<td>11.4% (12/105)</td>
</tr>
<tr>
<td>Coordinate pattern</td>
<td>0% (0/105)</td>
<td>12.4% (13/105)</td>
</tr>
<tr>
<td>Other error pattern</td>
<td>5.7% (6/105)</td>
<td>12.4% (13/105)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (105/105)</td>
<td>100% (105/105)</td>
</tr>
</tbody>
</table>

**Target responses**

As can be seen here, targeted responses were higher for subject RCs than for indirect object RCs for both adults and children. The asymmetry in targeted responses between the two conditions was striking for both groups (for adults 100% vs. 11.8%; for children 94.3% vs. 2.9%). These effects were tested for significance with a two-way mixed model ANOVA with group (adult/child) as the between-subject factor and gap position (subject/indirect object gap) as the within-subject factor. The analysis revealed a significant main effect of gap position (S > IO: \(F(1, 46) = 757.722, p < 0.001\)) and a main effect of group (adults > children: \(F(1, 46) = 5.148, p = .028\)). However, there was no significant interaction between group and gap position (\(F(1, 46) = 0.254, p = .617\)), indicating that the difference in targeted responses between the subject RC condition and the indirect object RC condition was not larger for the child group than for the adult group.

**Acceptable responses**

The adult group produced appropriate responses (i.e., targeted responses or acceptable alternatives) in the subject RC condition with 100% accuracy and in the indirect object RC condition with 96.5% accuracy. The difference between the two conditions was not
significant ($t(26) = -2.431, p = .22$). However, a strong overall subject-indirect object asymmetry was detected in the child group, who demonstrated a much higher rate of acceptable responses in the subject RC condition (94.3%) than in the indirect object RC condition (59.1%) ($t(20) = -30.984, p = .000$).

These effects were tested for significance with a two-way mixed model ANOVA with group as the between-subject factor and gap position as the within-subject factor. The analysis revealed a significant main effect of gap position (S > IO: $F(1, 46) = 22.281, p < 0.001$) and a main effect of group (adults > children: $F(1, 46) = 21.171, p < 0.001$). Moreover, there was significant interaction between group and gap position ($F(1, 46) = 13.451, p < 0.001$), indicating that the difference in acceptable responses between the indirect object RC condition and the subject RC condition was larger for the child group than for the adult group. In other words, regardless of group, the participants produced more semantically appropriate responses in subject RCs than in indirect object RCs, and that regardless of condition, the adults produced more correct responses than the children did.

2.1.3.2 Response strategies

Turning now to the types of responses produced by our participants, let us begin by considering the set of options observed when an indirect object RC was elicited.

**Response strategies by adult participants**

When adults did not produce a targeted RC in the indirect object RC condition, they almost always produced a well-formed and semantically appropriate subject RC by using one of the following two strategies:
i. **Subject RC using different lexical items.** As shown in (8), 57.3% of all 135 responses involved the use of an alternative verb (e.g., *get* instead of *give*) to produce a subject RC with the same approximate meaning as the targeted indirect object RC.

(8) Subject RC using different lexical items:
the boy [who _ is getting the bag from the girl]
(Target: the boy [that the girl is giving the bag to _ ])

ii. **Subject RC using a passive structure.** As exemplified in (9), 27.4% of the responses involved a subject RC in the passive voice.

(9) Subject RC using a passive structure:
the boy [ _ being given the bag by the girl]
(Target: the boy [that the girl is giving the bag to _ ])

Of the 37 responses involving a subject RC using a passive structure, just 5 did not include a *by*-phrase (e.g., *the boy being given the bag*). Crucially, these responses were pragmatically appropriate because there is only one boy who is getting the bag. For this reason, I considered a passive without *by*-phrase to be an acceptable response.

**Response strategies by child participants**

When the children did not produce a targeted RC in the indirect object RC condition, their primary responses involved (i) a well-formed and semantically appropriate subject RC (54.3%); (ii) an RC involving a head error (4.7%); (iii) a resumptive NP error (11.4%); or (iv) a coordinate pattern (12.4%).

i. **Subject RC using different lexical items.** Like adults, when children did not produce a targeted RC in the indirect object RC condition, the majority of their overall responses (54.3% of 105) contained a subject RC with a different lexical item to produce the same meaning, as shown in (8). Children only rarely used the passive voice to answer with a subject RC: the raw number of these responses was very low (two responses in total).
ii. RC involving a head error. Of the total 105 responses in the indirect object RC condition, 4.7% involved the use of an incorrect head NP, resulting in a grammatically well-formed but semantically inappropriate RC, as in (10). In the targeted answer, the head noun (boy) plays the role of indirect object in the modifying event, but in the head error, the speaker places the subject of the modifying event (girl) in the head noun position, thereby creating an unacceptable RC.

(10) Indirect object RC with head error:
the girl [that the boy is giving a bag to _ ]
(Target: the boy [that the girl is giving a bag to _ ])

iii. Resumptive NP. When the children produced indirect object RCs, they sometimes avoided gaps by inserting a full resumptive NP—a copy of the head noun—in the extraction site, creating a double-headed RC, as shown in (11). Of the total responses in the indirect object RC condition, 11.4% contained the resumptive NP error.8

(11) Resumptive NP: the boy that the girl is giving a bag to the boy
(Target: the boy [that the girl is giving a bag to _])

Resumptive NPs are ungrammatical in English, yet this was found to be one of the more commonly produced errors in the data from the children.

iv. Coordinate pattern. Of the 105 responses in the indirect object RC condition, 12.4% contained a coordinate pattern that did not have a relative clause, as exemplified in (12).

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8 Similarly, Hsu et al. (2009, p. 343) report a comparable result for children acquiring Mandarin, noting that resumptive NPs are ungrammatical in Chinese and were used more frequently in the production of direct object RCs, such as in the example below, than in subject RCs.

Xiao-nuhai zai kan dianshi (de na-ge dianshi)
Little-girl DUR watch TV DE that-CL TV
‘the TV which the little girl is watching (the TV)’
(12) Non-RC coordinate pattern:
This is the boy and the girl is giving a bag to the boy.  
(Target: the boy [that the girl is giving a bag to_])

Such a strategy for responding to the condition that targeted indirect object RCs can possibly be interpreted in terms of the conjoined clause hypothesis suggested by Tavakolian (1981). It seems that children produce a coordinate structure to avoid producing an indirect object RC.

Although children sometimes showed the first strategy (i.e., a subject RC using different lexical items), the large subject-indirect object RC asymmetry cannot be explained in the same way as for the adult group. Because children’s responses in the indirect object RC condition involved higher rates of non-targeted responses involving head errors, resumptive NP errors, and coordinate patterns than the adults’ responses did, children showed greater difficulty producing indirect object RCs than adults did.

2.1.4 Discussion

The overall results suggest that children have greater difficulty producing indirect object RCs than subject RCs: not only do they produce substantially fewer target responses in the indirect object RC condition than in the subject RC condition, they also make more grammatical errors in the former than the latter. Among adult speakers, there was also evidence for a subject RC advantage in this experiment.

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9 Tavakolian (1981) tested children between the ages of 3 and 5 on four types of RCs (SS, SO, OS, OO). She found that children performed best on the SS pattern and poorest on the OS pattern (78% vs. 19%). Her conjoined clause hypothesis suggests that children analyze the relative as being conjoined to the matrix clause rather than embedded in it. According to this strategy, an OS pattern like the example below is reanalyzed into a coordinate structure by the children, leading to incorrect responses.

OS: The lion stands on the duck [that _ bumps into the pig].
Coordinate structure: The lion [stands on the duck] and [bumps into the pig].
Experiment 1 revealed three notable non-targeted response strategies. First, lexical items were often changed to permit the production of a subject RC instead of an indirect object RC, as in (13a). Participants maintained the thematic role of the head (goal), but produced subject RCs through lexical substitution (e.g., get, receive, take).

The reverse, as in (13b), never happened.

(13) a. Target: the boy [that the girl is giving a bag to _ ]
   Actual response: the boy [that _ is receiving a bag from the girl]

b. Target: the boy [that _ is giving a bag to the girl]
   Actual response: the boy [that the girl is receiving a bag from _ ]

Second, adults often changed the syntactic structure (from active to passive) in order to permit production of a subject RC rather than an indirect object RC, as in (14a).\(^{10}\)

Thus, passivization provides a perfectly acceptable alternative to targeted responses in the indirect object RC condition. The subject RC condition has a comparable alternative, as shown in (14b), but no one ever chose that alternative.

(14) a. Target: the boy [that the girl is giving a bag to _ ]
   Actual response: the boy [that _ is being given a bag by the girl]

b. Target: the boy [that _ is giving a bag to the girl]
   Actual response: the boy [that the girl is being given a bag by _ ]

Third, the children produced resumptive NP errors, but they did so only in the indirect object RC condition (11.4% of total responses in that condition). What might account for these resumptive NP errors? They can be explained in terms of holding the

\(^{10}\) Montag and MacDonald’s (2011) results are compatible with this result, showing that a direct object RC with an animate head (e.g., the boy that the girl is throwing _) encouraged adult speakers to produce passive subject RCs (e.g., the boy that _ is thrown by the girl) instead.
planned head noun in working memory. Hsu et al. (2009) propose that in prenominal RCs (e.g., in Mandarin Chinese), in order for the production system to build an RC, the head noun must be planned ahead and then held in memory, even though its referent is activated at the gap position in the relative clause. In a similar way, the urge to activate the filler in the gap position increases as production of the sentence progresses: it is felt more strongly at the indirect object gap, which comes later in the N [S V DO _ ] pattern and less strongly at the subject gap, which comes early in the N [ _ V DO IO] pattern. There is thus a greater possibility that the head noun will be uttered in the indirect object gap position, resulting in a resumptive NP, than in the subject gap position.

Although the subject-object asymmetry has been found in studies on postnominal RCs in English (McDaniel et al., 1998; McKee & McDaniel, 2001; Tavakolian, 1981; Zukowski, 2009), the subject–indirect object asymmetry has not, to my knowledge, been discussed in the literature. The pattern of findings described above is consistent with the predictions made by the linear distance hypothesis, the structural distance hypothesis, and the semantic prominence hypothesis because all three predict that the indirect object RCs will be more difficult to produce.

2.2 Direct object vs. oblique RCs in English

2.2.1 Introduction

In Experiment 2, direct object and oblique RCs were used in order to control for both animacy and word order canonicity, as explained in Chapter 1. In Experiment 1, the effects of animacy were controlled for, but not the effects of word order canonicity, since only subject RCs have the canonical SVX word.
The linear distance hypothesis predicts that in English, direct object gap RCs will be easier to process than oblique RCs. This is because the linear distance between the filler and the gap is shorter in direct object RCs than in oblique RCs.

(15) a. Direct object RC: the book [that the boy put _ on the box]  
     \[1 \quad 2\]  

b. Oblique RC: the box [that the boy put the book _ on]  
     \[1 \quad 2 \quad 3\]

In example (15), two referential elements (*the boy, put*) intervene between the filler (*the book*) and the gap in the direct object RC, but three referential elements (*the boy, put, the book*) intervene between the filler (*the box*) and the gap in the oblique RC.

The structural distance hypothesis also predicts that in English, direct object RCs will be easier to produce than oblique RCs. This is because the oblique NP gap is more deeply embedded. The direct object RC in (16a) has two nodes intervening between the filler and the gap while the oblique object RC in (16b) has three.

(16) a. Direct object RC:

\[\begin{array}{c}
\text{NP} \\
\mid \text{N} \\
\quad \text{the book} \\
\mid \text{that} \\
\quad \text{S'} \\
\quad \quad \text{S} \\
\quad \quad \text{VP} \\
\quad \quad \quad \text{NP} \\
\quad \quad \quad \quad \text{the boy} \\
\quad \quad \quad \quad \quad \text{V} \\
\quad \quad \quad \quad \quad \quad \text{NP} \\
\quad \quad \quad \quad \quad \quad \quad \text{PP} \\
\quad \quad \quad \quad \quad \quad \quad \quad \text{P} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \text{NP} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{on} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{the box} \\
\end{array}\]

Number of nodes between the head noun and gap: 2 (S, VP)
b. Oblique RC:

Number of nodes between the head noun and gap: 3 (S, VP, PP)

The semantic prominence hypothesis also predicts that direct object RCs will be relativized more easily than oblique NPs because the oblique RC relativizes a less topic-worthy element, as shown in (17), based on the prominence hierarchy $S > DO > IO > OBL$.

(17) a. Direct object RC:

```
more topic-worthy

| the book [that the boy put _ on the box]
```

b. Oblique RC:

```
less topic-worthy

| the box [that the boy put the book on _]
```

### 2.2.2 Method

**Participants.** Twenty-eight adult native speakers of English formed the control group for the experiment, and their responses were compared with L1 child responses in order to see how child native speakers produce RCs differently from adult native speakers. The participants in this study included 21 native English-speaking children (age 5;0 to 6;10,
mean = 6;3); these were the same child participants who took part in Experiment 1.

Experiment 2 was conducted one week after Experiment 1 to avoid a task effect.

**Materials and design.** Like the previous experiment, the task comprised 10 test items and involved 2 conditions (direct object RC vs. oblique RC). The items were distributed into 4 lists, as in Experiment 1. The same type of RC appeared consecutively. It took approximately ten minutes to finish the task. All test items consisted of two picture pairs, with each picture containing one character and two objects; the participants were asked to describe the object indicated by the arrow in the second picture pair. All test items were semantically reversible, with two inanimate objects, so as to ensure that the participants could not rely on lexical and pragmatic clues, including real-world knowledge. For example, a test item such as (18a) is equally plausible pragmatically when the NPs are reversed, as in (18b).

(18)  

a. Target: the book [that the boy put _ on the box]  
b. Reversed: the box [that the boy put _ on the book]

However, in this experiment, the pictures depicted not two separate actions, as in Experiment 1, but an identical action performed by different agents (i.e., a boy and a girl) to elicit either the direct object RC or the oblique RC. Sample sets of pictures targeted to elicit direct object and oblique RCs, respectively, are presented in Figures 2.3 and 2.4. (See Appendix B for a full list of test items and practice items)

To elicit a direct object RC, the experimenter showed the participant a pair of pictures (e.g., Figure 2.3a) and a recorded voice described the action in each picture (i.e., “In the first picture, a boy is putting a book on a box. In the second picture, a girl is putting a book on a box”).
Then there was the sound of beep and an arrow appeared pointing at one of the four depicted objects (e.g., Figure 2.3b).

One referent had the thematic role of theme of an action and was marked with an arrow (e.g., the book in Figure 2.3b). This was expected to elicit a response including a direct object RC, such as “(The arrow mark is on) the book [that the boy is putting _ on the box].”

To elicit an oblique RC, the participant was shown a pair of pictures (e.g., Figure 2.4a) and heard the same prompt used in the direct object RC condition (i.e., “In the first picture, a boy is putting a book on a box. In the second picture, a girl is putting a book on a box”).
An object with the thematic role of *location* was marked with an arrow to elicit an oblique RC such as “(The arrow mark is on) the box [that the boy is putting a book on _]” (e.g., Figure 2.4b).

*Procedure.* The procedure was the same as described in Experiment 1.

*Adult group.* Twenty-eight adults yielded a total of 280 (10 × 28) responses, 140 (5 × 28) for the direct object RC condition and 140 (5 × 28) for the oblique RC condition. All data were included in the statistical analysis.

*Child group.* Twenty-one participants yielded a total of 210 (10 × 21) responses, 105 (5 × 21) for the direct object RC condition and 105 (5 × 21) for the oblique RC condition. No response was disregarded, and all were included in the statistical analysis.
2.2.3 Results

2.2.3.1 Performance on direct object RCs vs. oblique RCs

This RC production task consistently elicited RCs from English native adults and children. In addition to the targeted patterns (i.e., a direct object RC and an oblique RC), a variety of other response types were found, especially in contexts that were designed to elicit a direct object RC, as illustrated with the help of Figure 2.3b, repeated below.

![Figure 2.3b. A second picture pair used to elicit a direct object RC](image)

(19) Target response (direct object RC):
the book [that the boy put _ on the box]

Non-targeted responses:

a. Subject RCs using a passive structure
   (turning the direct object RC into a subject RC)
   the book [that _ was put on the box]

b. Resumptive NPs
   Resumptive pronoun: the book [that the boy put it on the box]
   Resumptive NP: the book [that the boy put the book on the box]

c. Coordinate pattern that avoids an RC
   the book is on the box and the boy put it

d. Other error types
   boy’s book
   the book on the box
   the boy put the book on the box
The non-target responses can be subdivided into two classes:

(i) acceptable alternative that offers well-formed descriptions of the referent singled out by the arrow; the example in (19a) falls into this category, as it accurately describes the book in the left picture by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of the referent, or both; examples (19b) – (19d) fall into this category.

Tables 2.3 and 2.4 summarize the response types produced by our adult and child participants in the contexts designed to elicit direct object and oblique RCs.

Table 2.3. Percentages of different types of responses in each category for each RC condition by adults (N = 28)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Direct object RC</th>
<th>Oblique RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>75.7% (106/140)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>Subject RC using different lexical items</td>
<td>0% (0/140)</td>
</tr>
<tr>
<td></td>
<td>RC using a passive</td>
<td>18.6% (26/140)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td>RC involving a reversal in grammatical relations</td>
<td>0% (0/140)</td>
</tr>
<tr>
<td></td>
<td>RC involving a head + reversal error</td>
<td>0% (0/140)</td>
</tr>
<tr>
<td></td>
<td>Other error types</td>
<td>5.7% (8/140)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100% (140/140)</td>
</tr>
</tbody>
</table>

Table 2.4. Percentages of different types of responses in each category for each RC condition by children (N = 21)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Direct object RC</th>
<th>Oblique RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>47.6% (50/105)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>Subject RC using different lexical items</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td></td>
<td>RC using a passive</td>
<td>20% (21/105)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td>RC involving a head error</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td></td>
<td>RC involving a reversal in grammatical relations</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td></td>
<td>RC involving a head + reversal error</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td></td>
<td>Resumptive NP</td>
<td>5.7% (6/105)</td>
</tr>
<tr>
<td></td>
<td>Coordinate pattern</td>
<td>6.7% (7/105)</td>
</tr>
<tr>
<td></td>
<td>Other error types</td>
<td>20% (21/105)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100% (105/105)</td>
</tr>
</tbody>
</table>
Target responses

As can be seen here, targeted responses were higher in direct object RCs than in oblique RCs for both adults and children. Paired-sample t-tests did not reveal a significant main effect of RC condition for adults (75.7% vs. 70%, \( t(27) = 0.826, p = .416 \)). However, the asymmetry in targeted responses between the two conditions was striking for the child group. Children produced significantly more target responses in the direct object RC condition than in the oblique RC condition (47.6% vs. 26.7%, \( t(20) = 2.076, p < .05 \)).

Acceptable responses

The asymmetry in semantically appropriate responses between the two conditions was striking for both groups. The adult group produced appropriate responses (i.e., targeted responses or acceptable alternatives) in the direct object RC condition with 94.3% accuracy and in the oblique RC condition with 86.5% accuracy (\( t(27) = 2.917, p = .007 \)). An asymmetry in appropriate responses for the child group between the two conditions was striking: 67.6% for direct object RCs compared to 34.3% for oblique RCs (\( t(20) = 5.775, p < 0.001 \)). These effects were tested for significance using a two-way mixed model ANOVA with group as the between-subject factor and gap position as the within-subject factor. The analysis revealed a significant main effect of gap position (DO > OBL: \( F(1, 47) = 49.334, p < 0.001 \)) and a main effect of group (adults > children: \( F(1, 48) = 56.871, p < 0.001 \)). Moreover, there was a significant interaction between group and gap position (\( F(1, 47) = 17.933, p < 0.001 \)), indicating that the difference between the direct object RC condition and the oblique RC condition was larger for the child group than for the adult group. In other words, regardless of group, the participants produced more appropriate responses in direct object RCs than in oblique RCs, and
regardless of the types of conditions, the adults produced semantically more appropriate responses than the children did.

2.2.3.2 Response strategies

Turning now to the types of responses produced by our participants, let us begin by considering the range of options observed when a direct object RC and an oblique RC were elicited.

2.2.3.2.1 Direct object RCs

Response strategies by adult participants

When adults did not produce a targeted RC in the direct object RC condition, they almost always produced a well-formed and semantically appropriate subject RC by using a passive structure, as exemplified in (20). Of the total responses in the direct object RC condition, 18.6% were of this type.

(20) Passive: turning the direct object RC into a subject RC
the book [that _ was put on the box by the boy]
(Target: the book [that the boy put _ on the box])

Of the 26 responses involving a subject RC using a passive structure, none manifested deletion of the by-phrase (e.g., the book that _was put).

Response strategies by child participants

When children did not produce a targeted RC in the direct object RC condition, they produced (i) a subject RC using a passive (20% of total responses); (ii) a resumptive NP error (5.7%); (iii) a coordinate pattern (6.7%); or (iv) another error type (20%).

i. Subject RC using a passive structure. Similar to the adult pattern, 20% of the children’s 105 responses in the direct object RC condition involved a subject RC in the
passive voice, as in (20) above. As was the case with the adults, none of these responses exhibited deletion of the by-phrase.

**ii. Resumptive NP.** Unlike adults, some children, instead of leaving a gap, inserted a resumptive pronoun, as in (21a), or a resumptive NP, as in (21b); of all responses in the direct object RC condition, 5.7% contained a resumptive error.

(21)  Target response:  
the book [that the boy put _ on the box]  
   a. Resumptive pronoun: the book [that the boy put it on the box]  
   b. Resumptive NP: the book [that the boy put the book on the box]

**iii. Coordinate pattern.** In 6.7% of responses, children used a coordinate structure when the direct object RC was targeted, as in (22). Such a strategy preserves the meaning of the targeted RC but without the RC.

(22)  Coordinate pattern:  
The book is on the box and the boy put it there.

**iv. Other error types.** Of the total 105 responses in the direct object RC condition, 20% contained other error types, including the production of possessive NPs, prepositional phrases, and other non-RC constructions, as exemplified in (23).

(23)  Target response:  
the book [that the boy put _ on the box]  
   Other error types:  
   boy’s book  
   the book on the box  
   the boy put the book on the box
2.2.3.2.2 Oblique RCs

In contexts that were designed to elicit an oblique RC, a variety of other response types were found in addition to the targeted patterns, as illustrated with the help of Figure 2.4b, repeated below.

![Figure 2.4b. A picture pair used to elicit an oblique RC](image-url)

(24) Target response (oblique RC):
the box [that the boy put the book on _]

Non-targeted responses:

a. Subject RC using different lexical items
   the box [that _ got the book from the boy]

b. Oblique RC using a passive structure
   the box [that the book is being put on _ by the boy]

c. RC involving a reversal in grammatical relations
   (Oblique RC $\rightarrow$ Direct object RC)
   the box [that the boy put _ on the book]

d. Oblique RC involving a head error (choice of wrong NP)
   the book [that the boy put the box on _]

e. Direct object RC involving a head + reversal error
   the book [that the boy put _ on the box]

f. Resumptive NPs
   Resumptive pronoun: the box [that the boy put the book on it]
   Resumptive NP: the box [that the boy put the book on the box]
g. Other error types
   the boy’s box
   the boy put the book on the box

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
   by the arrow; the examples in (24a) and (24b) fall into this category, as they both
   accurately describe the box in the left picture by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
   the referent, or both; examples (24c) – (24g) fall into this category.

Response strategies by adult participants

When adults did not produce a targeted RC in the oblique RC condition, they generally
produced a well-formed and semantically appropriate subject RC by using one of the
following two strategies:

i. Subject RC using different lexical items. Of the adults’ total 140 responses, 3.6%
   involved the use of an alternative verb (e.g., got instead of put) to produce a subject RC
   with the same meaning as the targeted oblique RC, as in (25).

   (25) Subject RC using different lexical items:
       the box [that _ got the book from the boy]
       (Target: the box [that the boy put the book on _])

ii. Oblique RC using a passive. As exemplified in (26), 12.9% of adults’ responses in the
oblique RC condition involved producing an oblique RC with passivization.

   (26) Oblique RC using a passive structure:
       the box [that the book is being put on _ by the boy]
       (Target: the box [that the boy put the book on _])
Of the 18 responses involving the oblique RC using a passive structure, none exhibited deletion of the by-phrase (e.g., *the box that the book was put on _*).

**Response strategies by child participants**

Although children (like adults) sometimes produced appropriate responses in the oblique RC condition, they had a tendency to produce more errors. These errors took one of four forms: (i) a head error (2.8%), (ii) a reversal error (3.8%), (iii) the use of a resumptive NP (29.5%), or (iv) other error types (24.9%).

**i. RC involving a head error.** As illustrated in (27), 2.8% of responses contained inappropriate responses with a head error. In the example, the targeted head noun (*box*) plays the role of the location in the modifying event, but in the head error, the speaker places the theme (*book*) of the modifying event in the head noun position.

(27) RC involving a head error (choice of wrong NP)
    the book [that the boy put the box on _]
    (Target: the box [that the boy put the book on _])

**ii. RC involving a reversal in grammatical relations.** As exemplified in (28), the reversal error occurred when a direct object RC was produced where an oblique RC was called for (3.8% of responses).

(28) RC involving a reversal in grammatical relations
    (Oblique RC → Direct object RC)
    the box [that the boy put _ on the book]
    (Target: the box [that the boy put the book on _])

**iii. Resumptive NP.** When children did not produce a targeted RC in the oblique RC condition, most of their errors involved a resumptive pronoun or NP, such as in (29). Children demonstrated higher rates of resumptive NP errors for oblique RCs (29.5%) than for direct object RCs (5.7%).
(29)  Resumptive NPs:
   Resumptive pronoun: the box [that the boy put the book on it]
   Resumptive NP: the box [that the boy put the book on the box]

iv. Other error types. Children’s non-target responses when oblique RCs were targeted were possessive NPs and sentences that did not contain RCs, as in (30) (24.9% of their responses).

(30)  the boy’s box  
      the boy put the book on the box

2.2.4 Discussion

The overall results suggest that children have greater difficulty producing oblique RCs than direct object RCs: not only did children produce substantially fewer target responses in the oblique RC condition than in the direct object RC condition, but they also made more grammatical errors in the former than the latter.\(^{11}\) Also, adults were likely in the oblique RC condition to choose a grammatical, semantically appropriate alternative response, suggesting that they were specifically “avoiding” oblique RCs by instead responding with a subject RC using different lexical items or with an oblique RC using a passive. That is, to avoid saying the box that the boy put the book on _, they might say the box that _ got the book from the boy or the box that the book is being put on _ by the boy.

Experiment 2 revealed three notable non-targeted response strategies. First, the syntactic structure was changed from active to passive in order to permit production of a

\(^{11}\) It has been argued that children avoid producing preposition stranding in English (Hilderbrand, 1987). However, later research has found that children both produced and comprehended preposition stranding unproblematically (French, 1984; McDaniel et al., 1998). In particular, McDaniel et al. (1998) examine the stranding and pied-piping possibilities in English-speaking children, using both an elicited production task and a judgment task. They reported (1) children’s frequent production and acceptance of preposition stranding and (2) rejection of preposition pied-piping. According to their analysis, the stranding alternative is favored because it involves movement of less material due.
subject rather than a direct object RC, as in (31a), and to permit production of an oblique RC in passive voice rather than an oblique RC with active voice, as in (31b).

(31)  a.  Target: the book [that the boy put _ on the box]
    Actual response: the book [that _ was put on the box]

    b.  Target: the box [that the boy put the book on _]
    Actual response: the box [that the book was put on _ by the boy]

Passivization provides approximately the same meaning as target responses in both direct object RC and oblique RC conditions. The strategy of responding with a passive structure to items that targeted direct object RCs has also been observed in previous research in English (Zukowski, 2009), Chinese (Hsu et al., 2009), and Korean (Kim, 2012). In terms of the intervening material between the filler and the gap, it is possible that adult and child speakers were trying to shorten the length of the filler-gap dependency, which is accomplished in both of the actual responses in (31). The results of this study confirm that in languages with postnominal RCs, direct object RCs are easier to produce than oblique RCs.

Second, lexical items were sometimes changed to allow production of a subject RC instead of an oblique RC (e.g., by using get or have instead of the target verb), as in (32).

(32)  Target: the box [that the boy put the book on _]
    Actual response: the box [that _ got the book from the boy]

Third, children produced resumptive NP errors, and they did so more often in the oblique RC condition than in the direct object RC condition. As mentioned in the discussion of Experiment 1, these resumptive NP errors can be explained in terms of
holding the planned head noun in working memory, as proposed by Hsu et al. (2009).

The need to reactivate the head noun in the gap position increases as production of the sentence progresses: children may feel this less strongly when they produce a direct object gap that comes earlier, as in the pattern $N \ [N \ V \ _\ OBL]$, and more strongly at the oblique gap that comes later, as in $N \ [N \ V \ DO \ _]$. This explanation suggests that there is a greater possibility that the head noun (or coreferential pronoun) will be uttered in the oblique gap position, resulting in a resumptive NP. Some studies have shown that the comprehension of direct object RCs with a resumptive pronoun did not differ from that of direct object RCs with a gap.\(^\text{12}\) This suggests that resumptive elements, whether NPs or pronouns, are used as a way to facilitate production rather than comprehension.

Targeted responses were higher in the direct object RC condition than in the oblique RC condition, an asymmetry not yet discussed in the literature. The attempted elicitation of oblique RCs sometimes created confusion and even a breakdown in grammaticality. This pattern of findings is consistent with the predictions made by the linear distance hypothesis, the structural distance hypothesis, and the semantic prominence hypothesis because all three predict that oblique RCs are more difficult to produce.

\(^{12}\) Friedmann and Novogrodsky (2004) and Friedmann et al. (2009) showed that resumptive pronouns in Hebrew are optional with the type of object relatives used in their study. According to their results, the comprehension of object relatives with a resumptive pronoun did not differ from the comprehension of object relatives with a gap. Under this result, resumptive and non-resumptive relatives differ only in a minimal fashion, in that movement is the common dependency-creating operation and a trace is involved in both cases, except that the trace is overtly signaled by the stranded pronoun in the resumptive relative.
2.3 Short Oblique vs. Long Oblique RCs in English

2.3.1 Introduction

Experiment 3 aims to test the predictions of the three different hypotheses regarding the possible role of frequency in understanding RC asymmetries. In Experiment 3, two types of oblique RCs, both involving a directional prepositional phrase, are compared while controlling for animacy, word order canonicity, and frequency.

Though oblique RCs of both types are low in frequency in some corpora (Hale, 2006, p. 658), have similar word order canonicity, and contain inanimate nouns, the two patterns differ in terms of the length of the filler-gap dependency (FGD), which is shorter in (33a) than in (33b).

(33) a. Oblique RC with short FGD:  
   the car [that the boy walked from _ to the church]

b. Oblique RC with long FGD:  
   the church [that the boy walked from the car to _]

The linear distance hypothesis predicts that oblique RCs with a short FGD, such as (34a), will be easier to process than oblique RCs with a long FGD, such as (34b).

(34) a. Oblique RC with short FGD:  
   the car [that the boy walked from _ to the church]

   1   2

b. Oblique RC with long FGD:  
   the church [that the boy walked from the car to _]

   1   2   3

Two referential elements (the boy, walked) intervene between the filler (the car) and the gap in (34a); but in (34b), three referential elements (the boy, walked, the car) intervene between the filler (the church) and the gap. Thus, this hypothesis predicts that in English,

---

13 Hale counted the number of occurrences of RC types in the Brown corpus in which subject RCs are more frequent than direct object RCs, and both of these RC types are more frequent than oblique RCs.
oblique RCs with a longer FGD will be more difficult for children than oblique RCs with a shorter FGD.

The structural distance hypothesis does not predict a difference between the oblique RCs with a short FGD and oblique RCs with a long FGD. As illustrated in (35), three nodes intervene between the filler and the gap both in oblique RCs with a short FGD and in oblique RCs with a long FGD conditions. The two oblique RCs are thus actually equal in terms of intervening nodes.

(35)  a. Oblique RC with short FGD:

```
  NP
   \-- N the car that \-- S'
       \-- SVP PP PP
       \-- V walked PP PP
           \-- P NP P NP
               \-- from to the church
```

Number of nodes between the head noun and gap: 3 (S, VP, PP)
b. Oblique RC with long FGD:

```
the church [that the boy walked from the car to the church]
```

Number of nodes between the head noun and gap: 3 (S, VP, PP)

The semantic prominence hypothesis also appears not to choose between the two types of RCs, as all obliques have the same status in the topicality hierarchy (S > DO > IO > OBL).

(36) a. Oblique RC with a short FGD:

```
less topic-worthy
the car [that the boy walked from _ to the church]
```

b. Oblique RC with a long FGD:

```
less topic-worthy
the church [that the boy walked from the car to _]
```

However, as noted by Givón (1988, p. 245), topicality can also be reflected in word order, in which the ‘topic’ portion of the clause (corresponding to the theme, given, known, or old information) precedes the ‘focus’ (corresponding to the rheme or new
information). If this is right, then the relativized item in the short filler-gap position in (36a) is arguably somewhat more topic-worthy than the relativized item in the long filler-gap position as in (36b). The semantic prominence hypothesis would then predict that oblique RCs with a short FGD will be produced more easily than oblique RCs with a long FGD since the latter involves a less topic-worthy referent than the former, as shown in (37).

(37) a. Oblique RC with a short FGD:  

\[ \text{more topic-worthy} \]

the car [that the boy walked from \_ to the church]

b. Oblique RC with a long FGD:  

\[ \text{less topic-worthy} \]

the church [that the boy walked from the car to \_]

2.3.2 Method

Participants. Twenty-one adult native speakers of English formed the control group for Experiment 3, and their responses were compared with L1 child responses. The 21 in this study were the same as those native English-speaking children (age 5;0 to 6;10, mean = 6;3) who took part in Experiments 1 and 2. Experiment 3 was conducted one week after Experiment 2 to avoid a task effect.

Materials and design. As in the previous experiments, the task involved 10 test items and two conditions (oblique RC with short FGD vs. oblique RC with long FGD). The items

---

Many scholars similarly observed that adults prefer to order ‘old’ information before ‘new’ information (Birner & Ward, 1998; Levelt, 1989; Menyuk, 1969; Prince, 1998) because adults typically mentioned ‘old or accessible’ referents first, before they introduce new or inaccessible referents that have not yet been mentioned in the discourse.
were distributed into four lists. Instances of each type of RC appeared consecutively. It
took approximately ten minutes to finish the task.

All test items consisted of two picture pairs, with each picture containing one
character and two locations (source and goal), and the participants were asked to describe
the object in the location indicated by the arrow. All test items were semantically
reversible, with two inanimate objects corresponding to locations, so as to ensure that the
participants could not rely on lexical and pragmatic clues, including real-world
knowledge. For example, a test item such as (38a) is equally plausible pragmatically
when the NPs are reversed, as in (38b).

(38)  a.   Target: the church [that the boy walked from the car to _]
   b.   Reversed: the car [that the boy walked from _ to the church]

To elicit an oblique RC with a short FGD, the experimenter gave the participant a
pair of pictures (e.g., Figure 2.5a) and a recorded native English speaker voice described
the action in each picture (i.e., “In the first picture, a boy is walking from a car to a
church. In the second picture, a boy is walking from a tree to a church”).

Figure 2.5a. An initial picture pair used to elicit an oblique RC with a short FGD

Then there was the sound of beep and an arrow appeared pointing at one of four objects
(e.g., Figure 2.5b).
Figure 2.5b. A second picture pair used to elicit an oblique RC with a short FGD

One referent had the thematic role of *source* of an action and was marked with an arrow, as shown in Figure 2.5b. This was expected to elicit a targeted response that included an oblique RC such as “(The arrow is on) the car [that the boy is walking from _ to the church].”

To elicit an oblique RC with a long FGD, the participant was shown a pair of pictures (e.g., Figure 2.6a) and given the same auditory prompt used in the oblique RCs with a short FGD (i.e., “In the first picture, a boy is walking from a car to a church. In the second picture, a boy is walking from a tree to a church”).

Figure 2.6a. An initial picture pair used to elicit an oblique RC with a long FGD
A location corresponding to the goal was then targeted with an arrow in a second pair of pictures (e.g., Figure 2.6b) in order to elicit an oblique RC with long FGD, such as “(The arrow is on) the church [that the boy is walking from the car to _].”

Figure 2.6b. A second picture pair used to elicit an oblique RC with a long FGD

**Procedure.** The procedure was the same as described in Experiments 1 and 2.

**Adult group.** Twenty-one adults yielded a total of 210 (10 × 21) responses, 105 (5 × 21) for the oblique RC in the short FGD condition and 105 (5 × 21) for the oblique RC in the long FGD condition. All data were included in the statistical analysis.

**Child group.** Twenty-one participants yielded a total of 210 (10 × 21) responses, 105 (5 × 21) for the oblique RC in the short FGD condition and 105 (5 × 21) for the oblique RC in the long FGD condition. No response was disregarded, and all were included in the statistical analysis.

**2.3.3. Results**

**2.3.3.1 Performance on oblique RCs with short FGDs vs. oblique RCs with long FGDs**

This RC production task consistently elicited RCs from English native adults and children. In addition to the targeted patterns (i.e., an oblique RC with a short FGD and an oblique RC with a long FGD), a variety of other response types were found, especially in
contexts designed to elicit an oblique RC with a short FGD, as illustrated with the help of Figure 2.5b, repeated below.

![Figure 2.5b](image)

Figure 2.5b. A picture pair used to elicit an oblique RC with a short FGD

(39) Target response (an Oblique RC with a short FGD):
the car [that the boy is walking from _ to the church]

Non-targeted responses:

a. Targeted RC with goal deletion
the car [that the boy is walking from _]

b. Resumptive NP
the car [that the boy is walking from the car to the church]

c. Preposition ‘from’ deletion
the car [that the boy is walking to the church]

d. Coordinate pattern that avoids a targeted RC
the car [that the boy came from _ ] and walked to the church

e. RC involving a reversal in grammatical relations
the car [that the boy is walking from the church to _]

f. Other error types
the boy is walking from the car

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out

by the arrow; the example in (39a) falls into this category, as it accurately describes

the car on the left side by means of a well-formed structure.
(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of the referent, or both; examples (39b) – (39f) fall into this category.

Tables 2.5 and 2.6 summarize the response types produced by our adult and child participants in the contexts designed to elicit the two types of oblique RCs.

Table 2.5. Percentages of different types of responses in each category for each RC condition by adults ($N = 21$)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Oblique RC with short FGD</th>
<th>Oblique RC with long FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>99.05% (104/105)</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change the order of the PPs</td>
<td>0% (0/105)</td>
<td>96.2% (101/105)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC involving a reversal in grammatical relations</td>
<td>0.95% (1/105)</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>0% (0/105)</td>
<td>1.9% (2/105)</td>
</tr>
<tr>
<td>Other error types</td>
<td>0% (0/105)</td>
<td>1.9% (2/105)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (105/105)</td>
<td>100% (105/105)</td>
</tr>
</tbody>
</table>

Table 2.6. Percentages of different types of responses in each category for each RC condition by children ($N = 21$)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Oblique RC with short FGD</th>
<th>Oblique RC with long FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>13.4% (14/105)</td>
<td>2.8% (3/105)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change the order of the PPs</td>
<td>0% (0/105)</td>
<td>7.6% (8/105)</td>
</tr>
<tr>
<td>PP deletion</td>
<td>18% (19/105)</td>
<td>8.5% (9/105)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC involving a reversal in grammatical relations</td>
<td>0.9% (1/105)</td>
<td>2.9% (3/105)</td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>8.6% (9/105)</td>
<td>42.9% (45/105)</td>
</tr>
<tr>
<td>Resumptive pronoun</td>
<td>0% (0/105)</td>
<td>0.9% (1/105)</td>
</tr>
<tr>
<td>Preposition ‘from’ deletion</td>
<td>46.7% (49/105)</td>
<td>0% (0/105)</td>
</tr>
<tr>
<td>Preposition ‘to’ deletion</td>
<td>0% (0/105)</td>
<td>26.7% (28/105)</td>
</tr>
<tr>
<td>Coordinate pattern</td>
<td>8.6% (9/105)</td>
<td>2.9% (3/105)</td>
</tr>
<tr>
<td>Other error types</td>
<td>3.8% (4/105)</td>
<td>4.8% (5/105)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (105/105)</td>
<td>100% (105/105)</td>
</tr>
</tbody>
</table>

**Target responses**

The asymmetry in targeted responses between the two conditions was striking for adult group. The asymmetry in targeted responses between the two conditions was very remarkable: 99.05% for oblique RCs with a short FGD compared to 0% for oblique RCs with a long FGD ($t(20) = 46.556, p < 0.001$). Even if the child group showed a higher
rate of targeted responses in the short FGD condition (13.4%) than in the long FGD condition (2.8%), the analysis did not reveal a significant main effect of RC condition for children ($t(20) = -1.633, p = .118$). These effects were tested for significance with a two-way mixed model ANOVA with group (adult/child) as the between-subject factor and gap position (OBL RC with a short FGD/OBL RC with a short FGD) as the within-subject factor. The analysis revealed a significant main effect of gap position (OBL RCs with short FGD > OBL RCs with long FGD: $F(1, 40) = 254.360, p < 0.001$) and a main effect of group (adults > children: $F(1, 40) = 144.544, p < 0.001$). Also, there was significant interaction between group and gap position ($F(1, 40) = 164.960, p < 0.001$), confirming that the difference in targeted response between the oblique RCs with a short FGD and the oblique RCs with a long FGD was larger for the child group than for the adult group. Thus, regardless of group, the participants produced more targeted responses for oblique RCs with a short FGD than for oblique RCs with a long FGD, and that regardless of the condition, the adults produced more targeted responses than did the children.

**Acceptable responses**

For adults an asymmetry in appropriate responses (i.e., target responses or acceptable alternatives) between the two conditions was not found: 99.05% for oblique RCs with a short FGD compared to 96.2% for oblique RC with a long FGD ($t(20) = 1.164, p = .258$). Children produced significantly more appropriate responses in the short FGD condition than in the long FGD condition (31.4% vs. 18.9%, $t(20) = -3.008, p = .007$).
2.3.3.2 Response strategies

Turning now to the types of responses produced by our participants, let us begin by considering the range of options observed when an oblique RC with a short FGD and an oblique RC with a long FGD were elicited.

2.3.3.2.1 Oblique RCs with short FGDs

Response strategies by adult participants

The adult participants produced the targeted RC over 99% of the time, as shown in (40).

(40) Target response:
the car [that the boy is walking from _ to the church]

Response strategies by child participants

When children did not produce a targeted RC in the short FGD condition, their responses primarily involved (i) deletion of the goal argument (18%); (ii) a resumptive NP error (8.6%); (iii) preposition deletion (46.7%); or (iv) a coordinate pattern (8.6%).

i. Goal deletion. Of the targeted responses in the short FGD condition, 18% involved an RC with the goal phrase deleted, as in (41). I considered this to be non-targeted but appropriate because it is an oblique RC with a short FGD.

(41) Target:
the car [that the boy is walking from _ to the church]

   RC with goal deletion:
the car [that the boy is walking from _]

ii. Resumptive NP. Children inserted a resumptive NP instead of leaving a gap, as shown in (42); of all 105 responses in the short FGD condition, 8.6% contained a resumptive NP error. Adults never produced this error.

(42) Resumptive NP:
the car [that the boy is walking from the car to the church]
iii. **Preposition deletion.** Unlike adults, when children did not produce a targeted RC in the short FGD condition, 46.7% of the overall responses involved an ungrammatical RC with deletion of the preposition preceding the gap, as in (43).

(43) Target response:
the car [that the boy is walking from _ to the church]

Preposition ‘from’ deletion:
the car [that the boy is walking _ to the church]

iv. **Coordinate pattern.** Of overall responses in the short FGD condition, 8.6% contained a coordinate structure to avoid producing an RC, as in (44).

(44) Coordinate pattern that avoids a targeted RC:
the car [that the boy came from _ ] and walked to the church

2.2.3.2.2 Oblique RCs with long FGDs

In addition to the targeted patterns (i.e., oblique RC with a long FGD), a variety of other response types were found, in contexts that were designed to elicit an oblique RC with a long FGD, as illustrated with the help of Figure 2.6b, repeated below.

![Figure 2.6b. A second picture pair used to elicit an oblique RC with a long FGD](image)

(45) Target response (Oblique RCs with a long FGD):
the church [that the boy is walking from the car to _ ]
Non-targeted responses:
a. PP order change
   the church [that the boy is walking to _ from the car]

b. Source deletion
   the church [that the boy is walking to _ ]

c. Resumptive NP
   the church [that the boy is walking from the car to the church]

d. Preposition ‘to’ deletion
   the church [that the boy is walking from the car_] 

e. Coordinate pattern that avoids a targeted RC
   the church [that the boy walked to _ ] and came from the car

f. Other error type
   the boy is walking from the car to the church

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
   by the arrow; the examples in (45a) and (45b) fall into this category, as they both
   accurately describe the left church by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
   the referent, or both; examples (45c) – (45f) fall into this category.

**Response strategies by adult participants**

When adults did not produce the targeted RC in the long FGD condition, they almost
always produced a well-formed and semantically appropriate oblique RC with a short
FGD. As shown in (46), 96.2% of the overall responses involved producing an oblique
RC with a short FGD with a goal-source order, resulting in the same approximate
meaning as the targeted oblique RC with a long FGD. In other words, they produced
short FGD oblique RCs instead of long FGD oblique RCs.
Response strategies by child participants

When children did not produce a targeted RC in the long FGD condition, their primary responses involved producing (i) oblique RCs using goal-source order (7.6%); (ii) oblique RCs with resumptive NPs (42.9%); (iii) ungrammatical RCs using preposition deletion (26.7%); or (iv) oblique RCs using source deletion (8.5%).

i. Oblique RCs using goal-source order. Like adults, when children did not produce a targeted RC in the long FGD condition, 7.6% of the overall responses contained an oblique RC with a short FGD. The shortened FGD was achieved by reordering the two prepositional phrases to produce an RC with the same meaning as the target RC, as shown in (46).

ii. Resumptive NP. As shown in (47), 42.9% of responses included a resumptive NP error in the long FGD condition.

iii. Preposition deletion. Unlike adults, 26.7% of responses in the long FGD condition contained ungrammatical responses without the ‘to’ preposition, as exemplified in (48).

iv. Source deletion. Of responses in the long FGD condition, 8.5% contained an oblique RC with a source deletion, which had the effect of shortening the FGD.
Source deletion:
the church [that the boy is walking to _]

As shown in (49), while the targeted response contains two directional prepositional phrases—source (from the car) and goal (to the church)—the speaker failed to produce the source phrase but included the goal phrase.

2.4 Experiment 3b

The purpose of Experiment 3b is to extend our inquiry to patterns in which the ordering of the two obliques in the recorded prompt is reversed. This experiment considers the question of whether PP order affects the asymmetry in L1 adults’ production of two oblique RCs—with short and long FGD. English allows two different patterns: (i) S-V-OBL (source)-OBL (goal); (ii) S-V-OBL (goal)-OBL (source). As shown in (50), these elements can be freely ordered with respect to each other because of the presence of the contrasting prepositions from and to. This additional study examines the S-V-OBL (goal)-OBL (source) as in (50b).

(50)  a.  S-V-OBL (source)-OBL (goal)
The boy is walking from the car to the church.

Oblique RC with a short FGD
the car [that the boy walked from_ to the church]

Oblique RC with a long FGD
the church [that the boy walked from the car to_]

b. S-V-OBL (goal)-OBL (source)
The boy is walking to the church from the car.

Oblique RC with a short FGD
the church [that the boy walked to _ from the car]

Oblique RC with a long FGD
the car [that the boy walked to the church from _]
Participants. Sixteen adult native speakers of English formed the control group for the experiment. Their responses were compared with L1 child responses (and also L1 adult responses in Experiment 3a). The participants in this study included 5 native English-speaking children (age 6;3 to 6;10, mean = 6;4). The child/adult participants in Experiment 3b were different from the child participants who took part in Experiments 1, 2, and 3a.

Materials and design. Like Experiment 3a, the task consisted of 10 test items and involved two conditions (oblique RCs with a short FGD and oblique RCs with a long FGD). However, in this experiment, prompts having S-V-OBL (source)-OBL (goal) order were used to elicit two oblique RCs. A complete list of test sentences can be found in Appendix D.

Procedure. The procedure was the same as described in Experiment 3a.

2.4.1 Results

2.4.1.1 Performance on oblique RCs with short FGDs vs. oblique RCs with long FGDs)

This RC production task consistently elicited RCs from English native adults and children. In addition to the targeted patterns (i.e., two oblique RCs), a variety of other response types were found, in contexts that were designed to elicit an oblique RC with a short FGD, as illustrated with the help of Figure 2.7, repeated below.
Figure 2.7. A picture pair used to elicit an oblique RC with a short FGD

(51) Target response (Oblique RC with a short FGD):
    the church [that the boy walked to _ from the car]

Non-targeted responses:

a. Targeted RC with a source deletion
   the church [that the boy is walking to _]

b. Resumptive NP
   the church [that the boy walked to the church from the car]

c. Preposition ‘to’ deletion
   the church [that the boy walked from the car]

d. Coordinate pattern that avoids a targeted RC
   the church that the boy is walking to_ and came from the car

e. Other error types
   the boy is walking to the church from the car

The non-target responses can be subdivided into two classes:

(i) acceptable alternative that offers well-formed descriptions of the referent singled out
    by the arrow; the example in (51a) falls into this category, as it accurately describes
    the church in the picture on the left by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
    the referent, or both; examples (51b) – (51e) fall into this category.
Tables 2.7 and 2.8 show that, for both children and adults, target responses were more likely to occur in oblique RCs with a short FGD than in oblique RCs with a long FGD.

Table 2.7. Percentages of different types of responses in each category for each RC condition by adults (N = 16)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Oblique RC with short FGD</th>
<th>Oblique RC with long FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>100% (80/80)</td>
<td>1.3% (1/80)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>0% (0/80)</td>
<td>97.4% (78/80)</td>
</tr>
<tr>
<td>Change the order of the PPs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other error types</td>
<td>0% (0/80)</td>
<td>1.3% (1/80)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (80/80)</td>
<td>100% (80/80)</td>
</tr>
</tbody>
</table>

Table 2.8. Percentages of different types of responses in each category for each RC condition by children (N = 5)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Oblique RC with short FGD</th>
<th>Oblique RC with long FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>20% (5/25)</td>
<td>0% (0/25)</td>
</tr>
<tr>
<td>Change the order of the PPs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP deletion</td>
<td>8% (2/25)</td>
<td>0% (0/25)</td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>24% (6/25)</td>
<td>32% (8/25)</td>
</tr>
<tr>
<td>Resumptive pronoun</td>
<td>0% (0/25)</td>
<td>4% (1/25)</td>
</tr>
<tr>
<td>Preposition ‘from’ deletion</td>
<td>0% (0/25)</td>
<td>28% (7/25)</td>
</tr>
<tr>
<td>Preposition ‘to’ deletion</td>
<td>32% (8/25)</td>
<td>0% (0/25)</td>
</tr>
<tr>
<td>Coordinate pattern</td>
<td>16% (4/25)</td>
<td>16% (4/25)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (25/25)</td>
<td>100% (25/25)</td>
</tr>
</tbody>
</table>

**Target responses**

Paired-sample *t*-tests suggested that adults tended to produce more targeted responses in the short FGD condition than in the long FGD condition (100% for oblique RCs with a short FGD compared to 1.3% for oblique RCs with a long FGD (*t*(15) = -79, *p* < 0.001). The child group showed a higher rate of targeted responses in the oblique RC with a short FGD condition (20%) than in the oblique RC with a long FGD condition (0%). However, the analysis did not reveal a significant main effect of RC condition for children because of small number of participants (*t*(4) = -1.520, *p* = .203).
The analysis revealed a significant main effect of gap position (OBL RCs with short FGD > OBL RCs with long FGD: $F(1, 19) = 28.995, p < 0.001$) and a main effect of group (adults > children: $F(1, 19) = 24.507, p < 0.001$). Also, there was significant interaction between group and gap position ($F(1, 19) = 13.216, p = .002$), confirming that the difference between the oblique RCs with a short FGD condition and the oblique RCs with a long FGD condition was larger for the child group than for the adult group.

Regardless of group, the participants produced more targeted responses in the short FGD condition than in the long FGD condition, and that regardless of the types of conditions, the adults produced more targeted responses than did the children.

**Acceptable responses**

The asymmetry in appropriate responses between the two conditions was not striking for both groups: for adults; 100% for oblique RCs with a short FGD compared to 98.7% for oblique RC with a long FGD, $t(15) = -1.000, p = .333$; for children; 28% vs. 20%, $t(4) = -.331, p = .757$).

### 2.4.1.2 Response strategies

Turning now to the types of responses produced by our participants, let us begin by considering the range of options observed when an oblique RC with a short FGD and an oblique RC with a long FGD were elicited.

#### 2.4.1.2.1 Oblique RCs with short FGDs

**Response strategies by adult participants**

The adult participants produced the targeted RC 100% of the time, as shown in (52).

(52) Target response:
    the church [that the boy walked to _ from the car]
**Response strategies by child participants**

When children did not produce a targeted RC in the short FGD condition, their responses primarily involved (i) a resumptive NP error (24%); (ii) preposition deletion (32%); or (iii) a coordinate pattern (16%).

**i. Resumptive NP.** Children inserted a resumptive NP instead of leaving a gap, as shown in (53); of all 25 responses in the short FGD condition, 24% contained a resumptive NP error.

(53)  
Resumptive NP:  
the church [that the boy walked to the church from the car]

**ii. Preposition deletion.** When children did not produce a targeted RC in the short FGD condition, 32% of the 25 responses involved an ungrammatical RC with the preposition preceding the gap deleted, as in (54).

(54)  
Preposition ‘to’ deletion  
the church [that the boy walked from the car]

**iii. Coordinate pattern.** Of overall responses in the short FGD condition, 16% contained a coordinate structure to avoid producing an RC, as in (55).

(55)  
Coordinate pattern that avoids a targeted RC:  
the boy went to the church and he came from the car

### 2.4.1.2.2 Oblique RCs with long FGDs

In addition to the targeted patterns (i.e., oblique RC with a long FGD), a variety of other response types were found, in contexts that were designed to elicit an oblique RC with a long FGD, as illustrated with the help of Figure 2.8b, repeated below.
Figure 2.8. A picture pair used to elicit an oblique RC with a long FGD

(56) Target response (Oblique RC with a long FGD):
the car [that the boy walked to the church from _]

Non-targeted responses:
  a. Goal deletion
      the car [that the boy walked from _]
  b. PP order change
      the car [that the boy walked from _ to the church]
  c. Resumptive NP
      the car [that the boy walked to the church from the car]
  d. Preposition ‘from’ deletion
      the car [that the boy walked to the church _]

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
    by the arrow; the examples in (56a) and (56b) fall into this category, as they
    accurately describe the car in the left picture by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
    the referent, or both; examples (56c) – (56d) fall into this category.

Response strategies by adult participants

When adults did not produce a targeted RC in the long FGD condition, they almost
always produced a well-formed and semantically appropriate oblique RC with a short
FGD. As shown in (57), 97.4% of the overall responses involved producing an oblique RC with a short FGD with a source-goal order, resulting in the same approximate meaning as the targeted oblique RC with a long FGD. In other words, they produced oblique RCs with a short instead of a long FGD.

(57) Targeted response:
the car [that the boy walked to the church from _]

Change the order of the PPs:
the car [that the boy walked from _ to the church]

**Response strategies by child participants**

When children did not produce a targeted RC in the long FGD condition, their primary responses involved producing (i) oblique RCs using a source-goal order (20%); (ii) oblique RCs with resumptive NPs (32%); (iii) ungrammatical RCs using preposition deletion (28%); or (iv) a coordinate pattern (16%).

1. **Oblique RC using source-goal order.** Like adults, when children did not produce a targeted RC in the long FGD condition, 20% of the 25 responses contained an oblique RC with a short FGD. The shortened FGD was achieved by reordering the two prepositional phrases to produce an RC with the same meaning as the targeted RC, as shown in (57).

2. **Resumptive NP.** As shown in (58), 32% of responses included a resumptive NP error in the long FGD condition.

(58) Resumptive NP
the car [that the boy walked to the church from the car]

Resumptive Pronoun
the car [that the boy walked to the church from it]
iii. **Preposition deletion.** Unlike adults, 28% of responses in the long FGD condition contained ungrammatical responses without the ‘from’ preposition, as exemplified in (59).

(59)  Preposition ‘from’ deletion:  
the car [that the boy walked to the church]

iv. **Coordinate pattern.** Of responses in the long FGD, 16% contained a coordinate structure to avoid producing an RC, as in (60).

(60)  Targeted response:  
the car [that the boy walked to the church from __]  

Coordinate pattern:  
the boy came from the car and he went to the church

2.4.2 **Discussion**

The overall results indicate that children have greater difficulty than adults producing both oblique RCs with a short FGD and oblique RCs with a long FGD. Children also have greater difficulty with oblique RCs with a long FGD than with a short FGD: not only did children produce fewer targeted responses in the long FGD condition than the short FGD condition, they also made more grammatical errors in the former than in the latter. In addition, adults tended in the long FGD condition to produce a grammatical and semantically appropriate alternative response by changing the order of the prepositional phrases, resulting in oblique RCs with a short FGD, which suggests that they were “avoiding” long oblique RCs. That is, the adult group avoided producing *the church that the boy is walking from the car to __* by saying instead *the church that the boy is walking to __ from the car.*

Experiment 3a revealed three notable non-targeted response strategies. First, when long oblique RCs were targeted, the syntactic structure was often changed from
oblique RCs with a long FGD to oblique RCs with a short FGD, as in (61a). However, the reverse never happened. No one ever produced the response in (61b).

(61) a. Target: the church [that the boy walks from the car to _]
Actual response: the church [that the boy walks to _ from the car]

b. Target: the car [that the boy walks from _ to the church]
Actual response: the car [that the boy walks to the church from _]

It appears that both adults and children prefer the short FGD construction to the long FGD construction.

Second, English-speaking children tended to produce ungrammatical responses due to preposition deletion in Experiment 3a; they deleted *from* in the short FGD condition (46.7%) and *to* in the long FGD condition (26.7%). Interestingly, the production of gapless RCs appears to increase with the length of the FGD.

Third, children produced resumptive NP errors more often in the long FGD condition than in the short FGD condition. As explained in the discussion of Experiments 1 and 2, these resumptive NP errors can be explained in terms of holding the planned head noun in working memory. The need to reactivate the head noun in the gap position increases as production of the sentence progresses: children may feel this less strongly when they produce an oblique RC with a short FGD, as in the pattern N [NP V _ OBL], and more strongly with a long FGD, as in N [NP V OBL _]. There is thus a greater possibility that the head noun will be repeated in the long FGD condition, resulting in a resumptive NP.

Target responses were more likely in oblique RCs with a short FGD condition than in oblique RCs with a long FGD condition. This pattern of findings is consistent
with the prediction made by the linear distance hypothesis and the semantic prominence hypothesis because they both predict that oblique RCs with a long FGD will be more difficult to produce.

2.5 General discussion

The primary finding from Experiment 1 is that while adults and children had little trouble with production of subject RCs, they had difficulty with the production of indirect object RCs. From Experiment 2, we can conclude that children produce direct object RCs more successfully than oblique RCs. In Experiment 3, adults and children both preferred to produce oblique RCs with short FGDs when oblique RCs with long FGDs were targeted. The summary of the expected results based on the three hypotheses is presented in Table 2.9.

Table 2.9. Differing predictions of comparative difficulty (easier > harder)

<table>
<thead>
<tr>
<th></th>
<th>Linear distance hypothesis</th>
<th>Structural distance hypothesis</th>
<th>Semantic prominence hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject vs. Indirect object RCs</td>
<td>S &gt; IO</td>
<td>S &gt; IO</td>
<td>S &gt; IO</td>
</tr>
<tr>
<td>Direct object vs. Oblique RCs</td>
<td>DO &gt; OBL</td>
<td>DO &gt; OBL</td>
<td>DO &gt; OBL</td>
</tr>
<tr>
<td>OBL RCs with a short FGD vs. OBL RCs with a long FGD</td>
<td>Short OBL &gt; Long OBL</td>
<td>Short OBL = Long OBL</td>
<td>Short OBL &gt; Long OBL</td>
</tr>
</tbody>
</table>

The predictions of each hypothesis and their success can be summarized as follows: (1) longer filler-gap dependencies are harder than shorter filler-gap dependencies, which is supported by Experiments 1, 2, and 3; (2) gaps that are more deeply embedded in syntactic structure are harder than gaps that are less deeply embedded, which is supported by Experiments 1 and 2, but not by Experiment 3; and (3) the lower the topicality of the relativized element (S > DO > IO > OBL), the more difficult it is for the RC to be about the head, which is supported by Experiments 1, 2 and 3.
In sum, our findings are consistent with both the linear distance hypothesis and the semantic prominence hypothesis. This is because distance (length of the FGD) in English tends to be highly confounded with topicality (an instance of semantic prominence): subjects are more topical than direct objects and direct objects are more topical than obliques, given that older information tends to precede newer information in English. One way around this problem is to investigate the production of RCs in a language such as Korean, which places RCs before the nouns that they modify. Although the topicality contrasts do not change in such a language (subjects are still more topical than direct objects, and so on), the distance relationships do change. There are two ways of looking at this.

The traditional assumption is that in Korean, the gap in a subject RC is more distant from the head noun than, say, the gap in a direct object RC—the reverse of what we find in English.

(62) a. Subject relative clause (longer FGD):
[[_ yeca-lul po-nun] namca man]
woman-see-RC.prs 1

‘the man who sees the woman’

b. Direct object relative clause (shorter FGD):
[namca-ka _ po-nun] yeca man see-RC.prs woman

1

‘the woman who the man sees’

Another explanation, proposed in O’Grady (2011), holds that there are actually no genuine distance effects in Korean because one cannot ascertain the existence of a gap until one encounters the head noun. (Prior to the head noun, there is no way of knowing whether an apparent gap corresponds to a relativized element, or is simply a null
His idea on the distance is somewhat different from the filler-gap linear distance because he suggested that the distance between the head and the point in the RC where a connection is made to the verb. This approach can explain why English direct object RCs are harder to produce than subject RCs because there is longer distance between the head and the verb in (63b).

(63) a. Subject RC: the man [that sees the woman]  
       <agent, theme>  
       |_________|

       b. Direct object RC: the woman [that the man sees]  
       <agent, theme>  
       |___________________|

However, in Korean, as shown in (64), the verb is adjacent to the head noun in both conditions. The verb is associated with the agent role in subject RCs as in (64a), but the verb is associated with the theme role in direct object RCs as in (64b).

(64) a. Subject relative clause:  
   [ ye-calul po-nun] namca  
   woman.Acc see-RC.prs man  
   <agent, theme>  
   |_________|

   ‘the man who sees the woman’

   b. Direct object relative clause:  
   [ namka-ka po-nun] yeca  
   man-Nom see-RC.prs woman  
   <agent, theme>  
   |_________|

   ‘the woman who the man sees’

Either way, the key point is this: topicality is dissociated from distance effects in Korean. Therefore, if we find that Korean shows the same RC preferences as English, it
can only be for reasons relating to topicality. That, in turn, would lead us to infer that topicality is also responsible for the preferences observed in English.
CHAPTER 3
FIRST LANGUAGE ACQUISITION OF KOREAN RCs

3.1 Acquisition of Korean RCs

Korean is a head-final language with subject-object-verb (SOV) word order, as shown in (1a). Subject RCs and direct object RCs are formed as shown in (1b) and (1c), respectively. RCs are prenominal in Korean and contain a gap that indicates the grammatical role of the relativized item. In (1b), the subject namca (‘man’) is relativized, as shown by the gap in the subject position. In (1c), the direct object yeca (‘woman’) is relativized, as indicated by the gap in the direct object position.

(1) a. namca-ka yeca-lul pon-ta.
    man-Nom woman-Acc see
    ‘The man sees the woman.’

b. Subject RC: only an accusative appears inside the RC
   [__ yeca-lul po-nun] namca
   woman-Acc see-RC.Prs man
   ‘the man [who __ sees the woman]’

c. Direct object RC: only a nominative appears inside the RC
   [namca-ka __ po-nun] yeca
   man-Nom see-RC.Prs woman
   ‘the woman [who the man sees __]’

As illustrated in these examples, there are no relative pronouns in Korean. The marking of RCs involves a set of verbal suffixes, including -un (retrospective), -nun (ongoing) and -ul (prospective), which are sometimes called relativizers.

In previous studies, a preference for subject relatives over direct object relatives in Korean has been observed among various groups and with different tasks (Jeon & Kim, 2007; Kim, 1987; Kwon et al., 2006; Lee-Ellis, 2011; O’Grady et al., 2001, 2003).
Research using a self-paced reading task (Kwon et al., 2006), eye-tracking (Kwon et al., 2010), and ERP measurements (Kwon et al., 2008) has demonstrated a processing advantage in Korean for subject RCs as compared with object RCs by testing adult native-speakers of Korean.

Based on data from 16 adult heritage learners of Korean, O’Grady et al. (2001) offer further evidence of the asymmetry between subject RCs and direct object RCs in Korean, demonstrating that subject RCs were understood 65% of the time, while direct object RCs were understood only 41.3% of the time. O’Grady et al.’s (2003) research on second language acquisition tested the difficulty associated with processing Korean RCs by using a comprehension task. It was found that 53 second-language speakers of Korean understood subject RCs more reliably (73.2%) than direct object RCs (22.6%). These studies have provided apparent support for the relationship between the NPAH (Keenan & Comrie, 1977) and the acquisition of RCs.15

Studies using both comprehension and production tasks have also established that children learning Korean as a first language perform better on subject relatives than on object relatives (Cho, 1999; Clancy et al., 1986; Kim, 1987; Lee, 1981). Clancy et al. (1986) conducted an act-out comprehension task with 30 Korean-speaking children (aged from 6;3 to 7;3) to study processing strategies associated with the development of RCs. Results demonstrated that children comprehended subject RCs (78.25%) better than direct object RCs (68.25%) in sentences where the RC modifies the subject of the matrix clause.

15 In contrast, some researchers have shown that the NPAH does not predict the acquisition findings of prenominal RCs in East Asian languages (e.g., Matthews & Yip, 2003; Ozeki & Shirai, 2007a, 2007b, 2010; Yip & Matthews, 2007). Comrie (2002, 2007) argued that East Asian RCs are noun-modifying clauses and should be classified as attributive clauses. Attributive RCs are neutral to the hypotheses for the NPAH; there is thus no prediction for an advantage of subject RCs over direct object RCs.
Kim (1987) examined longitudinal data from the spontaneous speech of three Korean children. She noted that the children first produced RCs around the age of 2. The earliest type of RC produced by children was a headless construction as shown in (2).

(2) Headless RC
\[\text{namca po-nun} \quad \text{ke} \]
\[\text{man see-RC.Prs thing} \quad \text{ke} \]
\[\text{‘what the man saw’} \quad \text{Data from Kim (2012)}\]

Later, they produced patterns such as (3), in which \( ke(s) \) is followed by a lexical head noun.

(3) Kes and a lexical head noun
\[\text{yeca po-nun kes} \quad \text{salam} \]
\[\text{woman see-RC.Prs thing person} \quad \text{ke} \]
\[\text{‘The man, the one who is seeing the woman’} \quad \text{Data from Kim (2012)}\]

Lee (1991) examined the natural speech data of 36 children from 1;4 to 3;9 years of age. She reported that Korean-speaking children begin to produce headless RC constructions and then progress to head-internal RCs, and finally to head-external RCs. The link between age and type of RC produced indicated that the occurrence of head-internal RC types emerged earlier than the head-external RC type. In her data, 50% of the RCs were direct object RCs and 33% were subject RCs in head-internal relative constructions as in (4a); however, 77% were subject RCs and 23% were direct object head-external RCs as in (4b).
(4) a. Head-internal RC
[namca-ka yeca-lul po-nun] kes
man-Nom woman-Acc see-RC.Prs thing
‘The woman who the man is seeing’
Data from Kim (2012)

b. Head-external RC
[namca-ka po-nun] yeca
man-Nom see-RC.Prs woman
‘The woman who the man sees’
Data from Kim (2012)

To my knowledge, Cho’s (1999) research is the only empirical study on first language acquisition that tested the difficulty of Korean RCs by using an elicited production task. His research with production data from children between 4 and 7 years of age demonstrated that children produced subject RCs better than direct object RCs. While direct object relativization occurred more frequently than subject relativization (36.8% vs. 31.1%) in head-internal constructions, subject relativization was more frequent than direct object relativation (48.4% vs. 36.3%) in head-external constructions. The results of his comprehension task mirrored those of his production task–subject RCs were processed with greater accuracy than direct object, indirect object, or oblique RCs. He concluded that children had more difficulty producing and comprehending direct object RCs than subject RCs.18

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17 Lee-Ellis (2011) conducted a study that elicited the production of Korean RCs from heritage speakers. Her study is not included in this discussion because the focus of the current study is on acquisition by monolingual Korean children.

18 However, Cho’s study had some limitations. First, the materials may have been too difficult for the children. Despite the subject RC preference, target responses in both subject and object relative conditions were quite low overall (21% vs. 17% of responses). The fact that the children heard two verbs in the lead-in description and also saw two different actions in the pictures may have had an effect on their production. Second, the error patterns were not categorized with adequate detail. Cho categorized the children’s grammatical responses into three types. However, it is necessary to consider the details of children’s production data in order to see why children avoid some types of RCs but produce other, alternative clauses. More specific analysis of non-target responses, ungrammatical responses, and RC type errors should be explored rigorously for a better understanding of children’s difficulties in producing RCs.
Kim (2012) indicated that in a production task Korean monolingual children (mean age 6;8) performed far better on subject RCs than on direct object RCs, with 82.8% accuracy for the subject RCs and only 50.4% accuracy for the direct object RCs. Among the types of errors observed, head-internal RCs in (4a) and a resumptive NP in (5) outnumbered any other type of error. The children also produced RCs involving a reversal error and a head error more in the direct object RC condition than in the subject RC condition.

(5) Resumptive NP:¹⁰
[namca-ka yeeca-lul po-nun] yeeca-ey-yo
man-Nom woman-Acc see-RC.Prs woman-Dat-Reg
‘The man sees the woman’

In sum, work on L1 acquisition of Korean generally suggests that subject RCs are easier than their direct object RCs in both comprehension and production. In particular, the higher frequency of head-internal RCs and resumptive NP errors in the direct object RC condition implies that direct object RCs are more difficult than subject RCs to produce as a head-external construction. This finding is consistent with the NPAH.

In order to tease apart distance and animacy expectation, while at the same time dealing with animacy considerations, Experiment 4 compared subject and indirect object RCs, exemplified in (6).

(6) a. Subject RC:
[ _ sonye-eykey kapang-ul cwu-koiss-nun] sonyen
girl-Dat bag-Acc give-Asp-RC.Prs boy
‘the boy [that _ is giving a bag to the girl]’

¹⁰This error type is called a resumptive NP error in the English data in Chapter 2.
b. Indirect object RC

[sonye-ka  _ kapang-ul cwu-koiss-nun]  sonyen
   girl-Nom  bag-Acc  give-Asp-RC.Prs  boy
   ‘the boy [that the girl is giving a bag to_]’

The patterns in (6) have the advantage of being semantically reversible since both the subject and the indirect object in such patterns are typically animate. This neutralizes the animacy factor, allowing us to focus on the difference in the distance between gap and filler in the two types of RCs. If the linear distance is a crucial factor in determining the production difficulty of an RC, the indirect object RC type should be significantly easier to produce than its subject counterpart.

However, there is an issue with respect to word order in subject RCs and indirect object RCs comparison. Whereas the indirect object RC follows a canonical subject-first word order, the subject RC shows a non-canonical pattern.

(7) a. Subject RC:

[  _  sonye-eykey  kapang-ul cwu-koiss-nun]  sonyen
   girl-Dat  bag-Acc  give-Asp-RC.Prs  boy
   IO  DO  V  S
   ‘the boy [that _ is giving a bag to the girl]’

b. Indirect object RC

[sonye-ka  _ kapang-ul cwu-koiss-nun]  sonyen
   girl-Nom  bag-Acc  give-Asp-RC.Prs  boy
   S  DO  V  IO
   ‘the boy [that the girl is giving a bag to_]’

To control word order canonicity, I compare the difficulty of direct object RCs with their oblique counterparts in Experiment 5 because both patterns exhibit the subject-first word order. In addition, both patterns in (8) have typically inanimate head noun, which neutralizes animacy expectations.20

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20 My suite of experiments also initially included a contrast between short and long oblique RCs, parallel to those reported for English in experiment 3 of the preceding Chapter. However, a methodological problem precludes the interpretation of those results, which I therefore will not report here.
a. Direct object RC:
[sonyen-i sangca-wiey _ noh-un] chayk
boy-Nom box-Loc put-Asp-RC.Pst book
‘the book [that the boy put _ on the box]’

b. Oblique RC:
[sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
‘the box [that the boy put the book on _]’

3.2 Subject vs. Indirect object RCs in Korean

3.2.1 Introduction

This study investigates Korean-speaking children’s production of RCs and deals with the relationship between sentence structure and sentence production to test the predictions of the three different hypotheses regarding the source of the asymmetry that was consistently observed in the English RC production reported in Chapter 2. I examine the three different potential explanations of RC processing difficulty by studying young children’s production of prenominal RCs in Korean. Lower rates of production of a targeted structure and higher rates of production of alternative responses (or errors) can indicate greater difficulty with a targeted structure. In addition to reporting rates of errors in the subject vs. indirect object gap conditions, I also analyze the types of errors found in children’s responses.

The linear distance hypothesis predicts that in a language with prenominal RCs, indirect object RCs will be easier to process than subject RCs. This is because the linear distance between the gap and the filler is shorter in indirect object RCs than in subject RCs.
As exemplified in (9a) and (9b), respectively, there are three referential elements (girl, bag, give) intervening between the gap and the filler (boy) in the subject RC, but there are only two referential elements (bag, give) intervening between the gap and the filler (boy) in the indirect object RC. If the linear distance between the filler and the gap affects the processing difficulty of RCs, subject RCs will be harder for Korean children than indirect object RCs because the linear distance between the gap and the filler is longer in the former than in the latter.

In contrast, the structural distance hypothesis predicts that indirect object RCs will be harder than subject RCs. This is because the indirect object gap is more deeply embedded inside the structure. Example (10a) shows the structure of a subject RC in Korean, with one node intervening between the gap and the head noun (S). Example (10b) shows the structure of an indirect object RC, with two nodes intervening between the gap and the head noun (S, VP).
(10)  a. Subject RC:

```
(10) Subject RC:

Number of nodes between head noun and gap: 1 (S)
```

b. Indirect object RC

```
(10) Indirect object RC

Number of nodes between head noun and gap: 2 (S, VP)
```

The semantic prominence hypothesis also predicts that indirect object RCs will be harder than subject RCs. This is because the subject position is semantically more topic-worthy than the indirect object position, as in (11), based on the prominence hierarchy $S \succ DO \succ IO \succ OBL$. 

85
In sum, while the linear distance and the structural distance hypotheses both predict a subject RC advantage in English (a language with postnominal RCs), the former predicts an indirect RC advantage and the latter predicts a subject RC advantage in Korean (a language with prenominal RCs). However, the prominence hypothesis predicts that in both languages, subject RCs will be easier than indirect object RCs because in both languages, the subject is semantically more prominent than the indirect object. The summary of the expected results based on the three hypotheses is presented in Table 3.1.

Table 3.1. Summary of expected results in Korean for each hypothesis

<table>
<thead>
<tr>
<th></th>
<th>Linear distance hypothesis</th>
<th>Structural distance</th>
<th>Semantic prominence</th>
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<tbody>
<tr>
<td>Subject (S) vs.</td>
<td>IO &gt; S</td>
<td>S &gt; IO</td>
<td>S &gt; IO</td>
</tr>
<tr>
<td>Indirect object (IO) RCs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2.2 Materials

Participants. The control group for the experiment comprised 21 adult native speakers of Korean, 13 females and 8 males (aged 19 to 22, mean = 21.5). Their responses were compared with those of Korean L1 children in order to see how children produce RCs differently from native speaker adults. Twenty-five native Korean-speaking children
(aged 5;0 to 6;7, mean = 5;9), recruited from a kindergarten in Korea, participated in the experiment: 15 girls and 10 boys (17 five-year-olds and 8 six-year-olds).

**Materials and design.** The materials and design were the same as those described in Experiment 1 in Chapter 2. The protocols that I used for the experiments are shown in Appendix E.

In an attempt to elicit a subject RC, for example, the participant was shown a pair of pictures while hearing a recorded voice describe the action in each picture, using Korean S-IO-DO-V order. For instance, as the participant was viewing the pictures in Figure 3.1a, he or she heard the Korean equivalent of the following description: “In the first picture, a boy is giving a bag to a girl. In the second picture, a girl is giving a bag to a boy.”

![Figure 3.1a. An initial picture pair used to elicit a subject RC](image)

Then, the child heard a beep, and an arrow mark appeared over the boy in the left picture (Figure 3.1b).
The target structure in this example is the subject RC in (12).

(12) Subject relative clause\(^\text{21}\)

\[
[_ \text{sonye-eykey kapang-ul cwu-koiss-nun}] \quad \text{sonyen}
\]
\[
\text{girl-Dat} \quad \text{bag-Acc} \quad \text{give-Asp-RC.Prs} \quad \text{boy}
\]

‘the boy [that _ is giving a bag to the girl]’

To elicit an indirect object RC, the same prompt as that used in the subject RC condition was given (in Korean, using S-IO-DO-V order): “In the first picture, a boy is giving a bag to a girl. In the second picture, a girl is giving a bag to a boy.”

An arrow then appeared over the boy in the picture, but this time it was over the boy in the right picture, as in Figure 3.2b.

\(^{21}\) The dative particle -eykey, which is classified either as a postposition or as a case marker, is used to express goals and recipients (O’Grady, 1997).
The child was expected to respond with an indirect object RC, as in (13).

(13) Indirect object relative clause:

\[
\text{sonye-ka } \underline{\text{kapang-ul } \text{cwu-koiss-nun}} \text{ sonyen} \\
\text{girl-Nom bag-Acc give-Asp-RC.Prs boy} \\
\text{‘the boy [that the girl is giving a bag to \underline{\_}]}\]

**Procedure.** The procedure was the same as described in Experiment 1 in Chapter 2.

**Responses.** To ensure that transcription was accurate and reliable, the data were recorded in Audacity, carefully transcribed by the author and another native speaker of Korean, and entered into a spreadsheet for coding and analysis. Although subjects sometimes gave more than one answer, only the first answer is reported in the results below.

**Adult group.** A total of 210 (10 × 21) responses were given by the 21 adults: 105 (5 × 21) for the subject-gap condition and 105 (5 × 21) for the indirect object-gap condition. All data were included in the statistical analysis.

**Child group.** A total of 250 (10 × 25) responses were given by the 25 children: 125 (5 × 25) for the subject-gap condition and 125 (5 × 25) for the indirect object-gap condition. All responses were included in the statistical analysis.
**Data coding.** The author and an additional native speaker of Korean coded the responses and both checked the data coding to reach agreement. Section 3.2.3 includes a complete list of examples for each type of response in each category.

### 3.2.3 Results

#### 3.2.3.1 Performance on subject RCs vs. indirect object RCs

The RC production task consistently elicited RCs from Korean native adults and children. In addition to the targeted patterns (i.e., a subject RC and an indirect object RC), a variety of other response types were found, especially in contexts that were designed to elicit an indirect object RC, as illustrated with the help of Figure 3.2b, repeated below.

![Figure 3.2b. A second picture pair used to elicit an indirect object RC](image)

(14) Target response (indirect object RCs):

```
[sonye-ka _kapang-ul cwu-koiss-nun] sonyen
girl-Nom bag-Acc give-Asp-RC.Prs boy
‘the boy [that the girl is giving a bag to_]’
```
Non-targeted responses:

a. Subject RC using different lexical items:\[a.\]
\[
[_\text{sonye-eykey kapang-ul pat-koiss-nun}] \text{sonyen}
\]
\[
girl-by(from) \text{ bag-Acc receive-Asp-RC.Prs boy}
\]
\begin{quote}
‘the boy [that _ is receiving a bag from the girl]’
\end{quote}

b. Subject RC with an embedded clause:
\[
[_i ([sonye-ka _i cwu-nun] kapang-ul] pat-koiss-nun]) \text{sonyen}\]
\[
girl-Nom give-RC bag-Acc receive-Asp-RC.Prs boy
\]
\begin{quote}
‘the boy [that _ is receiving the bag [that the girl is giving _]]’
\end{quote}

c. RC involving a reversal in grammatical relations:
\[
[_\text{sonye-eykey kapang-ul cwu-koiss-nun}] \text{sonyen}
\]
\[
girl-Dat bag-Acc give-Asp-RC.Prs boy
\]
\begin{quote}
‘the boy [that _ is giving a bag to the boy]’
\end{quote}

d. Resumptive NP:\[d.\]
\[
[\text{sonye-ka sonyen-eykey kapang-ul cwu-koiss-nun}] \text{sonyen}
\]
\[
girl-Nom boy-Dat bag-Acc give-Asp-RC.Prs boy
\]
\begin{quote}
‘the boy [that the girl is giving a bag to the boy]’
\end{quote}

e. Non-RC coordinate pattern:
\[
\text{sonye-ka kapang-ul tul-koiss-ko sonyen-i pwa-yo}
\]
\[
girl-Nom bag-Acc carry-Asp-Prs-and boy-Nom look-Prs-Reg
\]
\begin{quote}
The girl is carrying a bag and the boy is looking at it.’
\end{quote}

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out by the arrow; the examples in (14a) and (14b) fall into this category, as they both accurately describe the right boy by means of a well-formed structure.

Sohn (1999) suggests that only limited set of transitive verbs can have passive forms with a passive suffix (-i, -hi, -li, and –ki). Verbs which do not allow a passive suffix include dative verbs or benefactive verbs (e.g. cwuta ‘give’, patta ‘receive’, topta ‘help’, ipta ‘wear’). However, some examples as shown below seem to allow a passive structure:

\[
[_\text{sonye-eykey wusan-ul pillye-pat-koiss-nun}] \text{sonyen}
\]
\[
boy-by(from) \text{ umbrella-Acc lend-receive-Aps-RC.Prs. girl}
\]
\begin{quote}
‘the girl [that _ is receiving an umbrella from the boy]’
\end{quote}

(Target: the girl [that the boy is lending an umbrella to _])

Some participants responded with this these types of alternative responses, which look similar to a passive structure in English. In this example, pillye-patta (lend + receive) is a two-verb combination; thus, this belongs to a subject RC that using uses different lexical items.

As in English, resumptive NPs are ungrammatical in Korean.
(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of the referent, or both; examples (14c) – (14e) fall into this category.

Tables 3.2 and 3.3 summarize the response types produced by our adult and child participants in the contexts designed to elicit subject and indirect object RCs.

Table 3.2. Adults’ response types for subject RC and indirect object RC conditions ($N = 21$)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Subject RC</th>
<th>Indirect object RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Target response</td>
<td>100% (105/105)</td>
<td>7.6% (8/105)</td>
</tr>
<tr>
<td>Non-target but acceptable Subject RC using different lexical items</td>
<td>0% (0/105)</td>
<td>75.3% (79/105)</td>
</tr>
<tr>
<td>Subject RC with embedded clause</td>
<td>0% (0/105)</td>
<td>16.2% (17/105)</td>
</tr>
<tr>
<td>Non-target and unacceptable RC involving a reversal error</td>
<td>0% (0/105)</td>
<td>0.9% (1/105)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (105/105)</td>
<td>100% (105/105)</td>
</tr>
</tbody>
</table>

Table 3.3. Children’s response types for subject RC and indirect object RC conditions ($N = 25$)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Subject RC</th>
<th>Indirect object RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Target response</td>
<td>80.8% (101/125)</td>
<td>8% (10/125)</td>
</tr>
<tr>
<td>Non-target but acceptable Subject RC using different lexical items</td>
<td>0% (0/125)</td>
<td>62.4% (78/125)</td>
</tr>
<tr>
<td>Subject RC with embedded clause</td>
<td>0% (0/125)</td>
<td>6.4% (8/125)</td>
</tr>
<tr>
<td>Non-target and unacceptable RC involving a reversal error</td>
<td>0% (0/125)</td>
<td>4.8% (6/125)</td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>0% (0/125)</td>
<td>5.6% (7/125)</td>
</tr>
<tr>
<td>Other error types</td>
<td>19.2% (24/125)</td>
<td>12.8% (16/125)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (125/125)</td>
<td>100% (125/125)</td>
</tr>
</tbody>
</table>

**Target responses**

An overall subject-indirect object asymmetry was detected. The asymmetry in target responses between the two conditions is noticeable for both groups (for adults 100% for subject vs. 7.6% for indirect; for children 80.8% vs. 8%). These effects were tested for significance with a two-way mixed model ANOVA with group (adult/child) as the between-subject factor and gap position (subject/indirect object gap) as the within-subject factor. The analysis revealed a significant main effect of gap position (S > IO: $F (1, 44) = 320.996, p < 0.001$) and a main effect of group (adults > children: $F(1, 44) = 4.230, p =$
.046). Also, there was significant interaction between group and gap position ($F(1, 44) = 4.511, p = .039$), confirming that the difference in target response between the indirect object RC condition and the subject RC condition was larger for the child group than for the adult group.

**Acceptable responses**

The adult group produced acceptable responses (i.e., target responses or acceptable alternatives) in the subject RC condition with 100% accuracy and in the indirect object RC condition with 99.1% of accuracy. The difference between two conditions was not significant ($t(20) = -1.000, p = .329$). Like the Korean L1 adults, an overall subject-indirect object asymmetry was detected in the responses of the children, who demonstrated a much higher rate of target responses for the subject RC condition than for the indirect object RC condition. The asymmetry in appropriate responses between the two conditions is unremarkable: 80.8% for subject RCs compared to 76.8% for indirect object RCs ($t(24) = -.483, p = .634$).

**3.2.3.2 Response strategies**

Turning now to the types of responses produced by our participants, let us begin by considering the range of options observed when an indirect object RC was elicited.

**Response strategies by adult participants**

When adults produced a non-targeted response in the indirect object RC condition, they almost always produced a well-formed and semantically appropriate subject RC by using one of the following two strategies:
i. Subject RC using different lexical items. Of the 105 responses, 75.3% involved the use of an alternative verb (e.g., *pat-ta* ‘receive’ instead of *cwu-ta* ‘give’) to produce a subject RC with the same approximate meaning as the targeted indirect object RC, as in (15).

(15) Subject RC using different lexical items:

\[\text{[sonye-eykey kapang-ul pat-koiss-nun]} \quad \text{sonyen}\]
\[\text{girl-from bag.Acc receive-Asp-RC.Prs boy} \]

‘the boy [that _ is receiving a bag from the girl]’

ii. Subject RC with an embedded clause. As exemplified in (16), 16.2% of the responses involved a subject RC with an embedded clause.

(16) Subject RC with an embedded clause:

\[\text{[sonye-ka i cwu-nun kapangi-ul pat-koiss-nun ]]} \quad \text{sonyenj}\]
\[\text{girl-Nom give-RC bag.Acc receive-Asp-RC.Prs boy} \]

‘the boy [that _ is receiving the bag [that the girl is giving _]]’

Response strategies by child participants

When children produced a non-targeted response in the indirect object RC condition, they primarily responded with (i) a well-formed and semantically appropriate subject RC (62.4%); (ii) a subject RC with an embedded clause (6.4%); (iii) an RC involving a reversal error (4.8%); (iv) a resumptive NP error (5.6%); or (v) another error type (12.8%).

i. Subject RC using different lexical items. Like adults, the majority of the children’s 125 responses (62.4%) contained a subject RC with different lexical items to produce the same meaning as that of the target RC, as shown in (15).

ii. Subject RC with an embedded clause. As exemplified in (16), 6.4% of children’s responses involved a subject RC with an embedded clause.

iii. RC involving a reversal error. Children occasionally made a reversal error, producing a subject RC when an indirect object RC was called for (4.8% of responses). This
response results in a grammatically well-formed but semantically inappropriate RC, as in (17).

(17) Subject RC involving a reversal in grammatical relations:

[\_ kapang-ul cwu-koiss-nun] sonyen
  bag-Acc give-Asp-RC.Prs boy
  ‘the boy [that \_ is giving a bag]’
(Target: the boy [that the girl is giving a bag to \_])

iv. Resumptive NP. Children sometimes avoided an indirect object gap by inserting a full resumptive NP in the extraction position, creating a double-headed RC, as shown in (18).

Of the total 125 responses in the indirect object RC condition, 5.6% contained the resumptive NP error.

(18) Resumptive NP:

[sonye-ka sonyen-eykey kapang-ul cwu-koiss-nun] sonyen
  girl-Nom boy-Dat bag-Acc give-Asp-RC.Prs boy
  ‘the boy [that the girl is giving a bag to the boy]’

v. Other error types. Of the responses in the indirect object RC condition, 12.8% contained a non-RC pattern that did not have a RC, as exemplified in (19).

(19) a. Non-RC coordinate pattern:

sonye-ka kapang-ul tul-koiss-ko sonyen-i pwa-yo
  girl-Nom bag-Acc carry-Asp-Prs-and boy-Nom look-Prs-Reg
  ‘The girl is carrying a bag and the boy is looking at it.’

b. Non-RC

sonye-ka kapang-ul sonyen-eykey cwu-koiss-yo.
  girl-Nom bag-Acc boy-Dat give-Asp-Prs-Reg
  ‘The girl is giving a bag to the boy’

Even though children used the first two strategies (i.e., a subject RC using different lexical items and a subject RC with an embedded clause), children’s responses in the indirect object RC condition involved higher rates of unacceptable responses (i.e., reversal errors, resumptive NP errors, and non-RC patterns) than the adults’ responses did.
3.2.4 Discussion

The results of Experiment 4 suggest that L1 Korean children have greater difficulty producing indirect object RCs than subject RCs: they produced substantially fewer target responses in the indirect object RC condition than in the subject RC condition (8% vs. 80.8%, respectively) and made numerically more non-target and unacceptable responses in the former than in the latter condition (23.2% vs. 19.2%). The adult Korean L1 speakers also exhibited a subject RC advantage.

Experiment 4 revealed three suggestive response strategies. First, lexical items were often changed to permit the production of a subject RC instead of an indirect object RC, as in (20). Participants maintained the same thematic role of goal but produced subject RCs through lexical substitution (e.g., substituting pat-ta ‘receive’ for cwu-ta ‘give’). The reverse, as in (21), never happened.

(20) a. Target (indirect object RCs):

[sonye-ka _ kapang-ul cwu-koiss-nun] sonyen
girl-Nom bag.Acc give-Asp-RC.Prs boy
‘the boy [that the girl is giving a bag to _]’

b. Actual response:

[_ sonye-eykey kapang-ul pat-koiss-nun] sonyen
girl-by(from) bag.Acc receive-Asp-RC.Prs. boy
‘the boy [that _ is receiving a bag from the girl]’

(21) a. Target (subject RCs):

[_ sonye-eykey kapang-ul cwu-koiss-nun] sonyen
girl-Dat bag.Acc give-Asp-RC.Prs boy
‘the boy [that _ is giving a bag to the girl]’

b. Actual response:

[sonye-ka _ kapang-ul pat-koiss-nun] sonyen
girl-Nom bag.Acc receive-Asp-RC.Prs boy
‘the boy [that the girl is receiving a bag from _]’
It appears that children prefer to convert indirect object RCs into subject RCs, by altering the lexical composition and the syntactic structure of the sentence, as illustrated in (21a). This strategy is consistent with previous findings in Chapter 2.

Second, children sometimes produced a non-target and unacceptable responses instead of a targeted indirect object RC involving a reversal error (4.8% of total responses). They produced a subject RC when an indirect object RC was targeted, as in (22), thus producing a grammatical but semantically inappropriate response. Although the subject RC condition offered an opportunity for a reversal error, as shown in (23), no such error was produced.

(22) a. Target (indirect object RCs):

\[
\begin{align*}
\text{sonye-ka} & \quad \text{kapang-ul} \quad \text{cwu-koiss-nun} \\
girl & \quad \text{bag} & \quad \text{give-Asp-Rg.RC} & \quad \text{boy} \\
& \quad \text{‘the boy [that the girl is giving a bag to _]’}
\end{align*}
\]

b. Actual response (subject RCs):

\[
\begin{align*}
\text{sonye} & \quad \text{eykey} \quad \text{kapang-ul} \quad \text{cwu-koiss-nun} \\
girl & \quad \text{bag} & \quad \text{give-Asp-RC.Prs} & \quad \text{boy} \\
& \quad \text{‘the boy [that _ is giving a bag to the girl]’}
\end{align*}
\]

(23) a. Target (subject RCs):

\[
\begin{align*}
\text{sonye-eykey} & \quad \text{kapang-ul} \quad \text{cwu-koiss-nun} \\
girl & \quad \text{bag} & \quad \text{give-Asp-RC.Prs} & \quad \text{boy} \\
& \quad \text{‘the boy [that _ is giving a bag to the girl]’}
\end{align*}
\]

b. Actual response:

\[
\begin{align*}
\text{sonye-ka} & \quad \text{kapang-ul} \quad \text{cwu-koiss-nun} \\
girl & \quad \text{bag} & \quad \text{give-Asp-Rg.RC} & \quad \text{boy} \\
& \quad \text{‘the boy [that the girl is giving a bag to _]’}
\end{align*}
\]

Third, the children produced resumptive NP errors in the indirect object RC condition (5.6% of total responses), as in (24), thus providing an ungrammatical response. The subject RC condition never produced such an error, as in (25).
The higher frequency of the resumptive NP error in the indirect object RC condition implies that the indirect object RC is more difficult to produce as a head-external construction than is the subject RC. As discussed in section 2.1.4, Hsu et al. (2009) suggest that to produce a prenominal RC, the head noun must be planned ahead and then held in memory, although the relativized element is activated at the gap position. In this way, the need to activate the filler in the gap position increases as production of the sentence progresses. In other words, the later the gap, the greater the build-up of pressure to activate the filler. Thus, with the \[S \_DO V\] N pattern, the speaker feels more pressure to utter the resumptive NP than with the \[_IO DO V\] N pattern. The head noun is more likely, therefore, to be uttered in the indirect object gap position, resulting in a resumptive NP, than in the subject gap position.

The subject-indirect object asymmetry was found with English postnominal RCs in the first experiment reported in Chapter 2. The pattern of findings found for Korean is
not consistent with the predictions made by the linear distance hypothesis, which predicts that indirect object RCs will be easier to produce. In contrast, both the structural distance hypothesis and the semantic prominence hypothesis predict that the indirect object RCs will be more difficult to produce than subject RCs.

3.3 Direct object vs. oblique RCs in Korean

3.3.1 Introduction

The aim of Experiment 5 is to further test the predictions of the three hypotheses regarding the source of asymmetry in the production of different types of RCs. In order to control for animacy and word order canonicity in Korean, this experiment compares Korean speakers’ production of direct object and oblique RCs.

The linear distance hypothesis predicts that oblique RCs will be more difficult for Korean speakers to produce than direct object RCs. This is because the linear distance between the gap and the filler is longer in oblique RCs than in direct object RCs.

(26)  

a. Direct object RC [S OBL _V] HEAD  
[sonyen-i sangca-wiey _ noh-un] chayk  
boy-Nom box-Loc put-Asp-RC.Pst book 1  
‘the book [that the boy put _ on the box]’

b. Oblique RC [S _ DO V] HEAD  
[sonyen-i _ chayk-ul noh-un] sangca  
boy-Nom book-Acc put-Asp-RC.Pst box 1 2  
‘the box [that the boy put the book on _]’

As shown in example (26), in Korean, only one referential element, noh- (‘put’), intervenes between the filler, chayk (‘the book’) and the gap in the direct object RC sonyen-i sangca-wiey _ noh-un, but in the oblique RC sonyen-i _ chayk-ul noh-un, two
referential elements, *chayk* (‘the book’) and *noh* (‘put’), intervene between the filler, *sangca* (‘the box’), and the gap.

The structural distance hypothesis predicts that there will be no difference in difficulty in producing between the direct object RCs and the oblique RCs. As illustrated in (27), two nodes intervene between the gap and the filler both in direct object RCs and in oblique RCs conditions.

(27)  a. Direct object RC:

```
NP
  S
  NP
  boy
  PP
  box-on
  _
  put
  VP
  book

Number of nodes between the head noun and gap: 2 (S, VP)
```

b. Oblique RC:

```
NP
  S
  NP
  boy
  PP
  _
  box
  VP
  book
  put

Number of nodes between the head noun and gap: 2 (S, VP)
```
The semantic prominence hypothesis predicts that direct object RCs will be relativized more easily than oblique RCs because the oblique RC relativizes a less prominent element, as shown in (28), based on the prominence hierarchy S > DO > IO > OBL.

\[(28)\]

**a. Direct object RC**

_{more topic-worthy_

| [sonyen-i sangca-wiey _ noh-un] chayk
boy-Nom box-Loc put-Asp-RC.Pst book
‘the book [that the boy put _ on the box]’

**b. Oblique RC**

_{less topic-worthy_

| [sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
‘the box [that the boy put the book on _]’

With regard to the direct object-oblique asymmetry in relativization, the linear distance hypothesis and the semantic prominence hypothesis make the same prediction: the direct object RC has a processing advantage. However, the structural distance hypothesis predicts that there will be no difference in difficulty in producing between direct object RCs and oblique RCs. The summary of the expected results based on the three hypotheses is presented in Table 3.4.

<table>
<thead>
<tr>
<th>Table 3.4. Summary of expected results in Korean for each hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct object vs. Oblique RCs</td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td>DO &gt; OBL</td>
</tr>
</tbody>
</table>

3.3.2. Methods

**Participants.** The control group consisted of 22 adult native speakers of Korean; their responses were compared with those of Korean L1 children in order to compare
children’s RC production with that of adult native speakers. The same 25 Korean-speaking children (age 5;0 to 6;7, mean = 5;9) participated in this experiment as took part in Experiment 4. To avoid a task effect, Experiment 5 was conducted one week after Experiment 4.

**Materials and design.** Like Experiment 4 above, the task consisted of 10 test items distributed into 4 lists and involved two conditions (direct object RC vs. oblique RC). The same type of RC appeared consecutively. Participants finished the task in approximately ten minutes. Two picture pairs made up each test item, with each picture containing one character and two objects; the participants were asked to describe the object indicated by the arrow in the second picture pair. All test items contained two inanimate objects and were semantically reversible. Sample sets of pictures designed to elicit direct object and oblique RCs, respectively, are presented in Figures 3.3 and 3.4. The protocols that I used for the experiments are shown in Appendix F.

To elicit a direct object RC, the participant was shown a pair of pictures (e.g., Figure 3.3a) while hearing a recorded voice describe each picture in Korean, using S-OBL-DO-V order: “In the first picture, a boy is putting a book on a box. In the second picture, a girl is putting a book on a box.”

![Figure 3.3a](image)

**Figure 3.3a.** An initial picture pair used to elicit a direct object RC
Then the participant heard a beep and an arrow appeared pointing at one of the four depicted objects (e.g., Figure 3.3b).

Figure 3.3b. A second picture pair used to elicit a direct object RC

The referent marked with the arrow had the thematic role of theme of (e.g., the book in Figure 3.3b). This was expected to elicit a response including a direct object RC, as exemplified in (29).

(29)  [sonyen-i sangca-wiey _ noh-un] chayk
      boy-Nom box-Loc put-Asp-RC.Pst book
   ‘the book [that the boy put _ on the box]’

To elicit an oblique RC, the participant was shown a pair of pictures (e.g., Figure 3.4a) while hearing a recorded voice describe each picture’s action in Korean, using S-OBL-DO-V order: “In the first picture, a boy is putting a book on a box. In the second picture, a girl is putting a book on a box.”
Figure 3.4a. An initial picture pair used to elicit an oblique RC
An arrow marked an object with the thematic role of location, as in Figure 3.4b, to elicit an oblique RC as exemplified in (30).

Figure 3.4b. A second picture pair used to elicit an oblique RC

(30) [sonyen-i _ chayk-ul noh-un] sangca
    boy-Nom book-Acc put-Asp-RC.Pst box
    ‘the box [that the boy put the book on _]’

Procedure. The procedure was the same as described in Experiment 2 in Chapter 2.

Responses. The method for recording responses was the same as described in Experiment 4.

Adult group. Twenty-two adults gave a total of 220 (10 × 22) responses: 110 (5 × 22) for the direct object RC condition and 110 (5 × 22) for the oblique RC condition. All data were included in the statistical analysis.
Child group. Twenty-five children gave a total of 250 (10 × 25) responses: 125 (5 × 25) for the direct object RC condition and 125 (5 × 25) for the oblique RC condition. All responses were included in the statistical analysis.

3.3.3 Results

3.3.3.1 Performance on direct object RC vs. oblique RC

This RC production task consistently elicited RCs from Korean native adults and children. In addition to the targeted patterns (i.e., a direct object RC and an oblique RC), a variety of other response types were found in contexts that were designed to elicit a direct object RC, as illustrated with the help of Figure 3.3b, repeated below.

![Figure 3.3b. A second picture pair used to elicit a direct object RC](image)

(31) Target response:  
[soneyen-i sangca-wiey _ noh-un] chayk  
boy-Nom box-Loc put-Asp-RC.Pst book  
the book [that the boy put _ on the box]

Non-targeted responses:

a. Subject RC using a passive structure:  
[ _ soneyen-eyuyhay(se) sangca-wiey noh-i-e-cin] chayk  
boy-by box-Loc put-Pass-RC.Pst book  
‘the book [that _ was put on the box by the boy]’

---

24 -i is one of four variants (e.g., -i, hi, -li, and -ki) of the passive suffix in Korean, and it is conditioned by the stem-final sound (Sohn, 1999, p. 368). The postposition -eyuyhayse (‘by’) is used to mark the demoted action just like a dative suffix -eykey (‘to’). The demoted agent, here expressed as -eyuyhayse, is sometimes marked by -eykey.
b. Resumptive NP:

[sonyen-i sangca-wiey chayk-ul noh-un] chayk
‘the book [that the boy put the book on the box]’

c. RC involving a head error:

[sonyen-i chayk-wiey _ noh-un] sangca
boy-Nom book-Loc put-Asp-RC.Pst box
‘the box [that the boy put _ on the book]’

d. RC involving a reversal in grammatical relations:

[sonyen-i _ sangca-lul noh-un] chayk
boy-Nom box-Acc put-Asp-RC.Pst book
‘the book [that the boy put the box on _]’

e. RC involving a head + reversal error:

[sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
‘the box [that the boy put the book on _]’

f. Other error types

(1) Non-RC clause

sonyen-i sangca-ey chayk-ul noh-a-yo
boy-Nom box-Loc book-Acc put-Prg-Reg
‘The boy is putting the book on the box.’

(2) Possessive NP

sonyen (-uy) chayk
boy (Gen) book
‘the boy’s book’

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out by the arrow; the example in (31a) falls into this category, as it accurately describes the book in the picture on the left by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of the referent, or both; examples (31b) – (31f) fall into this category.
Tables 3.5 and 3.6 summarize the response types produced by our adult and child participants in the contexts designed to elicit direct object and oblique RCs.

Table 3.5. Adults’ response types for direct object RC and oblique RC conditions

<table>
<thead>
<tr>
<th></th>
<th>Responses</th>
<th>Direct object RC</th>
<th>Oblique RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>83.7% (92/110)</td>
<td>70% (77/110)</td>
</tr>
<tr>
<td>Non-target and</td>
<td>RC using a passive</td>
<td>12.7% (14/110)</td>
<td>14.5% (16/110)</td>
</tr>
<tr>
<td>acceptable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-target and</td>
<td>RC involving a reversal in grammatical relations</td>
<td>1.8% (2/110)</td>
<td>4.6% (5/110)</td>
</tr>
<tr>
<td>unacceptable</td>
<td>RC involving a head error</td>
<td>0% (0/110)</td>
<td>0.9% (1/110)</td>
</tr>
<tr>
<td></td>
<td>RC involving a head + reversal error</td>
<td>0.9% (1/110)</td>
<td>0.9% (1/110)</td>
</tr>
<tr>
<td></td>
<td>Other error types</td>
<td>0.9% (1/110)</td>
<td>9.1% (10/110)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>100% (110/110)</td>
<td>100% (110/110)</td>
</tr>
</tbody>
</table>

Table 3.6. Children’s response types for direct object RC and oblique RC conditions

<table>
<thead>
<tr>
<th></th>
<th>Responses</th>
<th>Direct object RC</th>
<th>Oblique RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>74.4% (93/125)</td>
<td>14.4% (18/125)</td>
</tr>
<tr>
<td>Non-target and</td>
<td>RC using a passive</td>
<td>0.8% (1/125)</td>
<td>0% (0/125)</td>
</tr>
<tr>
<td>acceptable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-target and</td>
<td>Resumptive NPs</td>
<td>5.6% (7/125)</td>
<td>8.8% (11/125)</td>
</tr>
<tr>
<td>unacceptable</td>
<td>RC involving a reversal in grammatical relations</td>
<td>0% (0/125)</td>
<td>11.2% (14/125)</td>
</tr>
<tr>
<td></td>
<td>RC involving a head error</td>
<td>3.2% (4/125)</td>
<td>4% (5/125)</td>
</tr>
<tr>
<td></td>
<td>Other error types</td>
<td>16% (20/125)</td>
<td>61.6% (77/125)</td>
</tr>
<tr>
<td>(1) Non-RC clause</td>
<td></td>
<td>12.8% (16/125)</td>
<td>40% (50/125)</td>
</tr>
<tr>
<td>(2) Possessive NP</td>
<td></td>
<td>0.8% (1/125)</td>
<td>16.8% (21/125)</td>
</tr>
<tr>
<td>(3) Don’t know</td>
<td></td>
<td>2.4% (3/125)</td>
<td>4.8% (6/125)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>100% (125/125)</td>
<td>100% (125/125)</td>
</tr>
</tbody>
</table>

**Target responses**

As can be seen here, target responses were higher in direct object RCs than in oblique RCs for both children and adults. Paired-sample t-tests showed that children produced significantly more target responses in the direct object RC condition than in the oblique RC condition (74.4% vs. 14.4%, t(24) = 10.663, p < 0.001); also, the analysis revealed a significant main effect of RC condition for adults (83.7% vs. 70%, t(21) = 2.854, p = .009). This finding indicates that the asymmetry in target responses between these two conditions was far more striking for the child group.
Acceptable responses

Children produced significantly more acceptable responses in the direct object RC condition than in the oblique RC condition (75.2% vs. 14.4%, t(24) = 10.255, p < 0.001); however, the adult group produced semantically appropriate responses in direct object RC conditions with 96.4% of accuracy and in oblique RC conditions with 84.5% of accuracy (t(21) = 1.073, p = .296). The asymmetry in semantically appropriate responses between the two conditions was striking only for the child group.

3.3.3.2 Response strategies

Turning now to the types of responses produced by our participants, let us consider the range of options observed when a direct object RC and an oblique RC were elicited.

3.3.3.2.1 Direct object RCs

Response strategies by adult participants

When the adults gave a non-targeted response in the direct object RC condition, they almost always used a passive structure to produce a well-formed and semantically appropriate subject RC, as exemplified in (32). Of the total 110 responses in the direct object RC condition, 12.7% were of this type.

(32) Subject RC using a passive structure:
    (turning the direct object RC into a subject RC)
    [sonyen-eyuyhay(se)sangca-wiey noh-i-e-cin] chayk
    boy-by box-Loc put-Pass-RC.Pst book
    ‘the book [that _ was put on the box by the boy]’

Response strategies by child participants

As already observed, the children had a much higher rate of target responses in the direct object RC condition (74.4%) than in the oblique RC condition (14.4%). The asymmetry in semantically appropriate responses is also striking (75.2% vs. 14.4%). When children
produced a non-targeted response in the direct object RC condition, their responses fell into three categories: (i) a resumptive NP error (5.6%); (ii) a head error (3.2%); or (iii) other error types (16%).

**i. Resumptive NP.** Unlike adults, some children, instead of leaving a gap, inserted a resumptive NP, underlined in example (33); of all responses in the direct object RC condition, 5.6% contained a resumptive NP error.

(33) Resumptive NP:

> [sonyen-i sangca-wiey chayk-ul noh-un] chayk  
> ‘the book [that the boy put the book on the box]’

**ii. RC involving a head error.** In 3.2% of responses, children produced a head error when a direct object RC was targeted, as in (34). No such responses occurred among adults.

(34) RC involving a head error:

> [sonyen-i chayk-wiey _ noh-un] sangca  
> boy-Nom book-on put-RC.Pst box  
> ‘the box [that the boy put _ on the book]’

**iii. Other error types.** Of the overall responses in the direct object RC condition, 16% contained other error types, including the production of possessive NPs and other non-RC constructions, as exemplified in (35).

(35) Non-RC clause

> sonyen-i sangca-ey chayk-ul noh-a-yo  
> boy-Nom box-on book-Acc put-Prg-Reg  
> ‘The boy is putting the book on the box.’

**Possessive NP**

> sonyen (-uy) chayk  
> boy (Gen) book  
> ‘the boy’s book’
3.3.3.2 Oblique RCs

In addition to the targeted patterns (i.e., oblique RC), a variety of other response types were found, in contexts that were designed to elicit an oblique RC, as illustrated with the help of Figure 3.4b, repeated below.

![Figure 3.4b](image)

Figure 3.4b. A second picture pair used to elicit an oblique RC

(36) Target response:
[sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
the box [that the boy put the book on _]

Non-targeted responses:

a. Oblique RC using a passive:
[sonyen-eyuyhay chayk-i _ noh-i-e-cin] sangca
boy-by book-Nom put-Pas-RC.Pst box
‘the box [that the book was put on _ by the boy]’

b. Resumptive NPs:
[sonyen-i sangca-wiey chayk-ul noh-un] sangca
boy-Nom box-Loc book-Acc put-Asp-RC.Pst box
‘the box [that the boy put the book on the box]’

c. RC involving a reversal error:
[sonyen-i chayk-wiey _ noh-un] sangca
boy-Nom book-Loc put-Asp-RC.Pst box
‘the box [that the boy put _ on the book]’

d. RC involving a head error:
[sonyen-i _ sangca-lul noh-un] chayk
boy-Nom box-Acc put-Asp-RC.Pst book
‘the book [that the boy put the box on _]’
e. RC involving a head + reversal error:
   [sonyen-i  sangca-wiey _ noh-un]  chayk
   boy-Nom  box-Loc  put-Asp-RC.Pst  book
   ‘the book [that the boy put _ on the box]’

f. Other error types:
   (1) Non-RC clause
       sonyen-i  sangca-ey  chayk-ul  noh-a-yo
       boy-Nom  box-Loc  book-Acc  put-Prg-Reg
       ‘The boy is putting the book on the box.’

   (2) Possessive NP
       sonyen  (-uy)  sangca
       boy  (Gen)  box
       ‘the boy’s box’

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
   by the arrow; the example in (36a) falls into this category, as it accurately describes
   the box in the picture on the left by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
     the referent, or both; examples (36b) – (36f) fall into this category.

Response strategies by adult participants

When adults gave a non-targeted response in the oblique RC condition, they almost
always produced a well-formed and semantically appropriate RC by passivizing the
clause:

Oblique RC using a passive. As exemplified in (37), 14.5% of adults’ responses in the
oblique RC condition involved producing an oblique RC with passivization of the
embedded clause.

(37) Oblique RC using a passive:
    [sonyen-eyuyhay  chayk-i   _noh-i-e-cin]  sangca
    boy-by     book-Nom      put-Pass-RC.Pst  box
    ‘the box [that the book was put on _ by the boy]’
Response strategies by child participants

Like adults, children sometimes produced acceptable responses in the oblique RC condition, but they overall produce more errors. Their errors took one of four forms: (i) the use of a resumptive NP (8.8%), (ii) a reversal error (11.2%), (iii) a head error (4%), or (iv) other error types (61.6%).

i. Resumptive NP. When children gave non-targeted responses in the oblique RC condition, they sometimes gave an ungrammatical response that contained a resumptive NP, as shown in (38). Children demonstrated higher rates of resumptive NP error for oblique RCs (8.8%) than for direct object RCs (5.6%).

(38) Resumptive NPs:
[sonyen-i sangca-wiy chayk-ul noh-un] sangca
boy-Nom box-Loc book-Acc place-RC.Pst box
‘the box [that the boy put the book on the box]’

ii. RC involving a reversal error. As exemplified in (39), children made a reversal error when they produced a direct object RC instead of the target oblique RC (11.2% of responses).

(39) RC involving a reversal error:
[sonyen-i chayk-wiy _ noh-un] sangca
boy-Nom book-Loc put-RCs.Pst box
‘the box [that the boy put _ on the book]’
(Target: the box [that the boy is putting the book on _])

iii. RC involving a head error. Of children’s total responses, 4% involved a head error, as in (40), where the target head noun (sangca ‘box’) plays the role of the location in the modifying event and the theme (chayk ‘book’) of the modifying event is in the head noun position.
(40) RC involving a head error:

\[
\begin{array}{c}
\text{sonyen-i} & \_\text{sangca-lul} & \text{noh-un} \\
\text{boy-Nom} & \text{box-Acc} & \text{put-Asp-RC.Pst} \\
\text{chayk} & \text{book} \\
\end{array}
\]

‘the book [that the boy put the box on _]’

iv. Other error types. Additional non-target responses when oblique RCs were targeted included possessive NPs and sentences that did not contain RCs, as in (41) (61.6% of their responses).

(41) Other error types:

(1) Non-RC clause

\[
\begin{array}{c}
\text{sonyen-i} & \text{sangca-ey} & \text{chayk-ul} & \text{noh-a-yo} \\
\text{boy-Nom} & \text{box-Loc} & \text{book-Acc} & \text{put-Prg-Reg} \\
\end{array}
\]

‘The boy is putting the book on the box.’

(2) Possessive NP

\[
\begin{array}{c}
\text{sonyen} & (-uy) & \text{sangca} \\
\text{boy} & (\text{Gen}) & \text{box} \\
\end{array}
\]

‘the boy’s box’

3.3.4 Discussion

The overall results of Experiment 5 suggest that children have greater difficulty producing oblique RCs than direct object RCs: they produced substantially fewer target responses and made more grammatical errors in the oblique RC condition than they did in the direct object RC condition. For their part, adults were likely in the oblique RC condition to choose a grammatical, semantically appropriate alternative response, suggesting that they were specifically “avoiding” oblique RCs.

Experiment 5 revealed three non-target response strategies. First, the syntactic structure was sometimes changed from active to passive in order to permit the production of a subject RC rather than a direct object RC, as in (42), and, to permit the production of
an oblique RC in passive voice rather than an oblique RC in active voice, as in (43). The latter change was made mostly by adult speakers.

(42)  
a. Target (direct object RCs):
[sonyen-i sangca-ey _ noh-un] chayk
boy-Nom box-Loc put-RC.Pst book
‘the book [that the boy put _ on the box]’

  b. Actual response:
[_ sonyen-eyuyhay sangca-wi ey noh-i-e-cin] chayk
boy-by box-Loc put-Pass-RC.Pst book
‘the book [that _ was put on the box by the boy]’

(43)  
a. Target (oblique RCs):
[sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
‘the box [that the boy put the book on _]’

  b. Actual response:
[sonyen-eyuyhay chayk-i _ noh-i-e-cin] sangca
boy-by book-Nom put-Pass-RC.Pst box
‘the box [that _ was placed the book by the boy]’

The advantage of passivization in the case of targeted direct object RCs is that it produces a subject RC with essentially the same meaning. In the case of oblique RCs, the effect of passivization is somewhat subtler: by downgrading the agent to oblique, it reduces by one the number of arguments in the clause that are more prominent/topic-worthy that the relativized element, which is itself an oblique.

Second, a breakdown in grammaticality occurred more often when an oblique RC was targeted. Participants made inappropriate responses with a head error or a reversal error, as in (44). Both adult and child speakers produced these errors more often in the oblique RC condition than in the direct object RC condition.

(44)  
a. Target
[sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
‘the box [that the boy put the book on_]’
b. RC involving a head error:

\[
\begin{align*}
\text{boy-Nom} & \quad \text{box-Acc} & \quad \text{put-Asp-RC.Pst} & \quad \text{book} \\
\text{sonyen-i}_ & \quad \text{sangca-lul}_ & \quad \text{noh-un}_ & \quad \text{chayk}
\end{align*}
\]

‘the book [that the boy put the box on_]’

c. RC involving a reversal error:

\[
\begin{align*}
\text{boy-Nom} & \quad \text{book-Loc} & \quad \text{put-Asp-RCs.Pst} & \quad \text{box} \\
\text{sonyen-i}_ & \quad \text{chayk-wiey}_ & \quad \text{noh-nun}_ & \quad \text{sangca}
\end{align*}
\]

‘the box [that the boy put _on the book]’

As exemplified in (44b), the target noun *sangca* (‘box’) fills the role of location in modifying the event, and the theme *chayk* (‘book’) of the modifying event is in the head noun position. The elicitation procedure used in the experiment requests that the participants pick out an item of one type (e.g., a box), but the respondents pick out an item of a different type (e.g., a book). In accordance with the prominence hypothesis, Hsu et al. (2009) suggested that speakers are less likely to use an event as a restrictor if it is internally focused on an entity other than the referent of the head noun. Because the production of oblique RCs requires learners to focus on the location—which is less prominent than the theme—and to select this as the head noun, the oblique RC is more likely to cause difficulty than the direct object RC in a production task. This is presumably why, as in (44c), a direct object RC (accusative) is produced in place of an oblique RC (locative), whereas the reverse error type is not observed.

Third, children produced resumptive NP errors, and they did so more often in the oblique RC condition than in the direct object RC condition. These resumptive NP errors cannot be explained in terms of holding the planned head noun in working memory, as proposed in Experiment 4 in this Chapter. If that were the case, we would expect a higher rate of resumptive NPs for direct object RCs than for oblique RCs, as the ‘hold time’ for direct object gaps in Korean is greater than for oblique gaps. But this is not what happens.
This suggests the need for an account of resumptive NPs errors, at least for Korean, that differs from Hsu et al.’s (2009) proposal for Chinese and English.

Target responses were higher in the direct object RC condition than in the oblique RC condition, an asymmetry that has not been discussed in studies on Korean RCs. The attempted elicitation of oblique RCs sometimes created confusion and even a breakdown in grammaticality. This pattern of findings is consistent with the linear distance hypothesis and the semantic prominence hypothesis, but not by the structural distance hypothesis, which predicts no difference in difficulty in producing the direct object RCs and the oblique RCs.

3.4. General Discussion

The primary finding from Experiment 4 is that while Korean L1 adults and children had little trouble with the production of subject RCs, they did have difficulty with the indirect object RCs, just like English-speaking children did. From Experiment 5, we can conclude that children produce direct object RCs more successfully than oblique RCs. The summary of the expected results based on the three hypotheses is presented in Table 3.7.

Table 3.7. Differing predictions of comparative difficulty

<table>
<thead>
<tr>
<th></th>
<th>Linear distance hypothesis</th>
<th>Structural distance hypothesis</th>
<th>Semantic prominence hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject vs. Indirect object RCs</td>
<td>IO &gt; S</td>
<td>S &gt; IO</td>
<td>S &gt; IO</td>
</tr>
<tr>
<td>Direct object vs. Oblique RCs</td>
<td>DO &gt; OBL</td>
<td>DO = OBL</td>
<td>DO &gt; OBL</td>
</tr>
</tbody>
</table>

The predictions of each hypothesis and their success can be summarized as follows: (1) longer linear distance is harder than shorter linear distance, which is supported by Experiment 5, but not by Experiment 4; (2) gaps that are more deeply embedded in syntactic structure are harder than gaps that are less deeply embedded, which is supported by Experiment 4, but not by Experiment 5; and (3) the lower the topicality of the
relativized element (S > DO > IO > OBL), the more difficult it is for the RC to be about the head, which is supported by Experiments 4 and 5.

As discussed in Section 2.5, distance in filler-gap dependencies is highly confounded with topicality in English: that is, both the linear distance hypothesis and the semantic prominence hypothesis predict that subject RCs will be easier to produce than indirect object RCs and that direct object RCs will be easier than oblique RCs. In Korean, however, unlike English, distance is not confounded with topicality: the linear distance hypothesis predicts that subject RCs will be more difficult to produce than indirect object RCs, but the semantic prominence hypothesis predicts the opposite: subject RCs will be easier than indirect object RCs and direct object RCs will be easier than oblique RCs. The topicality contrasts do not change in Korean; subjects are more topical than direct objects, and so on. Results from Korean-speaking children indicate that semantic prominence can contribute to the asymmetry between subject and indirect object and the asymmetry between direct object and oblique. In other words, it is the gap position in the semantic prominence hierarchy (S > DO > IO > OBL), not the linear distance between the gap and the head noun.

In sum, our findings from Korean adults and children are consistent with only the semantic prominence hypothesis, not with the linear distance hypothesis. The latter hypothesis incorrectly predicts that subject RCs should be harder for children than indirect object RCs. This finding is significant because the asymmetry in children’s production found between subject and indirect object RCs cannot be explained in light of the linear distance between the head and the gap.
CHAPTER 4
SECOND LANGUAGE ACQUISITION OF ENGLISH RCs

4.1 Prior L2 research on English RCs

There are parallels among children acquiring their first language (L1) and adults acquiring a second language (L2) with respect to complex grammatical development (see O’Grady et al., 2003 and the references therein). These parallels extend to asymmetries between subject RCs and direct object RCs in both comprehension and production. There has been experimental work on the L2 acquisition of English RCs (Eckman et al., 1988; Gass, 1979; Hamilton, 1994; Schachter, 1973; Wolfe-Quintero, 1992). For instance, as in L1 child acquisition, research in L2 acquisition provides strong evidence that subject RCs such as (1a) are easier to produce and understand than are direct object RCs such as (1b).

(1) a. Subject RC: the man that [ _ pushes the woman]

b. Direct object RC: the man that [the woman pushes _]

However, this finding is subject to exactly the same objections as the parallel finding in L1 acquisition: because the referent of head noun in the direct object RC is animate (an infrequent option in experience), the case could be made that any preference for subject relatives reflects the unusual character of the direct object test items. Following the logic in the two preceding Chapters, I will therefore seek evidence for asymmetries in the production of RCs by focusing on patterns in which animacy expectations are controlled for.
4.2 Research Questions

This will allow me to investigate three research questions:

1. Do L1 Korean-speaking L2 learners of English follow the same developmental sequence for various types of RCs as L1 adult and L1 child of English do? If so, how does L1 English development compare?

2. How do Korean-speaking L2 learners’ productions in their target language compare to those of their native language?

3. What hypotheses can predict RC difficulty for L2 learners of English?

4.3 Experiment 6: Subject vs. Indirect object RCs in L2 English

4.3.1 Introduction

In Experiment 6, I compare subject and indirect object RCs. This section aims to investigate the predictions of the three different hypotheses regarding the source of the asymmetry exhibited in the English L1 acquisition results first outlined in Chapter 2 (the linear distance hypothesis, the structural distance hypothesis, and the semantic prominence hypothesis). I examine these hypotheses by studying the production of L2 English RCs by adult native speakers of Korean, with a view to using asymmetries in the production of a targeted response and the use of alternative responses as evidence for the difficulty of particular RC types.

The linear distance hypothesis predicts that in languages with postnominal RCs, subject RCs will be easier to process than indirect object RCs. This is because the linear distance between the filler and the gap is shorter in subject RCs than in indirect object RCs.
(2)  a. Subject RC: the musician [that _ sent the book to the director]  
   b. Indirect object RC: the musician [that the director sent the book to_]  

This hypothesis predicts, therefore, that in English, indirect object RCs will be harder for the L2 learners of English than subject RCs because the linear distance between the filler and the gap is longer in the former than in the latter.

The structural distance hypothesis makes the same prediction for English as it does for other languages with postnominal RCs: indirect object RCs will be harder for the L2 learners of English than subject RCs because the indirect object gap is more deeply embedded, as shown in (3).

(3)  a. Subject RC:

Number of nodes between head noun and gap: 1 (S)
b. Indirect object RC:

\[
\begin{array}{c}
\text{N} \\
\text{the musician} \\
\text{that} \\
\text{S} \\
\text{V} \\
\text{sent} \\
\text{the book} \\
\text{P} \\
\text{NP} \\
\text{to} \\
\end{array}
\]

Number of nodes between head noun and gap: 3 (S, VP, PP)

The semantic prominence hypothesis also predicts that indirect object RCs will be harder than subject RCs for the L2 learners of English. This is because according to the semantic prominence hierarchy (discussed in Chapters 1 and 2), the subject position is more prominent than the indirect object position, as in (4).

\[(4) \quad a. \quad \text{Subject RC:} \]

\[
\begin{array}{c}
\text{more topic-worthy} \\
\text{the musician [that } _\_ \text{ sent the book to the director]} \\
\end{array}
\]

\[(4) \quad b. \quad \text{Indirect object RC:} \]

\[
\begin{array}{c}
\text{less topic-worthy} \\
\text{the musician [that the director sent the book to } _\_] \\
\end{array}
\]

4.3.2 Method

Participants. Forty L1 Korean-speaking L2 learners of English completed this experiment. All of them were recruited in Seoul, Korea. All participants had to be able to speak English without any difficulty because the experiments required them to produce
sentences after listening to prompts. All subjects were above the age of 20. Table 4.1 summarizes the background information for the two groups.

Table 4.1. Background Information of the L2 Groups

<table>
<thead>
<tr>
<th></th>
<th>Low proficiency group</th>
<th>High proficiency group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 22)</td>
<td>(n = 18)</td>
</tr>
<tr>
<td>Gender</td>
<td>Female 16</td>
<td>Female 16</td>
</tr>
<tr>
<td></td>
<td>Male 6</td>
<td>Male 2</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Mean 22.95</td>
<td>Mean 22.72</td>
</tr>
<tr>
<td></td>
<td>(SD) 1.88</td>
<td>(SD) 1.56</td>
</tr>
<tr>
<td>Age at starting learning English (years)</td>
<td>Mean 8.54</td>
<td>Mean 7.05</td>
</tr>
<tr>
<td></td>
<td>(SD) 1.22</td>
<td>(SD) 1.66</td>
</tr>
<tr>
<td>Length of learning English (years)</td>
<td>Mean 11.45</td>
<td>Mean 11.38</td>
</tr>
<tr>
<td></td>
<td>(SD) 2.1</td>
<td>(SD) 2.35</td>
</tr>
<tr>
<td>C-test score</td>
<td>Mean 18.454</td>
<td>Mean 36.38</td>
</tr>
<tr>
<td></td>
<td>(SD) 1.14</td>
<td>(SD) 1.88</td>
</tr>
<tr>
<td>(Maximum: 40)</td>
<td>Range 16-23</td>
<td>Range 34-39</td>
</tr>
</tbody>
</table>

Twenty-seven native English speakers from Experiment 1 were used as a control group.

**Materials and design.** The materials and design were the same as described in Chapter 2. Participants were given three tests individually in following order: Experiment 6 (Day 1), Experiment 7 (Day 2), and Experiment 8 (Day 3). One week separated the three experimental days.

To estimate L2 learners’ proficiency level, an English C-test (Schulz, 2006) (see Appendix G for details) was included in the experiment. Participants were given a C-test consisting of two short texts containing a total of 40 blanks, and were instructed to fill in the blanks; the first half of the desired word was always provided and the participants had to complete the word. One point was given for each correct completion, and no points were given if the word was not correctly completed. The C-test used in this experiment can only evaluate a participant’s proficiency level relative to that of the other participants in this study. The L2 participants were divided into two groups (low and high proficiency groups) based on their C-test scores. The mean ($M = 26.52$) was used as a cut-off point.
for this division. The participants whose scores were above the mean were grouped into a high proficiency group, and the participants whose scores were equal to or lower than the mean score were grouped into a low proficiency group.

**Procedure.** The procedure was the same as described in Experiment 1 in Chapter 1. The L2 participants were tested on the task in Experiment 6 in the first session and then tested on the task in Experiment 7 in the second session, with an intervening time interval of one week. The same L2 participants were tested on the task in Experiment 8 in the third session, with an intervening time interval of one week. At the end of the third session, the participants filled out a background information questionnaire and were given a C-test to measure their proficiency.

The L2 participants took approximately 15 minutes to finish the task of each experiment and less than 30 minutes for the proficiency task and the background information questionnaire (see Appendix H for details).

**Responses.** The data were recorded in Audacity, carefully transcribed by the author and one native speaker of English, and entered into a spreadsheet for coding and analysis. Although participants sometimes gave more than one answer, only the first answer is reported in the results below.

**L2 adult group.** The 40 L2 adults produced a total number of 400 (10 × 40) responses, 200 (5 × 40) responses for the subject RC condition and 200 (5 × 40) responses for the indirect object RC condition. No response was disregarded, and all were included in the statistical analysis.
Data coding. The author and one native speaker of English coded the responses and checked the data coding to reach agreement. Section 4.3.3.2 includes a complete list of examples for each type of response in each category.

4.3.3 Results (Performance on subject RCs vs. indirect object RCs)

The L2 learner’s responses to the test items in the experiments were matched to their proficiency scores on the C-test. The goal of the analysis was to examine the results from two (high and low) proficiency groups and compare them to those from the two native groups (adult and child). For each trial in the elicited-production task, participants had the opportunity to produce only one response. As such, the results indicate only what the participants’ initial response was.

4.3.3.1 Performance on subject RCs vs. indirect object RCs

The production task consistently elicited RCs from L2 learners of English. In addition to the targeted patterns (i.e., a subject RC and an indirect object RC), a variety of other response types were found, especially in contexts that were designed to elicit an indirect object RC, as illustrated with the help of Figure 4.1, repeated below.

Figure 4.1. A second picture pair used to elicit an indirect object RC
(5) Target response:
the boy [who the girl is giving a bag to _]

Non-targeted responses
a. Subject RCs using different lexical items:
the boy [who _ is getting the bag from the girl]

b. Subject RCs using a passive structure:
the boy [_ being given the bag by the girl]

c. RC involving a reversal in grammatical relations
(Indirect object RC → Subject RC)
the boy [that _ is giving a bag to the girl]

d. Preposition deletion
the boy [that the girl is giving a bag]

e. Other type of errors
the boy is giving a bag to the girl

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
by the arrow; the examples in (5a) and (5b) fall into this category, as they both
accurately describe the right boy by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
the referent, or both; examples (5c) – (5e) fall into this category.

Tables 4.2 and 4.3 summarize the response types produced by L2 participants in the
contexts designed to elicit subject and indirect object RCs.

Table 4.2. Percentages of different types of responses in each category for each RC
condition: High proficiency group (N = 18)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Subject RC</th>
<th>Indirect object RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>100% (90/90)</td>
<td>16.7% (15/90)</td>
</tr>
<tr>
<td>Non-target but acceptable Subject RC using different lexical items</td>
<td>0% (0/90)</td>
<td>54.5% (49/90)</td>
</tr>
<tr>
<td>Non-target and unacceptable RC involving a reversal in grammatical relations</td>
<td>0% (0/90)</td>
<td>1.1% (1/90)</td>
</tr>
<tr>
<td>Preposition deletion</td>
<td>0% (0/90)</td>
<td>3.3% (3/90)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (90/90)</td>
<td>100% (90/90)</td>
</tr>
</tbody>
</table>
Table 4.3. Percentages of different types of responses in each category for each RC condition: Low proficiency group ($N = 22$)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Subject RC</th>
<th>Indirect object RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target responses</td>
<td>94.5% (104/110)</td>
<td>10% (11/110)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>0% (0/110)</td>
<td>54.5% (60/110)</td>
</tr>
<tr>
<td>Subject RC using a passive</td>
<td>0% (0/110)</td>
<td>22.8% (25/110)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td>0% (0/110)</td>
<td>0.9% (1/110)</td>
</tr>
<tr>
<td>RC involving a reversal in grammatical relations</td>
<td>0% (0/110)</td>
<td>9.09% (10/110)</td>
</tr>
<tr>
<td>Preposition deletion</td>
<td>0% (0/110)</td>
<td>9.09% (10/110)</td>
</tr>
<tr>
<td>Non-RC</td>
<td>5.45% (6/110)</td>
<td>2.7% (3/110)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (110/110)</td>
<td>100% (110/110)</td>
</tr>
</tbody>
</table>

**Target responses**

The asymmetry in target responses between the two conditions was striking for both L2 groups (high proficiency group: 100% vs. 16.7%; low proficiency group: 94.5% vs. 10%). In order to investigate whether there are differences with respect to proficiency, the target responses were entered into an ANOVA with gap position (subject/indirect object gap) as the within-subject factor and proficiency as the between-subject factor.

Each group’s response patterns are very similar to those of the native English group, who showed an overall subject-indirect object asymmetry (100% vs. 11.8%). The differences between the two RCs were statistically significant for both groups (for the high proficiency group: $t(17) = -12.409, p < 0.001$; for the low proficiency group: $t(21) = -15.667, p < 0.001$).

These effects were tested for significance with a two-way mixed model ANOVA with group (high/low) as the between-subject factor and gap position (subject/indirect object gap) as the within-subject factor. The analysis revealed a significant main effect of gap position ($S > IO: F(1, 38) = 389.091, p < 0.001$) and a main effect of group (high proficiency group > low proficiency group: $F(1, 38) = 3.343, p = .075$). However, there was no significant interaction between group and gap position ($F(1, 38) = 0.61, p = .806$), confirming that the difference between the indirect object RC condition and the subject
RC condition was not larger for the low proficiency group than for the high proficiency group.

Acceptable responses

The high proficiency group produced acceptable responses in subject RC conditions with 100% accuracy and in indirect object RC conditions with 95.6% accuracy. The difference between the two conditions was not significant \((t(17) = -1.719, p = .104)\). Also, the low proficiency group produced acceptable responses in subject RCs (94.5%) and indirect object RCs (87.3%); the difference between the two conditions was not significant \((t(21) = -.946, p = .355)\).

These effects were tested for significance with a two-way mixed model ANOVA with group as the between-subject factor and gap position as the within-subject factor. The analysis failed to find a significant main effect of gap position (S > IO: \(F(1, 38) = 2.120, p = .154\)) or group (high proficiency group > low proficiency group: \(F(1, 38) = 3.886, p = .056\)). Moreover, there was no significant interaction between group and gap position \((F(1, 38) = .022, p = .833)\), indicating that the difference between the indirect object RC condition and the subject RC condition was not larger for the low proficiency group than for the high proficiency group.

4.3.3.2 Response strategies by L2 adult group

Turning now to the types of responses produced by our L2 participants, let us begin by considering the range of options observed when an indirect object RC was elicited.
Response strategies by high proficiency group

When the high proficiency L2 learners did not produce a targeted RC in the indirect object RC condition, they almost always produced a well-formed and semantically appropriate subject RC by using one of the following two strategies:

i. **Subject RC using different lexical items.** As shown in (6), 54.5% of the 90 responses involved the use of an alternative verb (e.g., *get* instead of *give*) to produce a subject RC with the same approximate meaning as the target indirect object RC.

   (6) Subject RC using different lexical items:
       the boy [who _ is getting the bag from the girl]
       (Target: the boy [that the girl is giving the bag to _])

   ii. **Subject RC using a passive structure.** As exemplified in (7), 24.4% of the responses involved a subject RC in the passive voice.

   (7) Subject RC using a passive structure:
       the boy [ _ being given the bag by the girl]
       (Target: the boy [that the girl is giving the bag to _])

Of the 22 responses involving a passivized subject RC, none exhibited deletion of the by-phrase (e.g., *the boy that _ is given the bag*).

iii. **Ungrammatical response without Preposition.** When the high proficiency group did not produce a target RC in the indirect object RC condition, 3.3% of responses contained inappropriate responses without a preposition. As shown in (8), the high proficiency L2 learners deleted *to* in the indirect object RC condition.

   (8) Ungrammatical response without a preposition:25
       *the boy [that the girl is giving a bag _]
       (Target: the boy [that the girl is giving the bag to _])

---

25 I considered this response to be ungrammatical without the preposition *to*, which appeared in the prompt. This error was largely restricted to the low proficiency group.
Response strategies by the low proficiency group

When the low proficiency L2 learners did not produce a targeted RC in the indirect object RC condition, their primary responses involved: (i) a well-formed and semantically appropriate subject RC (54.5%); (ii) a subject RC using a passive structure (22.8%); (iii) an RC involving a reversal error (0.9%); or (iv) preposition deletion (9.09%).

i. **Subject RC using different lexical items.** Like native adults (see Table 2.1 in Chapter 2), when the low proficiency L2 learners did not produce a targeted RC in the indirect object RC condition, the majority of their responses (54.5%) contained a subject RC with a different lexical items to produce the same meaning, as shown in (6).

ii. **Subject RC using a passive structure.** As exemplified in (7), 22.8% of the responses involved a subject RC in the passive voice. As in the case of the high proficiency group, none of the responses exhibited deletion of the by-phrase.

iii. **RC involving a reversal error.** When the low proficiency L2 learners produced indirect object RCs, they only rarely produced the reversal error when a subject RC was produced where an indirect object RC was called for: the raw number of these responses was very low (0.9%; one response in total by one L2 speaker) as shown in (9).

(9)  
RC involving a reversal in grammatical relations  
(Indirect object RC $\rightarrow$ Subject RC)  
the boy [that _ is giving a bag to the girl]  
(Target: the boy [that the girl is giving a bag to _])

iv. **Ungrammatical response without Preposition.** Of the responses in the indirect object RC condition, 9.09% contained ungrammatical responses without a preposition, as exemplified in (8).

v. **Non-RCs.** Of the responses in the indirect object RC condition, 2.7% contained a pattern that did not have a RC, as shown in (10).
The girl is giving a bag to the girl.
(Target: the boy [that the girl is giving a bag to _])

4.3.4 Discussion

The results reveal that both of the Korean-speaking L2 groups were less likely to produce indirect object RCs than subject RCs: not only do the low proficiency group produce substantially fewer targeted responses in the indirect object RC condition than in the subject RC condition, they also make more grammatical errors in the former than the latter.

Experiment 6 produced three non-target response strategies. First, lexical items were often changed to permit the production of a subject RC instead of an indirect object RC, as in (11a). Participants maintained the thematic role of goal but produced subject RCs through lexical substitution. The reverse, as in (11b), never happened.

(11) a. Target: the boy [that the girl is giving a bag to _]
   Actual response: the boy [that _ is receiving a bag from the girl]

b. Target: the boy [that _ is giving a bag to the girl]
   Actual response: the boy [that the girl is receiving a bag from _]

Second, both L2 groups often changed the syntactic structure (from active to passive\textsuperscript{26}) in order to permit production of a subject RC rather than an indirect object RC, as in (12a). Thus, passivization provides a perfectly acceptable alternative to targeted responses in the indirect object RC condition. The subject RC condition has a comparable alternative, as shown in (12b), but no participant chose that alternative.

\textsuperscript{26} Montag and MacDonald’s (2011) results are compatible with this result, showing that a direct object RC with an animate head (e.g., the boy that the girl is throwing _) encouraged adult speakers to produce passive subject RCs (e.g., the boy that _ is thrown by the girl) instead.
Third, the L2 groups tended to produce unacceptable responses due to preposition deletion, as in (13a): they deleted *to* in the indirect object RC condition (high group: 3.3%; low group: 9.09%). The reverse, as in (13b), never happened.

The production of non-gap-containing RCs appears to increase as the complexity of the structure increases (see Section 2.4.2). There is thus a greater possibility that a preposition will be deleted in indirect object RCs than in subject RCs, resulting an ungrammatical response. This error can perhaps be analyzed as a gapless response (i.e., noun modifying clause). In the gapless response analysis, RCs can be used as sentential modifiers that are allowed by their semantic connection with the head, as exemplified in (14) from Kwon (2008, p. 43).

(14) Dickens is one of the few authors [that/where I’d rather watch the video]

Kwon (2008) summarizes that RCs of this type do not require any movement in the derivation and they are considered as noun-modifying clauses (Comrie, 1998; Matsumoto, 1997).
The summary of the mean percentage of target and non-target but appropriate responses in each category for each RC condition by L1 English adults, children, and L2 learners of English is presented in Table 4.4.

Table 4.4. Mean percentage of ‘target response’ and ‘non-target but acceptable response’ in English and Korean

<table>
<thead>
<tr>
<th></th>
<th>Target response</th>
<th>Non-target but acceptable response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subject RCs</td>
<td>Indirect object RCs</td>
</tr>
<tr>
<td>Native English adult</td>
<td>100%</td>
<td>11.8%*</td>
</tr>
<tr>
<td>Native English child</td>
<td>94.30%</td>
<td>2.9%*</td>
</tr>
<tr>
<td>High proficiency group</td>
<td>100%</td>
<td>16.7%*</td>
</tr>
<tr>
<td>Low proficiency group</td>
<td>94.50%</td>
<td>10%*</td>
</tr>
<tr>
<td>Native Korean adult</td>
<td>100%</td>
<td>7.6%*</td>
</tr>
<tr>
<td>Native Korean child</td>
<td>80.80%</td>
<td>8%*</td>
</tr>
</tbody>
</table>

(*: indicates that the responses between the two conditions are significantly different)

As shown in Table 4.4, the subject-indirect object asymmetry manifested by the L2 learners of English is very similar to English L1 adults and children. The L2 data produced two notable points. First, the behavior of L2 learners was similar to that of L1 speakers; they were less likely to produce indirect object RCs, just like the native speakers studied in Experiment 1 in Chapter 2. Even though the low and high proficiency L2 groups did not show a significant difference with respect to targeted responses in the two RC conditions, both showed the exact same asymmetry between subject and indirect object RC conditions. When the L2 learners did not produce an indirect object RC, their responses involved a well-formed and semantically appropriate subject RC and subject RC using a passive structure. The attempted elicitation of indirect object RCs by the L2 groups sometimes created confusion and even a breakdown in grammaticality. As discussed in response strategies by L2 groups in 4.3.3.2, unacceptable responses involved use of a resumptive NP, reversal errors, and preposition deletion when indirect object
RCs were targeted. These responses were very much like those of the L1 English child group (e.g., resumptive NP, head errors, reversal errors, preposition deletion).

Second, similar to the preference pattern in L1 English, the results in Chapter 3 demonstrate that L1 Koreans have difficulty producing indirect object RCs. I tested 21 Korean adult native speakers and 25 children of Korean to examine how they produced Korean subject and indirect object RCs. Results demonstrated that a subject RC was far more likely to be produced than an indirect object RC (for adults: 100% vs. 7.6%; for children: 80.8% vs. 8%). L2 learners of English showed the exact same asymmetry between subject and indirect object RC conditions. When the L1 Korean children did not produce an indirect object RCs, unacceptable responses involved use of a resumptive NP and reversals errors that were very much like those found in the responses of L2 learners (e.g., resumptive NP, reversals, preposition deletion).

In sum, like native speakers of English and Korean, the L2 groups (both low and high proficiency) displayed a strong asymmetry in target responses between the two conditions. To my knowledge, the subject-indirect object asymmetry has not been discussed in the L2 literature. The pattern of findings is consistent with the linear distance hypothesis, the structural distance hypothesis, and the semantic prominence hypothesis, because all three predict that the indirect object RCs will be more difficult to produce.

4.4 Experiment 7: Direct object vs. oblique RCs in L2 English

4.4.1 Introduction

In Experiment 7, I compare direct object and oblique RCs. This section aims to investigate the predictions of the three different hypotheses regarding the source of the asymmetry exhibited in the English L1 acquisition results in Chapter 2. I examine these
hypotheses by studying L2 adults’ production of postnominal RCs in English, focusing on their success in producing the targeted responses and the alternative patterns and errors produced in cases of failure.

The linear distance hypothesis predicts that direct object gap RCs will be easier for the L2 learners of English to process than oblique RCs. This is because the linear distance between the filler and the gap is shorter in direct object RCs than in oblique RCs.

(15)  

a. Direct object RC: the book [that the boy put _ on the box]  
   \[1 \quad 2\]

b. Oblique RC: the box [that the boy put the book _on]  
   \[1 \quad 2 \quad 3\]

The structural distance hypothesis also predicts that in L2 English, direct object RCs will be easier the L2 learners of English to produce than oblique RCs. This is because the oblique gap is more deeply embedded inside the structure, as in (16).

(16)  

a. Direct object RC:

Number of nodes between the head noun and gap: 2 (S, VP)
b. Oblique RC:

Number of nodes between the head noun and gap: 3 (S, VP, PP)

The semantic prominence hypothesis also predicts that direct object RCs will be relativized more easily than oblique RCs by the L2 learners of English because the oblique RC relativizes a less prominent element, as shown in (17), based on the prominence hierarchy $S > DO > IO > OBL$.

(17) a. Direct object RC:

```
more topic-worthy

the book [that the boy put _ on the box]
```

b. Oblique RC:

```
less topic-worthy

the box [that the boy put the book on _]
```

4.4.2 Method

Participants. The same participants who took part in Experiment 6 participated in this experiment. Experiment 7 was conducted one week after Experiment 6.
Materials and design. The same materials employed for this experiment on direct object and oblique RCs in English (Experiment 2 in Chapter 2) were used for the L2 experiment.

Procedure. The procedure was the same as described in Experiment 2.

Responses. To ensure that transcription was accurate and reliable, the data were recorded in Audacity, carefully transcribed by the author and one native speaker of English, and entered into a spreadsheet for coding and analysis. Although participants sometimes gave more than one answer, only the first answer is reported in the results below.

L2 adult group. Forty adults produced a total of 400 (10 × 40) responses, 200 (5 × 40) responses for the subject RC condition and 200 (5 × 40) responses for the indirect object RC condition. No response was disregarded, and all were included in the statistical analysis.

Data coding. The author and one native speaker of English coded the responses and checked the data coding to reach agreement on. Section 4.4.3 includes a complete list of examples for each type of response in each category.

4.4.3 Results

4.4.3.1 Performance on direct object RCs vs. oblique RCs

This RC production task consistently elicited RCs from L2 learners of English. In addition to the targeted patterns (i.e., a direct object RC and an oblique RC), a variety of other response types were found in contexts that were designed to elicit a direct object RC, as illustrated with the help of Figure 4.2, repeated below.
Figure 4.2. A second picture pair used to elicit a direct object RC

(18) Target response:
the book [that the boy put _ on the box]

Non-targeted responses:

a. Subject RCs using a passive structure
   (turning the direct object RC into a subject RC)
   the book [that _ was put on the box]

b. Prepositional Phrase using a subject RC:
   the book on the box that is put by the boy
   (Target: the book [that the boy put _ on the box])

c. Coordinate pattern that avoids an RC
   the book [that _ is on the box and that the boy put it]

d. Other error types
   boy’s book
   the book on the box
   the boy put the book on the box

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
    by the arrow; the examples in (18a) and (18b) fall into this category, as they both
    accurately describe the left book by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
    the referent, or both; examples (18c) – (18d) fall into this category.
Tables 4.5 and 4.6 summarize the response types produced by L2 participants in the contexts designed to elicit direct object and oblique RCs.

Table 4.5. Percentages of different types of responses in each category for each RC condition: High proficiency group (N = 18)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Direct object RC</th>
<th>Oblique RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>47.8% (43/90)</td>
<td>40% (36/90)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC using a passive structure</td>
<td>52.2% (47/90)</td>
<td>0% (0/90)</td>
</tr>
<tr>
<td>OBL using a passive structure</td>
<td>0% (0/90)</td>
<td>32.2% (29/90)</td>
</tr>
<tr>
<td>Subject RC using different lexical items</td>
<td>0% (0/90)</td>
<td>18.8% (17/90)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preposition deletion</td>
<td>0% (0/90)</td>
<td>4.5% (4/90)</td>
</tr>
<tr>
<td>Non-RCs</td>
<td>0% (0/90)</td>
<td>4.5% (4/90)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (90/90)</td>
<td>100% (90/90)</td>
</tr>
</tbody>
</table>

Table 4.6. Percentages of different types of responses in each category for each RC condition: Low proficiency group (N = 22)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Direct object RC</th>
<th>Oblique RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target response</td>
<td>65.4% (72/110)</td>
<td>45.4% (50/110)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC using a passive structure</td>
<td>26.3% (29/110)</td>
<td>0% (0/110)</td>
</tr>
<tr>
<td>OBL using a passive structure</td>
<td>0% (0/110)</td>
<td>7.3% (8/110)</td>
</tr>
<tr>
<td>PP using a subject RC</td>
<td>3.7% (4/110)</td>
<td>0% (0/110)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC involving a reversal in grammatical relations</td>
<td>0% (0/110)</td>
<td>12.7% (14/110)</td>
</tr>
<tr>
<td>Resumptive NP</td>
<td>0% (0/110)</td>
<td>4.6% (5/110)</td>
</tr>
<tr>
<td>Resumptive Pronoun</td>
<td>0% (0/110)</td>
<td>6.1% (6/110)</td>
</tr>
<tr>
<td>Preposition deletion</td>
<td>0% (0/110)</td>
<td>21.8% (24/110)</td>
</tr>
<tr>
<td>Non-RCs</td>
<td>4.6% (5/110)</td>
<td>2.72% (3/110)</td>
</tr>
<tr>
<td>Total</td>
<td>100% (110/110)</td>
<td>100% (110/110)</td>
</tr>
</tbody>
</table>

**Target responses**

The high proficiency L2 group produced targeted responses in direct object RC conditions with 47.8% accuracy and in oblique RC conditions with 40% accuracy. The difference between the two conditions was not significant (t(17) = 1.719, p = .104).

However, the difference between the two conditions in target responses was marginally significant in the low proficiency group (direct object RCs 65.4% vs. oblique RCs 45.4%, t(21) = 1.964, p = .063).

These effects were tested for significance with a two-way mixed model ANOVA with group as the between-subject factor and gap position as the within-subject factor.
The analysis failed to reveal a significant main effect of gap position (DO > OBL: $F(1, 38) = 5.516, p = .024$) and a main effect of group (high proficiency group > low proficiency group: $F(1, 38) = .959, p = .334$). Moreover, there was no significant interaction between group and gap position ($F(1, 38) = .898, p = .349$), indicating that the difference between the direct object RC condition and the oblique RC condition was not larger for the low proficiency group than for the high proficiency group.

**Acceptable responses**

Paired-sample $t$-tests showed that the low proficiency L2 group produced significantly more acceptable responses in the direct object RC condition than in the oblique RC condition (95.4% vs. 52.7%, $t(21) = 6.410, p < 0.001$). Moreover, the analysis revealed a significant main effect of RC condition for the high L2 proficiency group (100% vs. 91%, $t(17) = 2.406, p = .028$). This finding indicates that the asymmetry in appropriate responses between these two conditions was particularly striking for the low proficiency group. Each group’s response patterns are very similar to those of the native English group, who showed an overall direct object-oblique asymmetry (for English L1 adults: 94.3% vs. 86.5%).

These effects were tested for significance with a two-was mixed ANOVA with gap position (direct object/oblique gap) as the within-subject factor and proficiency as a between-subject factor. The analysis revealed a significant main effect of gap position (DO > OBL: $F(1, 38) = 40.545, p < 0.001$) and a main effect of group (high proficiency group > low proficiency group: $F(1, 38) = 20.814, p < 0.001$). Moreover, there was a significant interaction between group and gap position ($F(1, 38) = 16.666, p < 0.001$), confirming that the difference between the direct object RC condition and the oblique RC
condition was larger for the low proficiency group than for the high proficiency group. In other words, regardless of proficiency, the participants produced more acceptable responses in direct object RCs than in oblique RCs, and regardless of the condition, the high proficiency group produced more acceptable responses.

4.3.3.2 Response strategies by L2 adult group

Turning now to the types of responses produced by our L2 participants, let us begin by considering the range of options observed when a direct object RC and an oblique RC were elicited.

4.3.3.2.1 Direct object RCs

Response strategies by high proficiency group

When the high proficiency L2 learners did not produce a targeted RC in the direct object RC condition, they always produced a well-formed and semantically appropriate subject RC by using a passive structure, as exemplified in (19). Of the total responses in the direct object RC condition, 52.2% were of this type.

(19) Passive: turning the direct object RC into a subject RC
the book [that _ was put on the box by the boy]
(Target: the book [that the boy put _ on the box])

Of the 47 responses involving the subject RC using a passive structure, none exhibited deletion of the by-phrase (e.g., the book that _was put.)

Response strategies by low proficiency group

The asymmetry in acceptable responses between the two conditions is striking: 95.4% for direct object RCs compared to 52.7% for oblique RCs. When they did not produce a targeted RC in the direct object RC condition, they produced (i) a subject RC using a
passive structure (26.3% of total responses); (ii) a prepositional phrase using a subject RC (3.7%); or (iii) a Non-RC (4.6%).

**i. Subject RC using a passive structure.** Similar to the high proficiency group, 26.3% of the low proficiency group’s overall responses in the direct object RC condition involved a subject RC in the passive voice, as in (19) above. As before, none of these responses exhibited deletion of the *by*-phrase.

**ii. Prepositional Phrase using a subject RC.** The low proficiency group responded with a prepositional phrase (PP) as in example (20), resulting in a phrase that had a subject RC; of all responses in the direct object RC condition, 3.7% were of this type.

(20) Prepositional Phrase using a subject RC:  
the book on the box that is put by the boy  
(Target: the book [that the boy put _ on the box])

**iii. Non-RCs.** Of the overall responses in the direct object RC condition, 4.6% contained other error types, including the production of non-RC constructions, as exemplified in (21).

(21) Target response:  
the book [that the boy put _ on the box]  

Non-RCs:  
the boy put the book on the box

**4.4.3.2.2. Oblique RCs**

In addition to the targeted patterns (i.e., oblique RC), a variety of other response types were found, in contexts that were designed to elicit an oblique RC, as illustrated with the help of Figure 4.3, repeated below.
Figure 4.3. A picture pair used to elicit an oblique RC

(22)  

Target response:  
the box [that the boy put the book on _]  

Non-targeted responses:  

a.  Subject RC using different lexical items  
the box [that _ got the book from the boy]  

b.  Oblique RC using a passive structure  
the box [that the book is being put on _ by the boy]  

c.  Direct object RC involving a reversal in grammatical relations  
(Oblique RC \(\rightarrow\) Direct object RC)  
the box [that the boy put _ on the book]  

d.  Preposition deletion:  
the box [that the boy put the book ]  

e.  Resumptive NP  
Resumptive pronoun: the box [that the boy put the book on it]  
Resumptive NP: the box [that the boy put the book on the box]  

f.  Non-RC  
the boy put the book on the box  

The non-target responses can be subdivided into two classes:  

(i)  acceptable alternatives that offer well-formed descriptions of the referent singled out  
by the arrow; the examples in (22a) and (22b) fall into this category, as they both  
accurately describe the left box by means of a well-formed structure.
(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of the referent, or both; examples (22c) – (22f) fall into this category.

**Response strategies by high proficiency group**

The high proficiency L2 learners sometimes produced appropriate responses in the oblique RC condition; however, they had a tendency to produce more errors. These errors took one of three forms: (i) subject RC using different lexical items (18.8%); (2) oblique RC using a passive structure (32.2%); or (iii) an ungrammatical response without a preposition (4.5%).

**i. Subject RC using different lexical items.** Of the high proficiency L2 learners’ overall responses, 18.8% involved the use of an alternative verb (e.g., *got* instead of *put*) to produce a subject RC with the same meaning as the targeted oblique RC, but with a subject gap instead of an oblique gap, as in (23).

(23) **Subject RC using different lexical items:**
the box [that _ got the book from the boy]

**ii. Oblique RC using a passive.** As shown in (18), 32.2% of the high proficiency L2 learners’ responses in the oblique RC condition involved producing an oblique RC with passivization of the embedded clause.

(24) **Oblique RC using a passive structure**
the box [that the book is being put on _ by the boy]

Of the 29 responses involving a passivized oblique RC, none exhibited deletion of the *by*-phrase.

**iii. Preposition deletion.** Of the responses in the oblique RC condition, 4.5% contained ungrammatical responses without the preposition *on*, as exemplified in (25).
(25) Preposition deletion:
*the box [that the boy put the book ]
(Target: the box [that the boy put the book on _])

Response strategies by low proficiency group

Although the low proficiency L2 group sometimes produced appropriate responses in the oblique RC condition, they had a tendency to produce more errors than the high proficiency L2 group did. These errors took one of three forms: (i) a reversal error (12.7%), (ii) the use of a resumptive NP (10.2%) or (iii) an ungrammatical response without a preposition (21.8%).

i. RC involving a reversal in grammatical relations. As exemplified in (26), the low proficiency L2 group produced reversal errors when a direct object RC was produced where an oblique RC was called for (12.7% of responses).

(26) RC involving a reversal in grammatical relations
(Oblique RC → Direct object RC)
the box [that the boy put _ on the book]
(Target: the box [that the boy put the book on _])

ii. Resumptive NP. When the low proficiency L2 group did not produce a targeted RC in the oblique RC condition, errors involved a resumptive pronoun or NP, such as in (27).

The low proficiency L2 group demonstrated higher rates of resumptives errors for oblique RCs (10.2%) than for direct object RCs (0%).

(27) Resumptive NP:
Resumptive pronoun: the box [that the boy put the book on it]
Resumptive NP: the box [that the boy put the book on the box]

iii. Preposition deletion. The low proficiency L2 group’s non-target responses when oblique RCs were targeted also included preposition deletion (21.8%).
(28) Preposition deletion: the box [that the boy put the book]
(Target: the box [that the boy put the book on_])

4.3.4 Discussion

The overall results suggest that the L2 groups have greater difficulty producing oblique RCs than direct object RCs. Not only did the low proficiency L2 learners produce substantially fewer targeted responses in the oblique RC condition than in the direct object RC condition, they also made more grammatical errors in the oblique condition than in the direct object condition. The high proficiency L2 learners were also more likely in the oblique RC condition to choose a grammatical, semantically appropriate alternative response, suggesting that they were specifically “avoiding” the targeted oblique RC by responding with a subject RC using different lexical items or with an passivized oblique RC. So, to avoid saying the box that the boy put the book on _, they might say the box that _ got the book from the boy or the box that the book is being put on _ by the boy.

Experiment 7 revealed three non-targeted response strategies. First, the syntactic structure was changed from active to passive in order to permit production of a subject rather than a direct object RC, as in (29a), and to permit production of an oblique RC in passive voice rather than an oblique RC with active voice, as in (29b).

(29) a. Target: the book [that the boy put _ on the box]

            Actual response: the book [that _ was put on the box]

            b. Target: the box [that the boy put the book on _]

            Actual response: the box [that the book was put on _ by the boy]

Passivization provides approximately the same meaning as target responses in both direct object RC and oblique RC conditions. The strategy of responding with a passive to items
that targeted direct object RCs has also been observed in previous research on English (Zukowski, 2009), Chinese (Hsu et al., 2009), and Korean (Kim, 2012). In terms of the intervening material between the filler and the gap, it is possible that L2 speakers of English were trying to shorten the length of the filler-gap dependency, which is accomplished in both of the actual responses in (29). The results of this study confirm that in languages with postnominal RCs, direct object RCs are easier to produce than oblique RCs.

Second, the low proficiency L2 learners produced resumptive NP errors, and they did so more often in the oblique RC condition than in the direct object RC condition (10.2% vs. 0%). As explained in the discussion of Experiment 1, these resumptive NP errors can be explained in terms of holding the planned head noun in working memory. The need to reactivate the head noun in the gap position increases as production of the sentence progresses: the L2 groups may feel this less strongly when they produce a direct object gap that comes earlier, as in the pattern N [N V _ OBL], and more strongly at the oblique gap that comes later, as in N [N V DO _]. This explanation suggests that there is a greater possibility that the head noun (or coindexed pronoun) will be uttered in the oblique gap position, resulting in a resumptive NP. This suggests that resumptive elements, whether NPs or pronouns, are used as a way to facilitate production rather than comprehension.

Third, L1 Korean-speaking L2 learners of English tended to produce ungrammatical responses due to deletion of the preposition on. The production of non-gap containing RCs appears to increase as the complexity of the structure increases. There is thus a greater likelihood that a preposition will be deleted in oblique RCs than in
direct object RCs, resulting in an ungrammatical response. The L2 learners in the low-proficiency group produced this ungrammatical response (21.8%) strikingly more often than the L2 learners in the high-proficiency group (4.5%).

The summary of the mean percentage of targeted and acceptable non-targeted responses in each category for each RC condition by L1 English adults, children, and L2 learners of English is presented in Table 4.7.

Table 4.7. Mean percentage of ‘target response’ and ‘non-target but acceptable response’ in English and Korean

<table>
<thead>
<tr>
<th>Group</th>
<th>Target response</th>
<th>Non-target but acceptable response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct object RCs</td>
<td>Oblique RCs</td>
</tr>
<tr>
<td>Native English adult</td>
<td>75.70%</td>
<td>70%</td>
</tr>
<tr>
<td>Native English child</td>
<td>47.60%</td>
<td>26.7%*</td>
</tr>
<tr>
<td>High proficiency group</td>
<td>47.80%</td>
<td>40%</td>
</tr>
<tr>
<td>Low proficiency group</td>
<td>65.40%</td>
<td>45.4%†</td>
</tr>
<tr>
<td>Native Korean adult</td>
<td>83.70%</td>
<td>70%*</td>
</tr>
<tr>
<td>Native Korean child</td>
<td>74.40%</td>
<td>14.4%*</td>
</tr>
</tbody>
</table>

(*: indicates that the responses between the two conditions are significantly different; †: marginally significant)

As shown in Table 4.7, the direct object-oblique asymmetry pattern of the L2 learners of English is very similar to the English L1 adults and children. The L2 data produced two notable points. First, the behavior of the L2 learners was similar to that of L1 speakers in their avoidance of oblique RCs.

Although the high proficiency group did not show a significant difference with respect to targeted responses in the two RC conditions, both groups produced more acceptable responses in the direct object condition, just like the L1 child group.

When the L2 learners did not produce a direct object RC, their responses involved a well-formed and semantically appropriate subject RC from using a passive structure. The attempted elicitation of oblique RCs by the L2 groups created confusion and even a breakdown in grammaticality. As discussed in response strategies by L2 groups in
4.4.3.2, unacceptable responses involved use of a resumptive, reversal errors, and preposition deletion when oblique RCs were targeted, and these responses were very much like responses strategies by L1 English child group (e.g., resumptive NP, head errors, reversal errors, head + reversal error, coordinate RCs).

Second, similar to the preference pattern in L1 English, the results from L1 Korean in Chapter 3 demonstrate that L1 Koreans have difficulty producing oblique RCs. I tested 22 adult native speakers and 25 children of Korean to examine how they produced Korean direct object and oblique RCs. I found that direct object RCs were more likely to be produced than oblique RC (for adults: 83.7% vs. 70%). Furthermore, Korean children were far better at producing direct object RCs with 74.4% accuracy than oblique RCs with 14.4%. Thus, a larger asymmetry between direct object-oblique RCs was strongly approved by Korean L1 child group as well as the L2 learners of English. When the L1 Korean children did not produce a direct object RC, unacceptable responses involved use of a resumptive NP, reversal errors and head errors, and these responses were very much like responses strategies by L2 learners (e.g., resumptives, reversal errors, preposition deletion).

In sum, like native speakers of English and Korean, the L2 groups (both low and high proficiency groups) displayed a strong asymmetry in targeted responses between the two conditions. This pattern of findings is consistent with the predictions made by the linear distance hypothesis, the structural distance hypothesis, and the semantic prominence hypothesis because all three predict that oblique RCs are more difficult to produce.
4.5 Experiment 8: Comparison of oblique RCs on different FGD lengths in L2

English

4.5.1 Introduction

The linear distance hypothesis predicts that oblique RCs with a short FGD, such as (30a), will be easier to process than oblique RCs with a long FGD such as (30b).

(30)  
  a. Oblique RC with short FGD:  
      the car [that the boy walked from _ to the church]  
      \[ \begin{array}{c} 1 \\ 2 \end{array} \]  
  b. Oblique RC with long FGD:  
      the church [that the boy walked from the car to _]  
      \[ \begin{array}{c} 1 \\ 2 \\ 3 \end{array} \]  
Thus, this hypothesis predicts that in English, oblique RCs with a longer FGD will be more difficult for children than oblique RCs with a shorter FGD.

The structural distance hypothesis does not predict a difference between the oblique RCs with a short FGD and oblique RCs with FGD, because both oblique RCs are equal in terms of intervening nodes.

(31)  
  a. Oblique RC with short FGD:

\[ \begin{array}{c} \text{NP} \\ \text{N} \\ \text{the car} \\ \text{that} \\ \text{S'} \\ \text{S} \\ \text{VP} \\ \text{V} \\ \text{walked} \\ \text{P} \\ \text{NP} \\ \text{from} \\ \_ \\ \text{to} \\ \text{the church} \\ \text{PP} \\ \text{PP} \\ \text{PP} \\ \text{NP} \end{array} \]

Number of nodes between the head noun and gap: 3 (S, VP, PP)
b. Oblique RC with long FGD:

The semantic prominence hypothesis \((S > \text{DO} > \text{IO} > \text{OBL})\) can predict that oblique RCs with a short FGD will be produced more easily than oblique RCs with a long FGD since the latter contains a lower relativized element than the former, as shown in (32).

(32) a. Oblique RC with a short FGD:

\[
\text{more topic-worthy} \\
\text{the car [that the boy walked from _ to the church]}
\]

b. Oblique RC with a long FGD:

\[
\text{less topic-worthy} \\
\text{the church [that the boy walked from the car to _]}
\]

4.5.2 Methods

Participants. The same participants who took part in Experiments 6 and 7 participated in this experiment. Experiment 8 was conducted one week after Experiment 7.
Materials and design. The same materials employed for the experiment on oblique RC with short FGD and oblique RC with long FGD in English (Experiment 3 in Chapter 2) were used for the L2 experiment.

Procedure. The procedure was the same as described in Experiment 3.

L2 adult group. Forty adults produced a total number of 400 (10 × 40) responses, 200 (5 × 40) responses for the subject RC condition and 200 (5 × 40) responses for the indirect object RC condition. No response was disregarded, and all were included in the statistical analysis.

Data coding. The author and one native speaker of English coded the responses and checked the data coding to reach agreement on a number. Section 4.5.3 includes a complete list of examples for each type of response in each category.

4.5.3 Results (Performance on oblique RCs with short FGD vs. oblique RCs with long FGD)

4.5.3.1 Production types in oblique RCs with short FGD

This RC production task consistently elicited RCs from L2 learners of English. In addition to the targeted patterns (i.e., an oblique RC with a short FGD and an oblique RC with a long FGD), a variety of other response types were found, in contexts that were designed to elicit an oblique RC with a short FGD, as illustrated with the help of Figure 4.4., repeated below.
Figure 4.4. A picture pair used to elicit an oblique RC with a short FGD

(33) Target response:
the car [that the boy is walking from _ to the church]

Non-targeted responses:

a. Preposition ‘from’ deletion
   the car [that the boy is walking to the church]

b. Resumptive NP
   the car [that the boy is walking from the car to the church]

c. RC involving a reversal in grammatical relations
   the car [that the boy is walking from the church to _]

g. Other error types
   Preposition deletion:
   the car [that the boy is walking to the church]

Non-RC:
   the boy is walking from the car to the church

All the non-target responses were:

(i) unacceptable alternatives that were either ill-formed, or that offered inaccurate
    descriptions of the referent, or both; examples (33a) – (33g) fall into this category.

Tables 4.8 and 4.9 summarize the response types produced by L2 participants in the
contexts designed to elicit two oblique RCs.
Table 4.8. Percentages of different types of responses in each category for each RC condition (High proficiency group: N = 18)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Oblique RC with short FGD</th>
<th>Oblique RC with long FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>88.8% (80/90)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>Change the order of the PPs</td>
<td>0% (0/90)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td>RC involving a reversal in grammatical relations</td>
<td>2.2% (2/90)</td>
</tr>
<tr>
<td></td>
<td>Preposition ‘to’ deletion</td>
<td>0% (0/90)</td>
</tr>
<tr>
<td></td>
<td>Preposition ‘from’ deletion</td>
<td>5.6% (5/90)</td>
</tr>
<tr>
<td></td>
<td>Non-RC</td>
<td>3.4% (3/90)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100% (90/90)</td>
</tr>
</tbody>
</table>

Table 4.9. Percentages of different types of responses in each category for each RC condition (Low proficiency group: N =22)

<table>
<thead>
<tr>
<th>Responses</th>
<th>Oblique RC with short FGD</th>
<th>Oblique RC with long FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Target response</td>
<td>60% (66/110)</td>
</tr>
<tr>
<td>Non-target but acceptable</td>
<td>Change the order of the PPs</td>
<td>0% (0/110)</td>
</tr>
<tr>
<td>Non-target and unacceptable</td>
<td>RC involving a reversal in grammatical relations</td>
<td>2.8% (3/110)</td>
</tr>
<tr>
<td></td>
<td>Resumptive NP</td>
<td>2.8% (3/110)</td>
</tr>
<tr>
<td></td>
<td>Preposition ‘from’ deletion</td>
<td>28.1% (31/110)</td>
</tr>
<tr>
<td></td>
<td>Preposition ‘to’ deletion</td>
<td>0% (0/110)</td>
</tr>
<tr>
<td></td>
<td>Non-RC</td>
<td>6.3% (7/110)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100% (110/110)</td>
</tr>
</tbody>
</table>

**Target responses**

The high proficiency group showed a higher rate of targeted responses in the oblique RC with a short FGD condition (88.8%) than in the oblique RC with a long FGD condition (3.3%). The low proficiency group showed a higher rate of targeted responses in the oblique RC with a short FGD condition (60%) than in the oblique RC with a long FGD condition (6.4%).

The analysis revealed a significant main effect of gap position (OBL RCs with short FGD > OBL RCs with long FGD: $F(1, 38) = 451.211, p < 0.001$) and a main effect of group (the high proficiency group > the low proficiency group: $F(1, 38) = 16.104, p < 0.001$). Also, there was significant interaction between group and gap position ($F(1,$
38) = 23.728, \( p < 0.001 \), confirming that the difference between the oblique RCs with a short FGD condition and the oblique RCs with a long FGD condition was larger for the low proficiency group than for the high proficiency group. Regardless of proficiency, the participants produced more targeted responses in the short FGD condition than in the long FGD condition, and that regardless of the types of conditions, the high proficiency group produced more targeted responses than did the low proficiency group.

Acceptable responses

Paired-sample \( t \)-tests suggested that the low proficiency group tended to produce more acceptable responses in the short FGD condition than in the long FGD condition (60\% vs. 38.2\%, \( t(21) = -3.626, p = .002 \); however, the analysis did not reveal a significant main effect of RC condition for the high proficiency group (88.8\% vs. 82.1\%; \( t(17) = -1.144, p = .269 \)).

These effects were tested for significance with a two-way mixed ANOVA with gap position (OBL RCs with short FGD/OBL RCs with long FGD) as the within-subject factor and proficiency as a between-subject factor. The analysis revealed a significant main effect of gap position (OBL RCs with short FGD > OBL RCs with long FGD: \( F(1, 38) = 11.252, p = .002 \)) and a main effect of group (the high proficiency group > the low proficiency group: \( F(1, 38) = 34.674, p < 0.001 \)). Also, there was not highly but marginally significant effect between group and gap position (\( F(1, 38) = 3.184, p = .082 \)), confirming that the difference between the oblique RCs with a short FGD condition and the oblique RCs with a long FGD condition was larger for the low proficiency group than for the high proficiency group. Regardless of proficiency, the participants produced more acceptable responses in the short FGD condition than in the long FGD condition, and that
regardless of the types of conditions, the high proficiency group produced more acceptable responses than did the low proficiency group.

4.5.3.2 Response strategies by L2 adult group

Turning now to the types of responses produced by our L2 participants, let us begin by considering the range of options observed when the two types of oblique RC were elicited.

4.5.3.2.1 Oblique RCs with short FGD

Response strategies by high proficiency group

When the participants did not produce a targeted RC in the short FGD condition, their responses involved (i) a reversal error (2.2%); (ii) preposition deletion (5.6%); or (iii) a non-RC (3.4%).

i. RC involving a reversal in grammatical relations. When the high proficiency group did not produce a targeted RC in the short FGD condition, 2.2% of the overall responses involved an RC involving a reversal in grammatical relations, as in (34).

(34) RC involving a reversal in grammatical relations:
    the car [that the boy is walking from the church to _]

ii. Preposition deletion. Unlike native adult group (see Experiment 3), when the high proficiency group did not produce a targeted RC in the short FGD condition, 5.6% of the overall responses involved an ungrammatical RC with the preposition preceding the deleted gap, as in (35).

(35) Target response:
    the car [that the boy is walking from _ to the church]

    Preposition ‘from’ deletion:
    the car [that the boy is walking to the church]
iii. Non-RC. Of overall responses in the short FGD condition, 3.4% contained a non-RC to avoid producing an RC, as in (36).

(36) Non-RC: the boy is walking from the car to the church

Response strategies by the low proficiency group

When they did not produce a targeted RC in the short FGD condition, their responses primarily involved (i) preposition deletion (28.1%); (ii) a reversal error (2.8%); or (iii) a resumptive NP error (2.8%).

i. Preposition deletion. When the low proficiency group did not produce a targeted RC in the short FGD condition, 28.1% of the overall responses involved an RC involving a preposition deletion error, as in (35).

ii. RC involving a reversal in grammatical relations. When the low proficiency group did not produce a targeted RC in the short FGD condition, 2.8% of the overall responses involved an RC involving a reversal in grammatical relations, as in (34).

iii. Resumptive NP. Unlike the high proficiency group, the low proficiency group inserted a resumptive NP instead of leaving a gap, as shown in (37). Of all the responses in the short FGD condition, 2.8% contained a resumptive NP error.

(37) resumptive NP: the car [that the boy is walking from the car to the church]

4.5.3.2.2 Oblique RCs with long FGD

In addition to the targeted patterns (i.e., oblique RC with a long FGD), a variety of other response types were found in contexts that were designed to elicit an oblique RC with a long FGD, as illustrated with the help of Figure 4.5., repeated below.
Figure 4.5. A second picture pair used to elicit an oblique RC with a long FGD

(38)  Target response:
    the church [that the boy is walking from the car to _ ]

    Non-targeted responses:
    a. PP order change
       the church [that the boy is walking to _ from the car]
    b. Resumptive NP
       the church [that the boy is walking from the car to the church]
    c. Preposition ‘to’ deletion
       the church [that the boy is walking _ from the car]

The non-target responses can be subdivided into two classes:

(i) acceptable alternatives that offer well-formed descriptions of the referent singled out
    by the arrow; the example in (38a) falls into this category, as it accurately describes
    the left church by means of a well-formed structure.

(ii) unacceptable alternatives that are either ill-formed, or offer inaccurate descriptions of
    the referent, or both; examples (38b) and (38c) fall into this category.
Response strategies by high proficiency group

When the high proficiency group did not produce a targeted RC in the long FGD condition, their responses involved (i) a change the order of the PPs (78.8%); (ii) preposition deletion (8.9%); or (iii) a reversal error (4.5%).

i. Oblique RCs using goal-source order. When the high proficiency group did not produce a target RC in the long FGD condition, they almost always produced a well-formed and semantically appropriate oblique RC with a short FGD. As shown in (39), 78.8% of the overall responses exhibited an oblique RC with a short FGD with a goal-source order, resulting in the same approximate meaning as the targeted oblique RC with a long FGD. In other words, they produced oblique RCs with a short instead of a long FGD.

(39) Target response:
the church [that the boy is walking from the car to _ ]

Change the order of the PPs:
the church [that the boy is walking to _ from the car]

ii. Preposition deletion. When the high proficiency group did not produce a target RC in the long FGD condition, 8.9% of responses contained ungrammatical responses without the ‘to’ preposition, as exemplified in (40).

(40) Preposition ‘to’ deletion
the church [that the boy is walking from the car]

iii. RC involving a reversal in grammatical relations. As exemplified in (41), the high proficiency group produced the reversal error when an oblique RC with a short FGD was produced where an oblique RC with a long FGD was called for (4.5% of responses).
Target response:
the church [that the boy is walking from the car to _ ]

RC involving a reversal in grammatical relations:
(Oblique RC with a long FGD ➔ Oblique RC with a short FGD)
the church [that the boy is walking from _ to the car]

Response strategies by low proficiency group

When the low proficiency group did not produce a target RC in the long FGD condition, their primary responses involved producing: (i) oblique RCs using goal-source order (31.8%); (ii) ungrammatical RCs using preposition deletion (30%); (iii) oblique RCs with resumptive NPs (14.5%); or (iv) a reversal error (9.1%).

i. Oblique RCs using goal-source order. When the low proficiency group did not produce a targeted RC in the long FGD condition, 31.8% of the overall responses contained an oblique RC with a short FGD. The shortened FGD was achieved by reordering the two prepositional phrases to produce an RC with the same meaning as the target RC, as shown in (39).

ii. Preposition deletion. Of responses in the long FGD condition, 30% of responses contained ungrammatical responses without the ‘to’ preposition, as exemplified in (40).

iii. Resumptive NP. Unlike the high proficiency group, 14.5% of responses included a resumptive NP error in the long FGD condition, as shown in (42).

(42) Resumptive NP:
the church [that the boy is walking from the car to the church]

iv. RC involving a reversal in grammatical relations. Of responses in the long FGD condition, 9.1% contained an oblique RC involving a reversal in grammatical relations, which had the effect of shortening the FGD, as in (41).
4.5.4 Discussion

The overall results indicate that the low proficiency group had greater difficulty than the high proficiency group producing both oblique RCs with a short FGD and oblique RCs with a long FGD. The low proficiency group also produced fewer targeted responses in the long FGD condition than in the short FGD condition and made more grammatical errors (e.g., resumptive NP errors) in the former than in the latter. Both high and low proficiency groups tended in the long FGD condition to produce a grammatical and semantically appropriate alternative response by changing the order of the prepositional phrases, resulting in oblique RCs with a short FGD, which suggests that they were “avoiding” long oblique RCs.

Experiment 8 revealed three non-target response strategies. First, when long oblique RCs were targeted, the syntactic structure was often changed from long FGD to short FGD oblique RCs, as in (43a). It appears that both groups prefer oblique RCs with short FGD than those with long FGD.

(43)  a. Target: the church [that the boy walks from the car to _]

     Actual response: the church [that the boy walks to _ from the car]

     Actual response: the church [that the boy walks to the church from _]

  b. Target: the car [that the boy walks from _ to the church]

     Actual response: the car [that the boy walks to the church from _]

Second, Korean-speaking learners of English tended to produce ungrammatical responses due to preposition deletion: they deleted from in the short FGD condition (High: 5.6% vs. Low: 28.1%) and to in the long FGD condition (High: 8.9% vs. Low: 30%). Not only did the low proficiency group delete the preposition more in the long FGD condition
than the short FGD condition, they were also more likely to make this error than the high proficiency group. There is thus a greater possibility that a preposition will be deleted in oblique RCs with long FGD, resulting in an ungrammatical response.

Third, the low proficiency group produced resumptive NP errors more often in the long FGD condition (14.5%) than in the short FGD condition (2.8%). These resumptive NP errors can be explained in terms of holding the planned head noun in working memory (see the discussion in Chapter 2). There is a greater possibility that the head noun will be repeated in the long FGD condition, resulting a resumptive NP.

A summary of the mean percentage of target and non-target but acceptable responses in each category for each RC condition by L1 English adults, children, and L2 learners of English is presented in Table 4.10.

Table 4.10. Mean percentage of ‘target response’ and ‘non-target but acceptable response’ in English

<table>
<thead>
<tr>
<th>Group</th>
<th>Target response</th>
<th>Non-target but acceptable response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OBL RCs with a short FGD</td>
<td>OBL RCs with a long FGD</td>
</tr>
<tr>
<td>Native English adult</td>
<td>99.05%</td>
<td>0%*</td>
</tr>
<tr>
<td>Native English child</td>
<td>13.40%</td>
<td>2.8%*</td>
</tr>
<tr>
<td>High proficiency group</td>
<td>88.80%</td>
<td>3.3%*</td>
</tr>
<tr>
<td>Low proficiency group</td>
<td>60%</td>
<td>6.4%*</td>
</tr>
</tbody>
</table>

(* : indicates that the responses between the two conditions are significantly different)

As shown in table 4.10, the asymmetry in responses for an oblique with a short FGD and an oblique with a long FGD for L2 learners of English is very similar to L1 English-speaking adults and children. The L2 data produced one notable point. The behavior of the L2 learners was similar to that of L1 speakers in manifesting a lower likelihood of producing oblique RCs with long FGD.

The low and high proficiency groups showed a significant difference with respect to targeted responses in the two RC conditions; thus, all L2 learners of English showed
the exact same asymmetry between two types of oblique RC. When the L2 learners did not produce an oblique RC with long FGD, like the native L1 adult group, their responses involved changing the order of the PPs. The attempted elicitation of oblique RCs, particularly from the low proficiency L2 group, created confusion and even a breakdown in grammaticality. As discussed in response strategies by L2 groups in 4.5.3.2, unacceptable responses involved using a resumptive NP and preposition deletion when two oblique RCs were targeted, and these responses were very much like response strategies by L1 English child group (e.g., resumptive NP and preposition deletion).

In sum, L2 groups were more likely to produce accurate target responses in the short FGD condition than in the long FGD condition. This finding is consistent with the prediction made by the linear distance hypothesis and the prominence hypothesis because both hypotheses predict that the long oblique RCs are more difficult to produce.

4.6 General discussion

The study used an elicited production task to examine the Korean-speaking learners of the production of postnominal RCs in English. The summary of the expected results based on the three hypotheses is presented in Table 4.11.

Table 4.11. Differing predictions of comparative difficulty in L2 Experiments

<table>
<thead>
<tr>
<th></th>
<th>Linear distance</th>
<th>Structural distance</th>
<th>Semantic prominence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject vs. Indirect object RCs</td>
<td>S &gt; IO</td>
<td>S &gt; IO</td>
<td>S &gt; IO</td>
</tr>
<tr>
<td>Direct object vs. Oblique RCs</td>
<td>DO &gt; OBL</td>
<td>DO &gt; OBL</td>
<td>DO &gt; OBL</td>
</tr>
<tr>
<td>Oblique RCs with a short FGD vs. Oblique RCs with a long FGD</td>
<td>Short OBL &gt; Long OBL</td>
<td>Short OBL = Long OBL</td>
<td>Short OBL &gt; Long OBL</td>
</tr>
</tbody>
</table>

The predictions of each hypothesis and their success can be summarized as follows: (1) longer filler-gap dependencies are harder than shorter filler-gap dependencies, as reported in Experiments 6, 7, and 8; (2) gaps that are more deeply embedded in syntactic structure
are harder than gaps that are less deeply embedded, as found in Experiments 6 and 7, but not by Experiment 8; and (3) the lower the topicality of the relativized element (\(S > \text{DO} > \text{IO} > \text{OBL}\)), the more difficult it is for the RC to be about the head, which is supported by Experiments 6, 7, and 8.

It seems clear that Korean-speaking learners of L2 English find: (1) subject RCs easier to produce than indirect object RC; (2) direct object RCs easier than oblique RC; and (3) oblique RCs with short FGDs than oblique RCs with long FGDs. The results parallel the pattern of RC acquisition in L1 English and Korean, and it can be concluded that learners of a language such as English have difficulty in the production of RCs when the relativized element is in lower position (i.e., direct object, indirect object, oblique) in the semantic prominence hierarchy.

Combined with the findings from studies in Chapters 2, 3, and 4, the following questions are raised: why do we have L1 Korean and English-like asymmetry patterns in L2 English? The preferences demonstrated by adults learning English as an L2 parallel those of children learning English and Korean as an L1. Unacceptable responses, particularly those produced by the low proficiency group, are similar to those made by L1 English and Korean children. These facts suggest that L2 learners too are sensitive to the topic-worthiness of heads in RC patterns and that they have representations in which subjects are more semantically prominent than indirect objects, direct objects are more prominent than obliques, and oblique RCs with short FGDs are more prominent than oblique RCs with long FGDs. The results taken together suggest that L1 English and Korean speakers and adult L2 learners of English employ similar kinds of processes and processing resources to produce RCs, but L2 learners experience greater difficulty
producing less accessible RCs. This point will be explained in more detail in the following Chapter. Implications of these findings are discussed in Chapter 5 for the understanding of L1 and L2 acquisition.

This notwithstanding, there are apparent signs of occasional L1 transfer as well. Particularly worthy of note in this regard is the preposition deletion strategy observed in the production of oblique RCs, which occurred at a much higher rate in the speech of the L2 learners than in child L1 learners as in (44).

(44) Preposition deletion:

a. Oblique RCs
   the box [that the boy put the book ]

   Target response:
   the box [that the boy put the book on_]

b. Oblique RCs with short FGDs:
   the car [that the boy is walking to the church]

   Target response:
   the car [that the boy is walking from _ to the church]

c. Oblique RCs with long FGDs:
   the church [that the boy is walking from the car]

   Target response:
   the church [that the boy is walking from the car to _]

This strategy is strongly reminiscent of the general practice in Korean (and many other languages) of dropping rather than stranding prepositions/postpositions when an oblique is relativized, as illustrated in (45).

(45) Oblique RC with long FGD:
[sonyen-i _ kyohoy(-kkaci) keleka-nun] cha
boy-Nom church(-to) walk-RC.Prs car
‘the car [that the boy is walking from _ to the church]
The absence of a stranded adposition and of a discernible gap in these patterns has led some (e.g., Comrie, 1998, 2002, 2007, 2008) to suggest that languages such as Korean do not have true relative clauses and that the patterns in (45) are best classified simply as ‘adnominal modifiers.’ I take no position on this matter, other than to note the apparent similarity of such patterns to some of the responses produced by the native speakers of Korean in response to situations that called for an oblique RC in English.

In order to have a more complete picture of the asymmetry in RCs production in second language acquisition, further studies need to be conducted to examine how English-speaking L2 learners of Korean produce several types of RCs in Korean. I hope to address this in future work.
CHAPTER 5
GENERAL DISCUSSION AND CONCLUSION

This dissertation investigates how English- and Korean-speaking adults and children produce various types of RCs. This final Chapter begins by summarizing the findings of each study described in Chapters 2, 3, and 4. The second section discusses the implications of these findings for our understanding of the acquisition of RCs. The third section concludes the dissertation by outlining remaining issues and suggesting further avenues for research.

5.1 Summary of the findings
In this dissertation, we have focused on three different pairs of RCs for comparison—(i) subject and indirect object RCs, (ii) direct object and oblique RCs, and (iii) oblique RCs with short FGDs and those with long FGDs.

(1) a. Subject RC:
    the boy [that _ is giving a bag to a girl]

   b. Indirect object RC:
    the boy [that a girl is giving a bag to _]

(2) a. Direct object RC:
    the book [that a boy is putting _ on a box]

   b. Oblique RC:
    the book [that the boy is putting a box on _]

(3) a. Oblique RC with a short FGD
    the car [that the boy is walking from _ to a car]

   b. Oblique RC with a short FGD
    the church [that the boy is walking from a car to _]

These three pairs have three properties in common: (i) they involve patterns with three lexical NP arguments; (ii) the relativized element has the prototypical animacy properties
of its grammatical relation (animate in the case of subjects and indirect objects, inanimate in the case of direct objects and obliques); and (iii) there is an argument in the RC whose animacy properties match those of the relativized item. In the case of indirect object RCs, there is an animate subject, in the case of oblique RCs, there is an inanimate direct object, and in the case of oblique RCs with a long FGD, there is an inanimate oblique, which is a source phrase.

An elicited production task identified three highly significant asymmetries in these patterns, which can be added to the more controversial asymmetry between subject and direct object RCs.

(4) a. Subject RCs > Direct object RCs
b. Subject RCs > Indirect object RCs
c. Direct object RCs > Oblique RCs
d. Oblique RCs with short FGD > Oblique RCs with long FGD

The similarity between these asymmetries and those captured in Keenan and Comrie’s NHAP is striking.

(5) Subject > Direct Object > Indirect Object > Oblique

Why do English-speaking children and L2 learners exhibit the same asymmetries in processing and producing RCs? Multiple interacting factors are involved in producing RCs, but it makes sense to ask whether any one factor might contribute to all three asymmetries. There are at least three possibilities to consider.

i. ***Distance effect.*** The distance between a gap and its filler contributes to the difficulty of processing RCs, which is consistent with the fact that filler-gap dependencies place a burden on the processor (Gibson, 1998, 2000; Gibson & Wu, 2013; Grodner & Gibson,
2005; Hawkins, 2004; Hsiao & Gibson, 2002; Warren & Gibson, 2002). It is possible that the amount of lexical material intervening between the gap and the filler contributes to the difficulty of computing complex types of RCs. On Gibson’s (1998) account, NPs and verbs that introduce new discourse referents are considered as crucial factors. Let us consider the contrast between subject and direct object relative clauses in (1), repeated here as (6).

(6)a. Subject relative clause:
the boy [that _ is giving a bag to a girl]
\[
\begin{array}{c}
1 \\
0
\end{array}
\]
b. Indirect object RC:
the boy [that a girl is giving a bag to _]
\[
\begin{array}{c}
1 \\
2 \\
3
\end{array}
\]
The filler-gap dependency in (6a) can be resolved at minimal cost to working memory, as none of the intervening items introduce a discourse referent. However, three elements with new discourse references—the NP a girl, the verb give, and the NP a bag—intervene between the filler and the gap in the indirect object RC in (6b). By this approach, direct object RCs should be easier than oblique RCs, and oblique RCs with short FGDs should be easier than those with long FGDs, as in (7) and (8).

(7) a. Direct object RC:
the book [that a boy is putting _ on a box]
\[
\begin{array}{c}
1 \\
2 \\
\end{array}
\]
b. Oblique RC:
the book [that the boy is putting a box on _]
\[
\begin{array}{c}
1 \\
2 \\
3
\end{array}
\]
(8) a. Oblique RC with a short FGD
the car [that the boy is walking from _ to a car]
\[
\begin{array}{c}
1 \\
2 \\
\end{array}
\]
b. Oblique RC with a short FGD
the church [that the boy is walking from a car to _]
\[
\begin{array}{c}
1 \\
2 \\
3
\end{array}
\]
ii. **Structural distance effect.** A structure’s complexity increases with the number of XP categories (S, VP, PP, etc) on the path in the tree structure between a gap and the element with which it is associated.

The structural distance between the filler and the gap determines the processing load of RCs. The structural distance of a subject RC, with one node intervening between the gap and the head will be easier to process than an indirect object RC, with 3 nodes intervening between the gap and the head, as in (9).

(9) a. Subject RC:

```
NP
   |   S'   
   |     |
the musician that
   |
S
   |
   V
   NP
   sent
   NP
   the book
   PP
   to
   NP
   the director
```

Number of nodes between head noun and gap: 1 (S)
b. Indirect object RC:

Number of nodes between head noun and gap: 3 (S, VP, PP)

By this approach, direct object RCs should be easier than oblique RCs, as shown in (10).

(10) a. Direct object RC:

Number of nodes between the head noun and gap: 2 (S, VP)
b. Oblique RC:

\[
\begin{align*}
\text{NP} & \quad \text{NP} \\
\text{N} & \quad \text{S'} \quad \text{S} \\
\text{the box} & \quad \text{that} \\
\text{NP} & \quad \text{VP} \\
\text{the boy} & \quad \text{V} \quad \text{NP} \\
\text{put} & \quad \text{the book} \quad \text{P} \quad \text{NP} \\
\text{on} & \\
\end{align*}
\]

Number of nodes between the head noun and gap: 3 (S, VP, PP)

However, the structural distance hypothesis does not predict a difference between the oblique RCs with a short FGD and oblique RCs with a long FGD because two oblique RCs are actually equal in terms of intervening nodes, as shown in (11).

(11) a. Oblique RC with short FGD:

\[
\begin{align*}
\text{NP} & \quad \text{NP} \\
\text{N} & \quad \text{S'} \quad \text{S} \\
\text{the car} & \quad \text{that} \\
\text{NP} & \quad \text{VP} \\
\text{the boy} & \quad \text{V} \quad \text{PP} \\
\text{walked} & \quad \text{P} \quad \text{NP} \quad \text{P} \quad \text{NP} \\
\text{from} & \quad \text{to} \quad \text{the church} \\
\end{align*}
\]

Number of nodes between the head noun and gap: 3 (S, VP, PP)
b. Oblique RC with long FGD:

iii. Prominence effect. It is observed that RCs must be about the referent of their head noun. Also, there are clause-internal contrasts with respect to what a clause can be about. On most accounts (Givón, 1983, 1988; Horn, 1986; O’Grady, 2011), RCs are most easily construed as being about their subject, while the direct object constitutes a sort of less prominent secondary topic.

(12) Semantic prominence hierarchy
subject > direct object > other

It is difficult to use a RC as a restrictor if it is internally focused on an entity other than the referent of the head noun (see Hsu et al., 2009). Thus, it is easiest to construe a clause as being about the referent of its subject, and next easiest to construe it as being about the referent of its direct object. Given this perspective, a subject RC should be easiest of all RC types, as in (13).
(13) a. Subject relative clause:

\[ more \text{ topic-worthy} \]

| the boy [that _ is giving a bag to a girl] |

b. Indirect object RC:

\[ less \text{ topic-worthy} \]

| the boy [that a girl is giving a bag to_] |

Direct object RCs should be easier than oblique RCs, and oblique RCs with short FGDs easier than those with long FGDs—exactly the asymmetries revealed by this dissertation’s production data (Experiments 1, 2, and 3).

(14) a. Direct object RC:

\[ more \text{ topic-worthy} \]

| the book [that the boy put _ on the box] |

b. Oblique RC:

\[ less \text{ topic-worthy} \]

| the box [that the boy put the book on_] |

(15) a. Oblique RC with a short FGD:

\[ more \text{ topic-worthy} \]

| the car [that the boy walked from _ to the church] |

b. Oblique RC with a long FGD:

\[ less \text{ topic-worthy} \]

| the church [that the boy walked from the car to_] |

The main findings from my experimental investigation on English RCs are summarized below.

(a) English-speaking children and adults had little trouble with the production of subject RCs; however, they balked at producing indirect object RCs. Likewise,
they produce direct object RCs more successfully than oblique RCs. Adults and children both also preferred to produce oblique RCs with short FGDs when oblique RCs with long FGDs were targeted.

(b) Like L1 English adults and children, the L2 studies show strong evidence that Korean-speaking learners of English prefer subject RCs to indirect object RCs, direct object RCs to oblique RCs, and oblique RCs with short FGDs to oblique RCs with long FGDs. This finding matches the developmental trend for RCs found in the L1 acquisition data in Chapter 2. This suggests a fundamental similarity in the syntactic representations used by the two groups of learners (e.g., English-speaking children and L2 learners of English).

(c) For the English data, linear distance effects tend to be confounded with the prominence effects because two hypotheses explain asymmetries in the same way. One way to explore the matter is to broaden our database by considering the relative difficulty of RCs in languages other than English. Korean is a case in point, as consideration of the following three contrasts helps reveal. The structure of Korean RCs is such that a structurally more proximate (less distant) subject gap is linearly more distant from the head, whereas a linearly closer indirect object gap is structurally more distant, as exemplified in (16) and (17).

(16) a. Subject RC:
�$_{sonye-eykey}$ kapang-ul cwu-koiss-nun] sonyen
girl-Dat bag-Acc give-Asp-RC.Prs boy
1 2 3
‘the boy [that _ is giving a bag to the girl]’
b. Indirect object RC

[sonye-ka _ kapang-ul cwu-koiss-nun] sonyen
    girl-Nom     bag-Acc     give-Asp-RC.Prs     boy

1  2

‘the boy [that the girl is giving a bag to_]’

(17) a. Subject RC:

```
NP
  S
   NP  VP
     PP  NP  V
        girl-to  bag  give
```

Number of nodes between head noun and gap: 1 (S)

b. Indirect object RC:

```
NP
  S
   NP  VP
     PP  NP  V
        bag  give
```

Number of nodes between head noun and gap: 2 (S, VP)
In (18a), only one referential element intervenes between the filler and the gap, but in (18b), two referential elements intervene between the filler and the gap. The structural distance hypothesis, however, predicts that there will be no difference in difficulty in producing direct object RC and oblique RC conditions because two nodes intervene between the filler and the gap as in (19). Thus, two RC conditions are actually equal in terms of intervening nodes.

(18) a. Direct object RC
[sonyen-i sangca-wiy_ noh-un] chayk
boy-Nom box-Loc put-Asp-RC.Prs book
1
‘the book [that the boy put _ on the box]’

b. Oblique relative clause
[sonyen-i _chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Prs box
1 2
‘the box [that the boy put the book on_]’

(19) a. Direct object RC:

Number of nodes between the head noun and gap: 2 (S, VP)
b. Oblique RC:

![Diagram of a sentence structure with a subject NP, a verb phrase (VP), and a direct object NP]

Number of nodes between the head noun and gap: 2 (S, VP)

The semantic prominence approach predicts that (i) subject RCs should be easier than indirect object RCs, (ii) direct object RCs should be easier than oblique RCs, and (iii) oblique RCs with short FGDs than oblique RCs with long FGDs, as in English. In contrast, the distance approach predicts that indirect object RCs should be easier than subject RCs, as the gap associated with an indirect object in a Subject – Complement – Verb language like Korean is closer to the head noun than is the gap found with a subject RC.

A summary of the prediction and the results based on the three hypotheses in English RCs is presented in Table 5.1 and Table 5.2, respectively.

Table 5.1. Differing predictions of comparative difficulty in English

<table>
<thead>
<tr>
<th></th>
<th>Linear distance hypothesis</th>
<th>Structural distance</th>
<th>Semantic prominence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject vs. Indirect object RCs</td>
<td>S &gt; IO</td>
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</tr>
<tr>
<td>Direct object vs. Oblique RCs</td>
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<td>DO &gt; OBL</td>
</tr>
<tr>
<td>Oblique RCs with a short FGD vs. Oblique RCs with a long FGD</td>
<td>Short OBL &gt; Long OBL</td>
<td>Short OBL = Long OBL</td>
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</tr>
</tbody>
</table>
Table 5.2. A summary of comparative difficulty in English

<table>
<thead>
<tr>
<th></th>
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</tr>
<tr>
<td>OBL RCs with a short FGD vs. OBL RCs with a long FGD</td>
<td>Short OBL &gt; Long OBL</td>
<td>Short OBL &gt; Long OBL</td>
<td>Short OBL &gt; Long OBL</td>
</tr>
</tbody>
</table>

A summary of the predictions and the results based on the three hypotheses in Korean RCs is presented in Table 5.3 and Table 5.4, respectively.

Table 5.3. Differing predictions of comparative difficulty in Korean

<table>
<thead>
<tr>
<th></th>
<th>Linear distance hypothesis</th>
<th>Structural distance hypothesis</th>
<th>Semantic prominence hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject vs. Indirect object RCs</td>
<td>$IO &gt; S$</td>
<td>$S &gt; IO$</td>
<td>$S &gt; IO$</td>
</tr>
<tr>
<td>Direct object vs. Oblique RCs</td>
<td>$DO &gt; OBL$</td>
<td>$DO = OBL$</td>
<td>$DO &gt; OBL$</td>
</tr>
</tbody>
</table>

Table 5.4. A summary of comparative difficulty in Korean

<table>
<thead>
<tr>
<th></th>
<th>Linear distance hypothesis</th>
<th>Structural distance hypothesis</th>
<th>Semantic prominence hypothesis</th>
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<tbody>
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<td>Subject vs. Indirect object RCs</td>
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<td>$S &gt; IO$</td>
<td>$S &gt; IO$</td>
</tr>
<tr>
<td>Direct object vs. Oblique RCs</td>
<td>$DO &gt; OBL$</td>
<td>$DO &gt; OBL$</td>
<td>$DO &gt; OBL$</td>
</tr>
</tbody>
</table>

The main findings from Korean studies are summarized below.

(a) Korean-speaking children and adults had little trouble producing subject RCs, but they tended to avoid production of indirect object RCs, as predicted by the prominence approach, but not by the distance approach. In addition, children and adults produced direct object RCs more successfully than oblique RCs, which is also predicted by the prominence approach, but not by the structural distance approach.

(b) Overall, the Korean data are consistent with only the semantic prominence hypothesis, not with the linear distance hypothesis or the structural distance hypothesis.
5.1.1 The difficulty principle on the acquisition of RCs

O’Grady (2011) proposes a close relationship between processing difficulty and developmental path.

(20) The difficulty principle (O’Grady, 2011, p. 31) Processing difficulty impedes use and mastery of particular form-meaning mappings.

Can this idea be extended to cover the results reported here? Possibly, but only if it can be shown that the processing cost associated with the production of RCs varies with the topic-worthiness of the head noun. This is not an implausible idea: more processing effort could easily be required to construe the sorts of situations in which a clause is about something other than the referent of its subject. However, establishing this requires data such as response time measurements, which are traditionally thought to be associated with processing cost. Some such data was in fact collected as part of the suite of experiments conducted for this dissertation, but its analysis will have to await a future opportunity. I therefore set to the side for now further consideration of the possibility that processing pressures relating to the computation of topic-worthiness may have a role to play in understanding RC asymmetries.

5.2. Implications of the findings

The findings reported in this dissertation have several implications for our understanding of the L2 acquisition of English RCs as well as the L1 acquisition of English and Korean RCs. First, the experimental design adopted in this dissertation resolved the animacy issues that introduce confounding factors in producing RCs by comparing (i) subject RCs and indirect object RCs, which always include an animate head; (ii) RCs with an inanimate head (direct object and oblique RCs); and (iii) two types of oblique RCs with
an inanimate head (only by English L1 and L2 data). These conditions are unlike the comparison between subject RCs and direct object RCs, because the former tends to have an animate head but the latter an inanimate head.

Second, with respect to the acquisition of RCs, various types of tasks were used to provide a subject-direct object asymmetry in previous studies. An elicited production task can provide a more reliable picture of the acquisition of RCs, particularly by investigating typologically different languages (e.g., English and Korean) with comparable test items. Under these circumstances, alternative responses and errors seen in English and Korean production data can be used to illustrate the difficulty associated with RC production. Production choices by both language groups reflect cognitively motivated production demands such as topic-worthiness.

Finally, what can be concluded from the fact that parallel contrasts (e.g., subject RC easier than indirect object RC) shows ups in both L1 and L2 acquisition? The results of the L2 study suggest that L2 learners of English are influenced by the same pressures, as native adults and children behaved similarly with regard to the subject-indirect object asymmetry, the direct object-oblique asymmetry, and obliques with a short FGD-oblique and those with a long FGD asymmetry in L1 English data. Nonetheless, it must be acknowledged that there is a potentially confounding factor here, as indirect object RCs and oblique RCs are typically heard and used far less in the L2-corpus data (Kang, 2011) than subject and direct object RCs.

5.3 Concluding remarks
This dissertation has explored the difficulty that English-speaking children, adults, and Korean-speaking second language learners exhibit with English RCs, and the difficulty
that Korean-speaking children and adults have with Korean RCs. A priority for the present experiments involves exploring whether findings from the existing literature corroborate a preference for subject RCs over direct object RCs, and whether these findings can be extended to other types of RCs, including those involving indirect objects, obliques, and other relations on the lower end of Keenan and Comrie’s (1977) hierarchy. In addition, the cross-linguistic comparative study of L1 and L2 acquisition offers insights into how language is learned and used.

The findings of the series of studies reported in this dissertation suggest that semantic prominence can play a crucial role in the production of RCs during L1 and L2 acquisition. The difficulty of an RC is determined in part by the semantic prominence of the referent of the head noun. Thus, it is easiest to produce RCs when the referent of the head noun is most easily construed as topic because the RC is supposed to be about the referent of the head noun. It was found that the semantic prominence hypothesis is the principal determiner of difficulty in RC constructions in Korean (Experiments 4 and 5). Additionally, this factor plays a major role in determining the developmental order for RCs in L1 acquisition for English (Experiments 1, 2, and 3) and for L2 acquisition for English (Experiments 6, 7 and 8).

In sum, this dissertation provides evidence from English that children’s production of RCs falls into three relation-based contrasts: S > IO, DO > OBL, and OBL with short FGDs > OBL with long FGDs. Moreover, the Korean data mirrors the first two contrasts. By investigating RCs in the two languages—in particular, the SOV order of Korean and the fact that it has prenominal RCs—it is clear that the distance (linear or structural) between the filler and the gap is not the key determinant of the difficulty
associated with producing RCs. Rather, as the contrasts from Korean make clear, semantic prominence seems to be the key deciding factor.

5.4 Remaining issues

While the findings of this dissertation have shed light on children’s and adults’ production of various types of RCs using a design that controls animacy, canonical word order, and frequency, a number of questions still remain. First and foremost, further investigation is necessary to examine Korean children’s production of two types of oblique RCs. As things stand now, the results of Experiments 4 and 5 (S vs. IO; DO vs. OBL) are unclear because frequency was not sufficiently controlled for. With data from the comparison between oblique RCs with short and long filler-gap dependencies, we can perhaps complete the picture of asymmetries in the production of both prenominal and postnominal RCs.

Second, a follow-up study that parallels the methodology of Experiment 5 is necessary to confirm the proposed explanation for the observed asymmetry between direct object RCs and oblique RCs. Since Korean allows the scrambling of constituents, two different patterns are possible, as in (21) and (22): (i) S-OBL-DO-V; (ii) S-DO-OBL-V, respectively (Sohn, 1999, p. 296).

(21) a. S-OBL-DO-V order (Experiment 5)

   sonyen-i sangca-ey chayk-ul noh-ko-iss-eyo
   boy-Nom box-Loc book-Acc put-Asp-Prog-Reg

   ‘The boy is putting the book on the box.’

b. Direct object RC

   [sonyen-i sangca-ey _ noh-un] chayk
   boy-Nom box-Loc put-Asp-RC.Pst book
   S OBL V DO

   the book [that the boy put _ on the box]
c. Oblique RC
[sonyen-i _ chayk-ul noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
S DO V OBL
the box [that the boy put the book on _]

(22) a. S-DO-OBL-V order (follow-up experiment)
sonyen-i chayk-ul sangca-ey noh-ko-iss-eyo
boy-Nom book-Acc box-Loc put-Asp-Prog-Reg
‘The boy is putting the book on the box.’

b. Direct object RC
[sonyen-i _sangca-ey noh-un] chayk
boy-Nom box-Loc put-Asp-RC.Pst book
S OBL V DO
the book [that the boy put _ on the box]

c. Oblique RC
[sonyen-i chayk-ul _ noh-un] sangca
boy-Nom book-Acc put-Asp-RC.Pst box
S DO V OBL
the box [that the boy put the book on _]

These contrasts raise the question of whether thematic prominence can be defined solely in terms of grammatical relations as assumed so far, or whether word order may also be relevant.

Lastly, one more step for future research is to investigate whether English-speaking learners of Korean produce various types of RCs in the way that Korean-speaking adults do. If that were the case, it would be interesting to see whether the same asymmetries founded in L1 acquisition are manifested in L2 learners. Such a finding would suggest that the same considerations of topic-worthiness that affect Korean children’s production RC also have an impact on English-speaking learners of Korean.
APPENDIX A. EXPERIMENT 1 TEST ITEMS

Practice items
1. In the first picture, there is a big dog and a small cat.
   In the second picture, there is a small dog and a big cat.
2. In the first picture, there is a short boy and a tall girl.
   In the second picture, there is a tall boy and a short girl.
3. In the first picture, a boy is running.
   In the second picture, a boy is sleeping.

Test items
1. In the first picture, a boy is giving a bag to a girl.
   In the second picture, a girl is giving a bag to a boy.
2. In the first picture, a boy is showing a hat to a girl.
   In the second picture, a girl is showing a hat to a boy.
3. In the first picture, a boy is throwing a ball to a girl.
   In the second picture, a girl is throwing a ball to a boy.
4. In the first picture, a boy is passing a box to a girl.
   In the second picture, a girl is passing a box to a boy.
5. In the first picture, a boy is handing a cup to a girl.
   In the second picture, a girl is handing a cup to a boy.
6. In the first picture, a girl is bringing a chair to a boy.
   In the second picture, a boy is bringing a chair to a girl.
7. In the first picture, a girl is reading a book to a boy.
   In the second picture, a boy is reading a book to a girl.
8. In the first picture, a girl is pushing a bicycle to a boy.
   In the second picture, a boy is pushing a bicycle to a girl.
9. In the first picture, a girl is lending an umbrella to a boy.
   In the second picture, a boy is lending an umbrella to a girl.
10. In the first picture, a girl is kicking a ball to a boy.
    In the second picture, a boy is kicking a ball to a girl.
APPENDIX B. EXPERIMENT 2 TEST ITEMS

Practice items
1. In the first picture, there is a small ball and a big book. 
   In the second picture, there is a big ball and a small tree.
2. In the first picture, there is a short tree and a tall chair.
   In the second picture, there is a tall tree and a short chair.

Test items
1. In the first picture, a boy is putting a book on a box. 
   In the second picture, a girl is putting a book on a box.
2. In the first picture, a boy is dropping a sock into a basket.
   In the second picture, a girl is dropping a sock into a basket.
3. In the first picture, a boy is placing a bag on a notebook.
   In the second picture, a girl is placing a bag on a notebook.
4. In the first picture, a boy is setting a napkin on a dish.
   In the second picture, a girl is setting a napkin on a dish.
5. In the first picture, a boy is laying a sweater on a blanket.
   In the second picture, a girl is laying a sweater on a blanket.
6. In the first picture, a girl is throwing a bag onto a cushion.
   In the second picture, a boy is throwing a bag onto a cushion.
7. In the first picture, a girl is pouring water into juice.
   In the second picture, a boy is pouring water into juice.
8. In the first picture, a girl is pushing a table toward a couch.
   In the second picture, a boy is pushing a table toward a couch.
9. In the first picture, a girl is hiding a photo under a letter.
   In the second picture, a boy is hiding a photo under a letter.
10. In the first picture, a girl is tossing a hat onto a cushion.
    In the second picture, a boy is tossing a hat onto a cushion.
APPENDIX C. EXPERIMENT 3a TEST ITEMS

Practice items
1. In the first picture, there is a tall tree and a short building.
   In the second picture, there is a short tree and a tall building.
2. In the first picture, there is a small island and a big park.
   In the second picture, there is a big park and a small island.

Test items
1. In the first picture, a boy is walking from a car to a church.
   In the second picture, a boy is walking from a tree to a church.
2. In the first picture, a boy is strolling from a school to a park.
   In the second picture, a boy is strolling from a church to a park.
3. In the first picture, a boy is paddling from a beach to an island.
   In the second picture, a boy is paddling from a dock to an island.
4. In the first picture, a boy is leaping from a table toward a skateboard.
   In the second picture, a boy is leaping from a chair toward a skateboard.
5. In the first picture, a boy is rowing from a buoy toward an island.
   In the second picture, a boy is rowing from a beach toward an island.
6. In the first picture, a boy is jogging from a school to a forest.
   In the second picture, a boy is jogging from a bus to a forest.
7. In the first picture, a boy is swimming from a dock to an island.
   In the second picture, a boy is swimming from a beach to an island.
8. In the first picture, a boy is jumping from a table toward a bicycle.
   In the second picture, a boy is jumping from a rock toward a bicycle.
9. In the first picture, a boy is sailing from an island toward a buoy.
   In the second picture, a boy is sailing from a beach toward a buoy.
10. In the first picture, a boy is traveling from a farm toward a city.
    In the second picture, a boy is traveling from a park toward a city.
APPENDIX D. EXPERIMENT 3b TEST ITEMS

Practice items
1. In the first picture, there is a tall tree and a short building.
   In the second picture, there is a short tree and a tall building.
2. In the first picture, there is a small island and a big park.
   In the second picture, there is a big park and a small island.

Test items
1. In the first picture, a boy is walking to a church from a car.
   In the second picture, a boy is walking to a church from a tree.
2. In the first picture, a boy is strolling to a park from a school.
   In the second picture, a boy is strolling to a park from a church.
3. In the first picture, a boy is paddling to an island from a beach.
   In the second picture, a boy is paddling to an island from a dock.
4. In the first picture, a boy is leaping toward a skateboard from a table.
   In the second picture, a boy is leaping toward a skateboard from a chair.
5. In the first picture, a boy is rowing toward an island from a buoy.
   In the second picture, a boy is rowing toward an island from a beach.
6. In the first picture, a boy is jogging to a forest from a school.
   In the second picture, a boy is jogging to a forest from a bus.
7. In the first picture, a boy is swimming to an island from a dock.
   In the second picture, a boy is swimming to an island from a beach.
8. In the first picture, a boy is jumping toward a bicycle from a table.
   In the second picture, a boy is jumping toward a bicycle from a rock.
9. In the first picture, a boy is sailing toward a buoy from an island.
   In the second picture, a boy is sailing toward a buoy from a beach.
10. In the first picture, a boy is traveling toward a city from a farm.
    In the second picture, a boy is traveling toward a city from a park.
APPENDIX E. EXPERIMENT 4 TEST ITEMS

Practice items
1. 첫번째 그림을 보면, 큰 개와 작은 교양이가 있어요.
   두번째 그림을 보면, 작은 개와 큰 교양이가 있어요.
2. 첫번째 그림을 보면, 작은 남자와 큰 여자가 있어요.
   두번째 그림을 보면, 큰 여자와 작은 남자가 있어요.
3. 첫번째 그림을 보면, 남자가 달리고 있어요.
   두번째 그림을 보면, 남자가 자고 있어요.

Test items
1. 첫번째 그림을 보면, 소년이 소녀에게 가방을 주고 있어요.
   두번째 그림을 보면, 소녀가 소년에게 가방을 주고 있어요.
2. 첫번째 그림을 보면, 소년이 소녀에게 모자를 보여주고 있어요.
   두번째 그림을 보면, 소녀가 소년에게 모자를 보여주고 있어요.
3. 첫번째 그림을 보면, 소년이 소녀에게 공을 던지고 있어요.
   두번째 그림을 보면, 소녀가 소년에게 공을 던지고 있어요.
4. 첫번째 그림을 보면, 소년이 소녀에게 상자를 옮겨주고 있어요.
   두번째 그림을 보면, 소녀가 소년에게 상자를 옮겨주고 있어요.
5. 첫번째 그림을 보면, 소년이 소녀에게 컵을 건네주고 있어요.
   두번째 그림을 보면, 소녀가 소년에게 컵을 건네주고 있어요.
6. 첫번째 그림을 보면, 소녀가 소년에게 의자를 가져다주고 있어요.
   두번째 그림을 보면, 소년이 소녀에게 의자를 가져다주고 있어요.
7. 첫번째 그림을 보면, 소녀가 소년에게 책을 읽어주고 있어요.
   두번째 그림을 보면, 소년이 소녀에게 책을 읽어주고 있어요.
8. 첫번째 그림을 보면, 소녀가 소년에게 자전거를 밀어주고 있어요.
   두번째 그림을 보면, 소년이 소녀에게 자전거를 밀어주고 있어요.
9. 첫번째 그림을 보면, 소녀가 소년에게 우산을 빌려주고 있어요.
   두번째 그림을 보면, 소년이 소녀에게 우산을 빌려주고 있어요.
10. 첫번째 그림을 보면, 소녀가 소년에게 공을 차고 있어요.
    두번째 그림을 보면, 소년이 소녀에게 공을 차고 있어요.
APPENDIX F. EXPERIMENT 5 TEST ITEMS

Practice items
1. 첫번째 그림을 보면, 작은 공과 큰 책이 있어요.
   두번째 그림을 보면, 큰 공과 작은 책이 있어요.
2. 첫번째 그림을 보면, 낮은 나무와 높은 의자가 있어요.
   두번째 그림을 보면, 높은 나무와 낮은 의자가 있어요.

Test items
1. 첫번째 그림을 보면, 소년이 상자위에 책을 놓고 있어요.
   두번째 그림을 보면, 소녀가 상자위에 책을 놓고 있어요.
2. 첫번째 그림을 보면, 소년이 바구니에 양말을 벗어뜨리고 있어요.
   두번째 그림을 보면, 소녀가 바구니에 양말을 벗어뜨리고 있어요.
3. 첫번째 그림을 보면, 소년이 공책위에 가방을 두고 있어요.
   두번째 그림을 보면, 소녀가 공책위에 가방을 두고 있어요.
4. 첫번째 그림을 보면, 소년이 짐사랑에 샐로를 내려놓고 있어요.
   두번째 그림을 보면, 소녀가 짐사랑에 샐로를 내려놓고 있어요.
5. 첫번째 그림을 보면, 소년이 담요위에 스웨터를 없고 있어요.
   두번째 그림을 보면, 소녀가 담요위에 스웨터를 없고 있어요.
6. 첫번째 그림을 보면, 소녀가 가방을 쿠션위로 내던지고 있어요.
   두번째 그림을 보면, 소년이 가방을 쿠션위로 내던지고 있어요.
7. 첫번째 그림을 보면, 소녀가 주스에 물을 따르고 있어요.
   두번째 그림을 보면, 소년이 주스에 물을 따르고 있어요.
8. 첫번째 그림을 보면, 소녀가 소파쪽으로 탁자를 밀고 있어요.
   두번째 그림을 보면, 소년이 소파쪽으로 탁자를 밀고 있어요.
9. 첫번째 그림을 보면, 소녀가 편지 아래 사진을 숨기고 있어요.
   두번째 그림을 보면, 소년이 편지 아래 사진을 숨기고 있어요.
10. 첫번째 그림을 보면, 소녀가 쿠션위로 모자를 던지고 있어요.
   두번째 그림을 보면, 소년이 쿠션위로 모자를 던지고 있어요.
APPENDIX G. C-TEST

Word Completion Exercise
(To be completed within 10 minutes)

Directions: The two texts below contain gaps where parts of some words have been left out (no whole words are missing, though). In the blanks provided, please complete the words so that the sentences and texts make sense. Note that in each blank, you should only complete one word; do not add extra words.

Text 1:

We all live with other people’s expectations of us. These are a reflec__________ of th__________ trying to under__________ us; th__________ are predic__________ of wh__________ they th__________ we will think, d__________ and feel.
Gene__________ we acc__________ the sta__________ quo, but these expec__________ can be ha__________ to han__________ when they co__________ from our fami__________ and can be diff__________ to ign__________, especially wh__________ they come from our par__________.

Text 2

The decision to remove soft drinks from elementary and junior high school vending machines is a step in the right direction to helping children make better choices when it comes to what they eat and drink. Childhood obe__________ has bec__________ a ser__________ problem in th__________ country a__________ children cons__________ more sugar-based fo__________ and sp__________ less ti__________ getting the nece__________ exercise. Many par__________ have quest__________ schools’ deci__________ to al__________ vending machines which disp__________ candy and so__________ drinks. Many schools, tho__________, have co__________ to re__________ on the mo__________ these machines generate through agreements with the companies which makes soft drinks and junk food.
Text 1:
We all live with other people’s expectations of us. These are a reflection of them trying to understand us; they are predictions of what they will think, do, and feel. Generally we accept the status quo, but these expectations can be hard to handle when they come from our family and can be difficult to ignore, especially when they come from our parents/partner.

Text 2
The decision to remove soft drinks from elementary and junior high school vending machines is a step in the right direction to helping children make better choices when it comes to what they eat and drink. Childhood obesity has become a serious problem in this country as children consume more sugar-based food and spend less time getting the necessary exercise. Many parents have questioned schools’ decisions to allow vending machines which dispense candy and soft drinks. Many schools, though, have come to rely on the money these machines generate through agreements with the companies which makes soft drinks and junk food.
APPENDIX H. LANGUAGE BACKGROUND

Questionnaire on Language Background  No: ___________
The questions below are intended to help us learn about your language learning experience. Your personal information will be kept confidential, and all other information will be used for research purposes only. Please read and answer all the following questions carefully. Use the blank space beside each question to clarify answers.

Sex: ___________ Home country: ____________________________

Language(s) besides your native language and English:

Language(s) you use with your family member at home:
1. At what age did you begin to study English? ___________________________________________________________________

2. How many years of school instruction of English did you receive?
(Please specify the total length) _______ year(s)

3. How many years of English grammar have you learned?
(Please specify the total length) _______ year(s)

4. How long have you lived in a place or places where English was/is the primary language of communication?
(Please specify the total length) _______ year(s)

5. Approximately how many hours a day do you use English? (Please specify) ____________

6. Please rate your English listening, speaking, writing, and reading abilities by circling a number on the 6-point scales below:
Speaking:
1 2 3 4 5 6
(beginning)(lower intermediate)(intermediate)(high intermediate) (advanced) (near native)

Listening:
1 2 3 4 5 6
(beginning)(lower intermediate)(intermediate)(high intermediate) (advanced) (near native)

Reading:
1 2 3 4 5 6
(beginning)(lower intermediate)(intermediate)(high intermediate) (advanced) (near native)

Writing:
1 2 3 4 5 6
(beginning)(lower intermediate)(intermediate)(high intermediate) (advanced) (near native)

7. Please rate your overall English proficiency by circling a number on the 6-point scales below:
Overall:
1 2 3 4 5 6
(beginning)(lower intermediate)(intermediate)(high intermediate) (advanced) (near native)
REFERENCES


