

## ABSTRACT

Title of dissertation: LANGUAGE-SPECIFIC CONSTRAINTS ON  
SCOPE INTERPRETATION IN FIRST  
LANGUAGE ACQUISITION

Takuya Goro, Doctor of Philosophy, 2007

Directed By: Professor Colin Phillips  
Department of Linguistics

This dissertation investigates the acquisition of language-specific constraints on scope interpretation by Japanese preschool children. Several constructions in Japanese do not allow scope interpretations that the corresponding English sentences do allow. First, in Japanese transitive sentences with multiple quantificational arguments, an inverse scope interpretation is disallowed, due to the Rigid Scope Constraint. Second, Japanese logical connectives cannot be interpreted under the scope of local negation, due to their Positive Polarity. Thirdly, in Japanese infinitival complement constructions with implicative matrix verbs like *wasureru* (“forget”) the inverse scope interpretation is required, due to the Anti-Reconstruction Constraint. The main goal of this research is to determine how Japanese children learn these constraints on scope interpretations. To that end, three properties of the acquisition task that have an influence on the learnability of linguistic knowledge are examined: productivity, no negative evidence, and arbitrariness.

The results of experimental investigations show that Japanese children productively generate scope interpretations that are never exemplified in the input. For example, with sentences that contain two quantificational arguments, Japanese children accessed inverse scope interpretations that Japanese adults do not allow. Also, Japanese children interpret the disjunction *ka* under the scope of local negation, which is not a possible interpretive option in the adult language. These findings clearly show that children do not acquire these scope constraints through conservative learning, and raise the question of how they learn to purge their non-adult interpretations. It is argued that input data do not provide learners with negative evidence (direct or indirect) against particular scope interpretations. Two inherent properties of input data about possible scope interpretations, data sparseness and indirectness, make negative evidence too unreliable as a basis for discovering what scope interpretation is impossible. In order to solve the learnability problems that children's scope productivity raise, I suggest that the impossibility of their non-adult interpretations are acquired by learning some independently observable properties of the language. In other words, the scope constraints are not arbitrary in the sense that their effects are consequences of other properties of the grammar of Japanese.

LANGUAGE-SPECIFIC CONSTRAINTS ON SCOPE INTERPRETATION IN  
FIRST LANGUAGE ACQUISITION

By

TAKUYA GORO

Dissertation submitted to the Faculty of the Graduate School of the  
University of Maryland, College Park, in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
2007

Advisory Committee:  
Professor Colin Phillips, Chair  
Professor Jeffrey Lidz  
Professor Norbert Hornstein  
Professor Paul Pietroski  
Professor Michael Israel

© Copyright by  
Takuya Goro  
2007

## Acknowledgements

First, I would like to thank my advisers and teachers. I am deeply grateful to Colin Phillips for his tireless support, advice, guidance, feedback, criticism, encouragement, or just about everything that an academic adviser can ever do to his student. Colin always kept reminding me to aim high, to look at things from a different perspective, and not to forget about determiners when writing something in English (© Nina Kazanina). I would like to thank Stephen Crain for his huge impact on my academic interests. During my first 2.5 years at UMD, Stephen continuously gave me important inspirations, which formed the basis of this thesis. I am also imbedded to Jeff Lidz, who offered me a lot of insights and was always willing to share his knowledge of the literature. Howard Lasnik and Norbert Hornstein were both wonderful teachers of syntax, and I really enjoyed their classes in which I learned a lot about the basics of linguistics: how to establish an issue, how to form an argument, how to interpret data, how to test a hypothesis, and so on. I would also like to thank Paul Pietroski and Michael Israel for their helpful comments and discussion.

This dissertation is a compilation of five years of work. Many people have heard parts of the story and have given me insightful comments and feedbacks, which have made a huge impact on the outcome. Those people include: Anna Szabolcsi, Ivano Caponigro, Andrea Gualmini, Rozz Thornton, Luisa Meroni, Andrea Zukowski, Koji Sugisaki, Tetsuya Sano, Yasuhiko Kato. I would also like to thank the following fellow Japanese linguists for providing me judgments: Chizuru Nakao, Akira Omaki, Maki Kishida, Shin Tanigawa, and Sachiko Aoshima. A very special thank-you note

is due to Tomo Fujii and Masaya Yoshida. I thank them for endless – literary endless – hours of discussion on topics in linguistics and topics in everything else.

It is simply impossible to run a child language experiment without the help of many people. The experimental studies in this thesis were carried out in collaboration with Sachie Akiba, Utako Minai, Tomo Fujii and Annie Gagliardi: without them, this work wouldn't have been possible. Annie also kindly helped me proofread the final draft of the thesis. I thank her for the invaluable help. I would like to thank those who helped me conducting experiments: Noriko Kobayashi, Keiko Niwa, Nami Yoshihara, Hiroyuki Shimada, Rob Fiorentino, Rozz Thornton, Lisa Pearl, Collen Hokason, Natsuko Katsura, Shin-ichi Tamura, Nobumi Shinmen, and Akira Omaki. I am also grateful to the teachers, children and staff at the Center of Young Children in University of Maryland at College Park, Totsuka Sumire Kindergarten in Yokohama, Miyagi Gakuin Kindergarten and Takamori Meisen Kindergarten in Sendai. This work was also supported by a National Science Foundation Doctoral Dissertation Research Grant (No. 0617350). Rob Magee at UMD gave me invaluable help in the process of winning the award. Masatoshi Koizumi generously offered me an opportunity to carry out a part of this research in Japan as a research assistant at Tohoku University in 2006-2007. I am also deeply indebted to Ryuji and Hiroe Takeno, who hosted me during the summer of 2003, 2004, and 2005, making it possible to keep running experiments with Japanese children every year.

I thank my fellow students at UMD for making my life in Maryland fun, fruitful and memorable. Among them, I am especially indebted to Kaori Ozawa and Hajime Ono, who always helped me on a lot of things.

I want to thank my father Masaki Goro, and also Akiko Fuse, for their continuous support. I would have starved to death without the food packages. Last but not least, I want to express my sincere thanks to Yoko Sato, for her support, patience, and encouragement throughout the five years. I just do not know enough words to explain how grateful I am to her for being with me.

## Table of Contents

|   |           |
|---|-----------|
| <b>Acknowledgements .....</b>   | <b>ii</b> |
| <b>Table of Contents .....</b>  | <b>v</b>  |
| <br>  |           |
| <b>Chapter 1: Introduction .....</b>                                    | <b>1</b>  |
| 1.1 Scope flexibility and language-specific constraints.....            | 2         |
| 1.2 Learnability .....  | 5         |
| 1.2.1 Productivity and conservatism.....                                | 9         |
| 1.2.2 Experience and negative evidence .....                            | 12        |
| 1.2.3 Arbitrariness of the constraints .....                            | 18        |
| 1.3 Organization.....   | 20        |
| <br>  |           |
| <b>Chapter 2: Freedom of Scope in the Development of Japanese .....</b> | <b>22</b> |
| 2.1 Covert scope-shifting .....   | 22        |
| 2.2 A few preliminaries.....  | 25        |
| 2.2.1 Phrase structure in Japanese.....                                 | 25        |
| 2.2.2 Scope of indefinites.....   | 27        |
| 2.3 Scope rigidity .....  | 34        |
| 2.4 Experiments: Inverse scope in canonical order sentences .....       | 36        |
| 2.4.1 Marsden (2004).....   | 38        |
| 2.4.2 Sano (2004).....  | 41        |
| 2.4.3 Felicitous uses of indefinites.....                               | 44        |
| 2.4.4 Experiments: design and participants .....                        | 47        |
| 2.4.5 Results.....  | 52        |
| 2.4.6 Discussion .....  | 54        |
| 2.5 Experiments: Inverse scope in scrambled order sentences .....       | 57        |
| 2.5.1 Scrambling and scope interpretations .....                        | 57        |
| 2.5.2 Children's grammar of scrambling.....                             | 60        |
| 2.5.3 The scope interaction between dake and A mo B mo.....             | 64        |
| 2.5.4 Experiments: design and participants .....                        | 67        |
| 2.5.5 Results.....  | 70        |
| 2.5.6 Control experiments.....  | 71        |
| 2.6 Freedom of Scope .....  | 76        |
| 2.7 A learnability problem.....   | 85        |
| <br>  |           |
| <b>Chapter 3: Covert Scope-Shifting in Japanese .....</b>               | <b>93</b> |
| 3.1 Introduction.....   | 93        |
| 3.2 Not-so-rigid scope in Japanese .....                                | 94        |
| 3.2.1 Specificity of the subject.....                                   | 94        |
| 3.2.2 Irrealis contexts.....  | 97        |
| 3.2.3 Implausible surface interpretation.....                           | 100       |



|   |   |            |
|---|---|------------|
| 3.3   | Not-so-free scope interpretations in English and Japanese.....      | 102        |
| 3.3.1   | Locality .....  | 103        |
| 3.3.2   | Quantifiers that do not invert .....                                | 107        |
| 3.3.3   | Scope freezing effect.....  | 109        |
| 3.3.4   | Summary .....   | 112        |
| 3.4   | Ways of restricting scope.....                                      | 113        |
| 3.4.1   | Locality: CSS as syntactic movement.....                            | 113        |
| 3.4.2   | Quantifiers that do not invert: decomposition and shortest movement | 116        |
| 3.4.3   | Scope freezing: covert raising and Shortest.....                    | 123        |
| 3.5   | A theory of Japanese scope interpretations.....                     | 128        |
| 3.5.1   | Basic assumptions .....   | 128        |
| 3.5.2   | “Scope rigidity” in Japanese .....                                  | 132        |
| 3.5.3   | Blocking effects .....  | 133        |
| 3.5.4   | Nominative subjects.....  | 138        |
| 3.6   | Scrambling and reconstruction .....                                 | 159        |
| 3.6.1   | Reconstruction asymmetry.....                                       | 159        |
| 3.6.2   | A base-generation analysis .....                                    | 168        |
| 3.6.3   | Two types of reconstruction?.....                                   | 176        |
| 3.7   | Revisiting the learnability problem.....                            | 178        |
| 3.8   | Summary .....   | 184        |
| <b>Chapter 4: The Acquisition of Japanese Logical Connectives.....</b>    |   | <b>186</b> |
| 4.1   | Introduction.....   | 186        |
| 4.2   | The scope of Japanese connectives.....                              | 187        |
| 4.2.1   | The interpretive contrast .....                                     | 187        |
| 4.2.2   | Semantics of Japanese connectives.....                              | 190        |
| 4.2.3   | Scope of Japanese negation .....                                    | 193        |
| 4.2.4   | Strength of negation.....   | 197        |
| 4.2.5   | Summary and issues for language acquisition .....                   | 203        |
| 4.3   | Disjunction in first language acquisition .....                     | 204        |
| 4.3.1   | Structure dependence of children’s semantic interpretations .....   | 205        |
| 4.3.2   | “Two-faced” disjunction.....  | 209        |
| 4.3.3   | Interim summary .....   | 218        |
| 4.4   | Experimental design: pragmatic felicity .....                       | 219        |
| 4.5   | Experiments: simple negative sentences.....                         | 226        |
| 4.5.1   | Design and participants.....  | 226        |
| 4.5.2   | Results and discussion .....  | 232        |
| 4.6   | Experiments: sentences containing <i>dake</i> “only” .....          | 237        |
| 4.6.1   | Design and participants.....  | 237        |
| 4.6.2   | Results and discussion .....  | 244        |
| 4.7   | Children’s knowledge of Japanese connectives.....                   | 246        |
| <b>Chapter 5: Japanese Logical Connectives and Positive Polarity.....</b> |   | <b>254</b> |
| 5.1   | Introduction.....   | 254        |

|  |   |            |
|--|---|------------|
| 5.2  | A syntactic account.....                                      | 256        |
| 5.3  | Japanese connectives and positive polarity.....               | 265        |
| 5.4  | Further consequences.....                                     | 272        |
| 5.4.1  | The size of complement clauses.....                           | 272        |
| 5.4.2  | Non-overt negations.....                                      | 280        |
| 5.5  | Revisiting the learnability problem.....                      | 286        |
| 5.6  | On the “wide-scope” interpretation of English <i>or</i> ..... | 292        |
| 5.7  | Summary.....  | 296        |
| <b>Chapter 6: Anti-reconstruction and Grammar Variation in Adult Japanese ..</b> |   | <b>298</b> |
| 6.1  | Introduction.....   | 298        |
| 6.2  | Implicative verbs.....  | 299        |
| 6.3  | Anti-reconstruction.....                                      | 304        |
| 6.4  | Experiment #1.....  | 312        |
| 6.4.1  | Design and participants.....                                  | 312        |
| 6.4.2  | Results.....  | 317        |
| 6.4.3  | Discussion.....   | 318        |
| 6.5  | Experiment #2.....  | 320        |
| 6.5.1  | Design and participants.....                                  | 320        |
| 6.5.2  | Results.....  | 323        |
| 6.5.3  | Discussion.....   | 324        |
| 6.6  | General discussion.....                                       | 328        |
| <b>Chapter 7: Conclusions .....</b>  |   | <b>336</b> |
| 7.1  | Productivity, no negative evidence, and arbitrariness.....    | 336        |
| 7.2  | Covert scope-shifting in natural languages.....               | 343        |
| <b>Bibliography .....</b>  |   | <b>346</b> |

## **Chapter 1: Introduction**

A central problem for a theory of language acquisition is determining how children learn both what is possible and what is not possible. This problem is especially acute for phenomena residing at the boundary between syntax and semantics, where (a) the mapping from surface form to meaning is often complex and (b) languages vary in how form and meaning align. In this thesis, I aim to use the acquisition of quantifier scope phenomena as a probe into the character of the syntax-semantics mapping and the learning of this mapping. This domain embodies both aspects of the problem, because (a) semantic scope relations do not always match surface syntactic relations, and (b) languages and constructions vary in how transparent the mapping is.

This thesis investigates the acquisition of language-specific constraints on scope interpretation in Japanese. In the language, certain scope interpretations that are possible with the corresponding sentences in languages like English are blocked. The main purpose of the investigation is to determine how knowledge of such language-specific constraints on scope interpretations can be acquired by first language learners. This introduction aims to specify the empirical issues that must be addressed by a study of the acquisition of language-specific scope constraints. I begin by briefly reviewing cross-linguistic variation in possible scope interpretations, and then turn to the logic of language learning. Together, these two problems lead to important empirical questions for a theory of how language-specific constraints on scope interpretation are learned.

## 1.1 Scope flexibility and language-specific constraints

In natural languages, scope relations between logical words do not always correspond to surface linear/hierarchical relations. For example, the English sentences in (1) allow “inverse” scope interpretations where a hierarchically lower quantificational element takes wider scope than a higher one:

- (1) a. John didn't find someone  
can mean: “there is someone that John didn't find”
- b. Everyone didn't read this book  
can mean: “not everyone read this book”

The existence of inverse scope interpretations demonstrates that the mapping between surface syntax and semantics is not always simple, and suggests that the mapping system of natural language encompasses some mechanism that relates mismatching surface syntactic representations and semantic representations. The mechanism could be covert syntactic operations (often referred to as *Quantifier Raising* or QR) that alter hierarchical relations between quantificational elements without audible consequences for surface forms (e.g., Huang 1982; May 1977; McCawley 1970). Another possibility is that the mechanism consists of semantic rules that determine the scope relations of quantificational elements independent of their syntactic positions (e.g., Cooper 1983; Steedman 1987). Although these approaches have various different empirical and theoretical consequences, they all share the characteristic that something beyond a simple uniform composition mechanism applied to the surface syntactic representation is required.

Scope flexibility in natural languages is not an unrestricted phenomenon. Rather, many sentences/constructions in natural languages are scopally unambiguous, allowing only one of the logically possible scope interpretations. Particularly relevant to our concern here is the existence of various language-specific constraints on scope interpretation. For example, the following construction in Japanese does not show the scope ambiguity that its English counterpart shows:

- (2) Dareka-ga dono-sensei-mo hihan-sita  
 someone-NOM every teacher criticize-did  
 Literally: “Someone criticized every teacher”  
 $\exists >> \forall / * \forall >> \exists$

In Japanese transitive sentences with multiple QP arguments like (2), the inverse scope interpretation is disallowed: the object QP cannot take scope wider than the subject QP (e.g., Hoji 1985; Kuno 1973; Kuroda 1970). Thus, the sentence can only mean that “there is a specific individual who criticized every teacher”, but not that “for every teacher, there is an individual who criticized him”. Following Huang (1982), this is called the *rigid scope constraint*.

Another example of a language-specific constraint on scope interpretations is illustrated by the interpretive contrasts in the following pairs of simple negative sentences that involve a logical connective:

- (3) a. John doesn't speak French *or* Spanish  
 → John does not speak French AND does not speak Spanish
- b. John-wa furansugo *ka* supeingo-o hanasa-nai  
 John-TOP French or Spanish-ACC speak-NEG  
 → John does not speak French OR does not speak Spanish
- (4) a. John doesn't speak *both* French *and* Spanish  
 → John does not speak French OR does not speak Spanish

- b. John-wa furansugo *mo* supeingo *mo* hanasa-nai  
 John-TOP both French and Spanish speak-NEG  
 → John does not speak French AND does not speak Spanish

In English sentences the disjunction *or* and the conjunction *both...and...* are interpreted within the scope of local negation, allowing inferences that closely resemble De Morgan's laws in propositional logic. In contrast, the Japanese disjunction *ka* and the conjunction *...mo...mo* resist taking scope under local negation, yielding distinct interpretations from their English counterparts. In earlier studies (Goro 2004, 2006), I argued that Japanese logical connectives are *Positive Polarity Items*, which must take scope over local negation (e.g., Progovac 1994; Szabolcsi 2004). A Positive Polarity Item forces the inverse scope interpretation when it appears within the surface c-command domain of local negation.

Another constraint concerns the scope interaction between a certain class of verbs and a quantificational argument within the complement clause of the verb:

- (5) Taroo-wa mado-wo zenbu shime-wasure-ta  
 Taroo-TOP window-ACC all close-forget-PAST  
 Literally: "Taroo forgot to close all the windows"  
 \**forget* >>  $\forall / \forall$  >> *forget*

In Japanese infinitival complement constructions with implicative matrix verbs like (5) a QP in the complement clause must take wider scope than the matrix predicate (Bobaljik & Wurmbrand 2005, 2007; Koizumi 1995; Sano 1985). In other words, the inverse scope interpretation is obligatory in this type of construction: the object QP is thematically related to the complement predicate, but must take wider scope than the

matrix predicate. Following Bobaljik and Wurmbrand I will refer to this phenomenon as the *anti-reconstruction constraint*.

Given these variations in possible scope interpretations among different languages, a first language learner must somehow learn both what is possible and what is impossible about scope interpretation in his target language. In other words, one cannot place the burden completely on innate linguistic knowledge: the scope interpretations that are blocked in the Japanese examples above are possible in their English counterparts, therefore it is impossible to assume that those interpretations are ruled out by innate linguistic knowledge. The learning process can be regarded as discovering the correct hypothesis about the possible mappings between surface syntax and semantics. A theory of language acquisition must therefore specify how it is possible for first language learners to discover the correct hypothesis about the mappings by using the input data that is available to them. In what follows, I will define the task for a theory of the acquisition of language-specific constraints on scope interpretation in terms of the learnability approach (e.g., Pinker 1979, 1989; Wexler and Culicover 1980; Baker and McCarthy 1981), and specify what must be uncovered by empirical investigation.

## **1.2 Learnability**

In order to construct a theory of the acquisition of a given piece/domain of linguistic knowledge, the following components in the acquisition process must be specified: (i) the learner's contribution, (ii) the learner's experience, and (iii) what is learned. Pinker (1989) pointed out that when each of those components has a certain

characteristic, the acquisition problem becomes a paradox, which cannot be explained in any logically reasonable way. I will briefly review each of Pinker's points.

*Productivity of the learner.* Since any natural language allows unboundedly many different expressions, and since the acquisition of language is carried out on the basis of finite numbers of input sentences that children hear from their parents, language acquisition cannot be a strictly conservative process. Learners cannot simply stick to expressions that they have heard, and must make generalizations that go beyond their finite linguistic experience, so that they can productively generate new expressions that were not included in the input data. However, the task of language acquisition becomes complicated when a learner's generalization generates, for example, an expression X that is not possible in the target language. In such a case, the learner must learn to modify his hypothesized generalization so that it correctly blocks the expression X. The question, then, is how such learning is triggered, and how experience contributes to the process.

*Obtaining negative evidence from experience.* One possibility is that input experience provides some kind of negative evidence to the learner, leading him to recognize that expression X is impossible in the target language. One type of negative evidence that has been extensively discussed in the literature is direct negative evidence, i.e., some sort of parental feedback (e.g., correction, disapproval, etc.) to children's utterances. However, the available evidence suggests that direct negative evidence is not systematically provided to children. For example, since Brown and Hanlon (1970), research on child-parent interactions has repeatedly found that the form of parental feedback (e.g., approval or disapproval) to children's speech is not



contingent on the well-formedness of children's utterances. Given this, Pinker concludes that learners cannot count on direct negative evidence to find out what is not possible in the language.

*Arbitrariness of the constraint.* It is possible that the impossibility of the expression X is a consequence of some general property of the language. In such a case, the learner does not have to be directly told that X is impossible: learning the general property should lead him to expunge X from his language. However, it is also possible that the constraint that blocks generation of X is arbitrary in the sense that the impossibility of X is not related to any other property of the grammar. In such a case, the learner can only learn that X is impossible based on input experience that provides (negative) evidence against X. Thus, how children can learn a given piece of knowledge (especially one that involves a negative constraint) depends highly on the properties of what is learned: when the target knowledge involves an arbitrary constraint, the burden on experience becomes larger.

A learnability paradox arises when an acquisition task has the following three characteristics: (i) *productivity*: the learner productively generates new expressions in such a way that some ungrammatical expressions are also generated, (ii) *no negative evidence*: experience does not provide the learner with any form of negative evidence against the ungrammatical expressions, and (iii) *arbitrariness*: the ungrammaticality of those expressions is not predictable from other generalizations that can be made on the basis of observable properties of the language, and therefore the learner needs direct evidence that shows the expressions are not possible in the language. With all these aspects, the acquisition of that piece of linguistic knowledge resists a logical

learnability account: the learner makes a mistake that must be corrected by the time he becomes an adult, but there is no reasonable way to explain how the correction occurs. Accordingly, a theory of language acquisition must deny at least one of the three components.

The same kind of learnability paradox can arise in the acquisition of language-specific constraints on scope interpretation in Japanese, when (i) children generate scope interpretations that are not possible in the adult language (e.g., the inverse scope interpretation for sentences like (2)), (ii) input data do not provide any kind of negative evidence against children's non-adult scope interpretations, and (iii) the relevant constraint is arbitrary in the sense that the impossibility of those scope interpretations is not related to any other properties of the language. Given this background, the empirical questions that must be addressed in a study of the acquisition of the language-specific constraints on scope can be summarized as follows:

- (6) a. *Productivity*: How productive are Japanese children in the acquisition of possible scope interpretations? Do they generate scope interpretations that have not been exemplified in the input? Do they allow scope interpretations that Japanese adults do not allow?
- b. *No negative evidence*: Do input data provide children with any form of negative evidence against particular scope interpretations? If direct negative evidence is not available, is there any other way for children to discover useful information that shows that those scope interpretations are impossible?
- c. *Arbitrariness*: How arbitrary are the language-specific constraints on scope interpretation? Can the impossibility of specific scope interpretations be predicted based upon some other properties of the language? If so, are the crucial properties learnable from experience?

In the remainder of the chapter, I will discuss each of the questions in turn.

### 1.2.1 Productivity and conservatism

A learnability paradox arises when the learner makes an overly permissive generalization which cannot be falsified by input evidence. One way to avoid being stuck with overly permissive generalizations is to avoid making such generalizations: if you do not make a mistake in the first place, you do not have to correct your mistake. In the literature, this idea has usually been implemented in some form of *conservative* learning algorithm. Such a conservative algorithm forces the learner to choose the most restrictive generalization and to hold that generalization until positive evidence shows that it is too restrictive. In other words, a conservative learning mechanism assumes that something is impossible unless it is shown to be possible. This default assumption contributes to the formation of knowledge about what is impossible. That is, the absence of falsifying evidence against the narrowest generalization is translated by the learning mechanism into evidence about what is impossible. Under this type of learning strategy, the crucial input data that triggers a modification of the current hypothesis does not have to be all that abundant: logically, a single encounter with the crucial data suffices, as long as the data unambiguously reveals the over-restrictedness of the current hypothesis.<sup>1</sup>

This kind of learning mechanism has widely been assumed in various approaches to language acquisition. Within the Principles and Parameters approach the idea is often implemented in *the subset principle* for parameter setting. The Subset Principle

---

<sup>1</sup> An independent issue is to what extent such unambiguous triggering data is available to children. The availability of unambiguous triggers depends highly on the relation between a learner's hypotheses: if the hypotheses largely overlap with respect to their predictions, then the set of unambiguous triggers should correspondingly be small. See Gibson and Wexler (1994) and Fodor (1998) for discussion of this issue. In any case, the issue should therefore be considered in connection with a concrete model of the learner's hypotheses.

forces the learner to choose the parameter value that yields the most restrictive grammar, i.e., the grammar that generates the smallest subset of sentences, until positive evidence proves that the parameter setting cannot generate possible sentences in the language (e.g., Berwick 1985; Clark 1992; Fodor 1992, 1994; Manzini and Wexler, 1987; Roeper and de Villiers 1987; Wexler 1993). In addition to the subset principle for syntactic acquisition, some studies on the acquisition of semantics have proposed the Semantic Subset principle, which states that children assume as a default the scope interpretation that yields the narrowest truth conditions (i.e., the interpretation that makes the sentence true in the fewest possible situations: Crain et al., 1994; Goro and Akiba 2004; Goro 2004; Jing et al. 2005).<sup>2</sup> Additionally, a somewhat different implementation of the idea of conservative learning can be found in Snyder (2007; in press), in which the author claims the following:

- (7) Children do not begin making productive use of a new grammatical construction in their spontaneous speech until they have both determined that the construction is permitted in the adult language, and identified the adults' grammatical basis for it.

(Snyder 2007)

The claim is referred to as Grammatical Conservatism (GC). GC is different from the subset principle in that it predicts that the learner may avoid using a grammatical construction even if the construction is generated by the most restrictive parameter setting. In this respect GC is more experience-driven than the subset principle is: innate linguistic knowledge alone is not sufficient for the learner to assume that a

---

<sup>2</sup> Recent studies on computational models of language learning have revealed that implementing the idea of the Subset Principle in a realistic model of syntactic acquisition is less straightforward than was imagined (e.g., Fodor and Sakas 2005). I leave this issue open here.

certain construction is available in the language. Furthermore, more strongly experience-based learning models also incorporate the idea of conservative learning (e.g., Baker, 1979; Tomasello, 2000, 2003). Although these approaches have various different empirical and theoretical consequences, they share the prediction that in no case can children's grammar be more permissive than adults' grammar: there should be no overgeneralization, since conservative learning is precisely the mechanism that blocks overgeneralizations.

It is true that some form of conservative learning model can often provide a conceptually appealing resolution to a learnability paradox because it circumvents the difficult problem of "unlearning". However, whether or not children are actually conservative learners is an independent empirical issue. It has been observed that in some linguistic domains children do make overgeneration errors in the course of language acquisition. For example, there are well-documented observations that children spontaneously use verbs in non-adult argument structure frames, e.g., *he get died*, etc. (e.g., Bowerman 1983; Gropen et al. 1989; Pinker 1989). In the present case, therefore, it is important to empirically assess the question of how conservative (or conversely, how productive) Japanese children are in the acquisition of possible scope interpretations. If empirical evidence shows that children do make overgeneration errors with scope interpretation, then a theory of language acquisition must solve the problem of unlearning, however difficult it might be.

In this thesis, I employ an experimental paradigm that is called the Truth Value Judgment Task (e.g., Crain and McKee 1985; Crain and Thornton 1998) to investigate children's knowledge of language-specific constraints on scope

interpretation. The basic logic of the experimental paradigm is as follows: a test sentence with two quantificational elements is provided as a description of a certain kind of situation. In the situation, the scope interpretation that is possible in the adult language makes the sentence false, and the scope interpretation that is blocked by a language-specific constraint makes the sentence true. For example, sentence (2) is presented in a situation where each teacher was criticized by a different individual. The surface scope ( $\exists \gg \forall$ ) interpretation is false, because there is no unique individual who criticized every teacher; in contrast, the inverse scope ( $\forall \gg \exists$ ) interpretation is true, because every teacher was criticized by someone. If the child accepts the sentence as a truthful description of the situation, then the response is interpreted as evidence that the participant accessed the inverse scope interpretation. Conversely, if the participant judges the sentence to be false under the situation, then the response is interpreted as evidence that the participant obeys the rigid scope constraint. The results of the experimental investigations will be reported in Chapter 2, 4, and 6.

### *1.2.2 Experience and negative evidence*

With respect to scope interpretation, it seems straightforward to assume that children do not receive direct negative evidence. Direct negative evidence against a particular scope interpretation could only arise when (i) the child uses a doubly-quantified sentence intending that scope interpretation, (ii) the caretaker notices that the sentence does not match the situation under the other possible scope interpretation, and (iii) the caretaker corrects the child in a way that the child can understand that the problem is his scope assignment (rather than, for example, the choice of the particular

lexical items). Given that parental feedback is highly inconsistent even in the cases where children's errors are much more obvious (i.e., errors in forms, rather than in interpretations), it is extremely unlikely that children actually encounter such a situation.

One possible way to recover from overly permissive generalizations without relying on direct negative evidence is to resort to *indirect negative evidence* (INE). The idea was first discussed in early 1980s (e.g., Chomsky 1981) and has recently been attracting growing attention within research on probabilistic learning models (e.g., Elman 1993; Lewis and Elman 2001; Seidenberg 1997; Tenenbaum and Griffiths 2001; Rhode and Plaut 1999; Regier and Gahl 2004). Roughly speaking, INE is the absence of input evidence that a certain hypothesis predicts to be possible in the language, and the learning mechanism uses the absence of expected data as evidence against the hypothesis. An important characteristic of recent probabilistic learning models that shapes learning around INE is that they have an ability to discriminate subset-superset hypotheses on the basis of positive evidence alone (e.g., Regier and Gahl 2004; but see Pearl and Lidz 2006). For the acquisition of possible scope interpretations, a probabilistic learner who can reliably detect the absence of a certain scope interpretation in the input data would be able to use the absence as evidence against the hypothesis that generates the scope interpretation.

Since children do make overgeneration errors in some domains (e.g., argument structure alternation), a mechanism that ensures recovery from this kind of overgeneration error is necessary in any theory of language acquisition, and a probabilistic learning model that takes advantage of indirect negative evidence may

be a good candidate for this role. However, it must be pointed out that compared to learners of argument structure alternations, learners of scope interpretations must rely on sparse and indirect data. Among the possible combinations of quantificational elements, only a subset of them are informative for learners: for example, *someone read a book* is not informative for learners of the rigid scope constraint, because the inverse scope interpretation is truth-conditionally indistinguishable from the isomorphic interpretation. Moreover, a potentially informative combination of quantificational elements may be used in a context where the two scope interpretations happen to yield the same truth value: both interpretations of *everyone didn't come* are true when nobody came. These factors lead to inherent sparseness of the relevant data. Furthermore, the intended scope interpretation is not apparent in the linguistic signals. For example, even if the sentence “Someone ate everything” is presented to the learner with an intended inverse scope interpretation, nothing about the form tells the learner whether surface scope or inverse scope is intended.<sup>3</sup> This contrasts with the discovery of regularities in forms, where objective observations can directly reveal crucial evidence. For example, an English input sentence like “John gave Mary the book” directly tells the learner that the verb *give* can be used in the double object frame. Likewise, a Japanese input sentence in the form “NP-ACC NP-NOM

---

<sup>3</sup> I am aware of the fact that some marked intonation pattern can force a specific scope interpretation. However, such prosodic markings of scope do not seem to be a robust phenomenon. Leddon, Lidz and Pierrehumbert (2004) carried out an experiment in which they recorded English-speaking parents reading stories to their pre-school children. The stories contained potentially scope-ambiguous sentences such as *every bunny didn't jump over the fence*, and those sentences were read under two kinds of situations: ones that correspond to the surface scope interpretations and others that correspond to the inverse scope interpretations. The results of the analysis of the recorded utterances found no systematic prosodic distinction between the intended surface scope interpretation and the intended inverse scope interpretation.



Verb” directly shows that the word order (i.e., scrambling) is permitted in the language.

Furthermore, scope ambiguities of the kind we are concerned with here do not straightforwardly follow from the properties of directly observable regularities of surface syntax.<sup>4</sup> This contrasts with the discovery of usual structural ambiguities, where independently observable patterns should allow the learner to draw a conclusion about possible interpretive options. To illustrate, let us observe the case of thematic ambiguity in Japanese relative clauses. In Japanese, a relative clause with a stative predicate such as *suki* “like” allows two different thematic interpretations, as illustrated in (8).

- (8) Taroo-ga sukina onna-no ko  
 Taroo-NOM like female-GEN child  
 “The girl who likes Taroo” or “The girl who Taroo likes”

This ambiguity arises because the predicate in the relative clause *suki* “like” takes a nominative object. Combined with the head-final order of Japanese, this property makes it possible for the relative clause in (8) to have two possible surface structural analyses.

- (9) a. Taroo-ga onna-no ko-ga sukida → [Taroo-ga  $t_i$  sukina] onna-no ko<sub>*i*</sub>  
 Taroo-NOM female-GEN child-NOM likes  
 “Taroo likes girls/the girl” → The girl who Taroo likes
- b. Onna-no ko-ga Taroo-ga sukida → [ $t_i$  Taroo-ga sukina] onna-no ko<sub>*i*</sub>

---

<sup>4</sup> There are also scope ambiguities that directly follow from surface syntactic ambiguity. For example, the English sentence "John didn't marry Mary because she was rich" is ambiguous with respect to the relative scope relation between negation and the *because*-clause: it can either mean "John didn't marry Mary, and it was because she was rich" or "John married Mary but it was not because she was rich". It is generally assumed (e.g., Johnston 1993) that the ambiguity reflects the attachment ambiguity of the *because*-clause: if the *because*-clause is attached to the position that is higher than negation, the former interpretation results, and the lower attachment yields the latter interpretation. For an acquisition study on this kind of ambiguity, see Nakao and Goro (forthcoming).

female-GEN child-NOM Taroo-NOM likes  
“Girls/the girl likes Taroo” → “The girl who likes Taroo”

The ambiguity in (8) is an automatic consequence of the fact that (i) the predicate takes multiple nominative arguments, and (ii) both the subject and object precede the verb in Japanese. Those two properties should be easily observable in input signals. Consequently, the learner does not need direct evidence about the possible interpretive options of forms like (8). That is, in order to learn that the form is ambiguous, it is not necessary for the learner to hear the form in situations that match each of the two interpretive options. In contrast, the scope ambiguity of “Someone ate everything” does not follow straightforwardly from any directly observable properties of the language. The sentence is simply not structurally ambiguous in its surface syntactic representation.

The inherent indirectness of evidence for possible scope interpretations leads to an increased role for the learner in discovering crucial evidence. In other words, information about possible scope interpretations can only come from the learner’s internally generated hypotheses about what the sentence s/he just heard is likely to mean. This dependence on the learner’s internal state can lead to a significant discrepancy between *inputs* and *intakes* (i.e., signals from external world and information that the learner gains from the signals). For example, suppose that a child heard the sentence “Someone ate everything” uttered with the intended inverse scope. It is possible that the child assigns the surface scope interpretation to the sentence, and does not correct his incorrect scope assignment for the following reasons: (i) the surface scope interpretation happened to (also) be true in the situation where the

sentence was uttered, (ii) the child did not have enough information to explicitly judge whether or not the surface scope interpretation is true, and simply assumed that it must be true, or (iii) the child noticed that the surface scope interpretation did not match the situation, but he assumed that the speaker said something wrong. In such a case, the input data would be interpreted by the learner as evidence for the surface scope interpretation, rather than the evidence for the inverse scope interpretation. Therefore, in general, the probability of positive evidence for a certain scope interpretation in the learner's intake may not appropriately reflect the actual probability of positive evidence for that scope interpretation in the input to the learner. This can be problematic for a probabilistic learner who relies on probabilistic comparisons of positive evidence for possible scope interpretations. The learner can miss nontrivial amounts of positive evidence for a certain scope interpretation; conversely, the learner may also "fabricate" nontrivial amounts of positive evidence by interpreting input sentences with a certain type of scope interpretation that is not possible in the language. These points make it unclear whether or not first language learners can reliably extract indirect negative evidence (i.e., absences of certain scope interpretations) from input data.

In sum, constraints on scope interpretation make the problem of unlearning a more complex task than, for example, constraints on argument structure alternation do. There are two inherent complexities associated with input data about possible scope interpretations: data sparseness and indirectness. I will bring up those points again when I discuss the specific cases of the acquisition of language-specific constraints on scope in Chapter 2 and 4.

### 1.2.3 Arbitrariness of the constraints

A constraint is arbitrary when its effect (i.e., the impossibility of a certain set of expressions) cannot be derived from any other property of the grammar. Thus, learners of an arbitrary constraint must independently discover the impossibility of the relevant expressions from input experience, and hence can be seriously impaired by data sparseness and indirectness. In contrast, if the impossibility of a certain set of expressions is a consequence of some other property of the language, learners do not need to rely crucially on input evidence to find out what is impossible. In this connection, an important insight can be drawn from the concept of *parameter* in the Principles and Parameters approach (Chomsky 1981, 1986; Chomsky and Lasnik 1995).

When it was first introduced to the theory of grammar and language acquisition, the concept of *parameter* aimed to derive multiple consequences by setting the value of one parameter, thereby reducing the burden on an inductive learning mechanism. This original idea of parameter is clearly stated in the following quote from Chomsky (1981: 4):

- (10) If these parameters are embedded in a theory of UG that is sufficiently rich in structure, then the languages that are determined by fixing their values one way or another will appear to be quite diverse, since the consequences of one set of choices may be very different from the consequences of another set; yet at the same time, limited evidence, just sufficient to fix the parameters of UG, will determine a grammar that may be very intricate and will in general lack grounding in experience in the sense of an inductive basis.

Over the years, the meaning of the term *parameter* has been stretched to the extent that it is sometimes used to refer to highly specific cross-linguistic contrasts.

Nevertheless, in some recent parametric approaches to language acquisition (e.g., Baker 2001; Snyder 1995, 2001, in press; Sugisaki 2003), the original spirit of the concept of parameter remains the same: the system of parameters allows the learner to derive a wide variety of grammatical consequences by setting parameter values on the basis of limited evidence.

Quite independent of whether or not one actually employs some specific mechanism of parameters, the parametric approach to language acquisition provides an important insight about how learners might acquire knowledge about what is impossible. The insight can be stated in the following terms. For a learner who is equipped with a grammatical system that has a rich internal structure, learning something new (i.e., introducing a new component to the grammar) can affect other parts of the existing grammar. Such a consequence can be *negative* in the sense that it has the effect of blocking the generation of representations which had previously been possible until the introduction of the new component. Under this scenario, the learner acquires knowledge about what is impossible as a consequence of learning something else. This opens up the possibility of getting around the data-sparseness problem that arises within some areas of grammatical acquisition. Suppose that a certain property X of a language/construction is a consequence of another grammatical property Y of the language/construction. Then, as long as the learner knows the causal relation between X and Y, and Y can be learned from observable properties of the input, then the learner does not need evidence about X in the input. The acquisition of X effectively piggybacks on the acquisition of Y.

In order to determine whether or not this type of explanation can be applied to the acquisition of language-specific constraints on scope interpretation in Japanese, it is necessary to examine the nature of the constraints in detail. Chapters 3 and 5 of this thesis are thus devoted to theoretical analyses of scope constraints in Japanese, in which I present previously unnoticed empirical data, and propose theories of the scope constraints in Japanese that account for this data. Based on the theoretical models, their implications for a theory of language acquisition will be discussed.

### **1.3 Organization**

The chapters of this thesis are organized as follows. Chapter 2 examines acquisition of the rigid scope constraint in Japanese. Experimental investigations on Japanese children's scope interpretations reveal that children allow inverse scope interpretations that adults do not allow. These findings call for a non-conservative learning mechanism that allows children to purge their non-adult interpretations. Based on considerations of what input data is available, I argue that unlearning cannot be carried out on the basis of probabilistic indirect negative evidence. The acquisition of scope rigidity in Japanese thus presents a learnability problem as to how children learn to restrict their overly permissive grammar of scope. Chapter 3 presents a theoretical analysis of the rigid scope constraint in Japanese. Based on novel empirical data, I argue that the rigid scope constraint is not a property of the language as a whole: the lack of inverse scope interpretations is restricted to specific cases, and Japanese has a mechanism for shifting the scope of an element, whose properties are shown to be the same as the mechanism of covert scope-shifting in English. I then propose that the apparent scope contrast between Japanese and English is due to a

pragmatic implicature imposed on nominative subjects in Japanese. Chapter 3 also examines scope-reconstruction with scrambling, and provides a theory of scrambling reconstruction. Based on the theoretical account that I develop in Chapter 3, I argue that the acquisition of the syntactic/semantic/pragmatic properties of case particles feeds the acquisition of scope rigidity. Chapter 4 discusses findings on the acquisition of Japanese logical connectives and positive polarity, presenting experimental data that show that Japanese children assign non-adult scope interpretations to the disjunction *ka*. Consideration of the input evidence available to children again leads to the conclusion that the non-adult scope interpretation cannot be unlearned on the basis of evidence about possible scope interpretations. Chapter 5 analyzes the scope properties of Japanese logical connectives. I propose that the connectives are positive polarity items that are subject to obligatory covert movement targeting a functional projection above negation. The syntactic movement analysis accounts for the interesting properties of positive polarity: locality and insensitivity to non-overt negation. Based on this analysis, I argue that the possible hypotheses about the scope of disjunctions in natural languages must be constrained by some innate knowledge. Chapter 6 focuses on the anti-reconstruction constraint. With this case, experimental investigations reveal that a certain proportion of adult Japanese speakers accept the scope interpretation that is claimed to be impossible in the literature. Based on these results, I argue that two populations with a different grammar of anti-reconstruction coexist among adult speakers of Japanese. I propose that this variation among adult speakers is due to the unreliability of the relevant input evidence. In chapter 7, I discuss the overall consequences of the findings in this thesis.

## Chapter 2: Freedom of Scope in the Development of Japanese

### 2.1 Covert scope-shifting

In natural languages, semantic relations between logical words are not always uniquely determined by surface linear/hierarchical relations. For example, the English sentence in (11) has two truth-conditionally distinct interpretations, which correspond to two different scope interpretations of the logical words:

(11) Some student admires every professor. ( $\exists \gg \forall / \forall \gg \exists$ )

The *scope ambiguity* observed in cases like (11) is distinct from standard cases of *structural ambiguity* in, for example, sentences like *John hit the man with a stick*. For such structurally ambiguous sentences, one can easily motivate two distinct surface syntactic representations that correspond to each of the possible interpretations, using standard syntactic tests (movement, substitution, etc.). For scopally ambiguous sentences like (11), however, the interpretive ambiguity cannot be straightforwardly reduced to syntactic ambiguity in most cases. For example, there seems to be no independent syntactic evidence that indicates the existence of two possible surface structural relations between the subject and the object of a transitive predicate. Given this, we assume that sentences like (11) have a single surface syntactic representation, and that natural language encompasses some mechanism that maps a single surface syntactic representation to multiple semantic representations. The mechanism could be a covert syntactic operation (often referred to as *Quantifier Raising*, or *QR*) that



alters hierarchical relations between quantificational elements without audible consequences for surface forms (e.g., Huang 1982; May 1977; McCawley 1970). Another possibility is that the mechanism consists of semantic rules that determine the scope relations of quantificational elements independent of their syntactic positions (e.g., Cooper 1983; Steedman 1987). Although these approaches have various different empirical and theoretical consequences, they all share the characteristic that something beyond a simple composition mechanism applied to the surface syntactic representation is required.

Among possible interpretations, we are particularly interested in those in which a hierarchically lower quantificational element takes scope over a higher one (e.g., the  $\forall \gg \exists$  reading in (11)). Such interpretations are called *inverse scope* interpretations, as opposed to *surface scope* interpretations in which a hierarchically higher element takes wider scope than lower ones. Inverse scope has often been considered to be a “marked” interpretive option (e.g., Gil 1982), mainly because the interpretation pattern often shows a lesser degree of accessibility as compared to surface scope interpretations. First, speakers often show considerable difficulty in accessing inverse scope interpretations, even with “standard” examples of scope ambiguity such as (11). Some earlier theoretical works even claimed that there is no such thing as an inverse scope interpretation in sentences like (11) (e.g., Reinhart 1976). In psycholinguistic experimental research, inverse scope readings have repeatedly been shown to yield lower acceptance rates and/or higher processing loads relative to surface scope interpretations (e.g., Ioup 1975; Gil 1982; Kurtzman and MacDonald 1993; Frazier 2000; Anderson 2005). Second, the availability of inverse scope is subject to cross-

linguistic variation. Languages like Japanese (e.g., Kuroda 1970; Kuno 1973; Hoji 1985), Chinese (e.g., Huang 1982; Aoun and Li 1993), Korean (e.g., Kim 1989; Ahn 1990; Sohn 1995), and German (e.g., Krifka 1998; Pafel 2005) are reported to be “scopally rigid” in the sense that the counterparts of (11) in those languages allow only the surface scope interpretation. Given these asymmetries, I assume that while surface scope interpretations are directly “read off” from hierarchical orders in surface syntactic representations, some additional mechanism is responsible for the derivation and/or processing of inverse scope interpretation. In other words, I assume that surface scope interpretations are “default” scope interpretations, and some extra steps are involved in deriving corresponding inverse scope interpretations. This extra mechanism that derives inverse scope interpretations will be referred to as *covert scope-shifting* (CSS).

This chapter has two main parts. First, it reports the results of experimental studies that investigated Japanese children’s interpretations of sentences that contain two quantificational arguments. The results reveal that Japanese children access inverse scope interpretations that Japanese adults do not allow. In other words, Japanese children’s grammar of CSS appears to be overly permissive in that it generates scope interpretations that are prohibited in the adult language. Second, it discusses the problem for a theory of language acquisition that the experimental data raise. Japanese children’s non-adult interpretations suggest that they do not learn possible scope interpretations through conservative learning, and therefore necessitates a learning mechanism that allows them to purge their non-adult interpretations. I argue that indirect negative evidence cannot provide a basis for

children to solve the learning problem, due to the sparseness of relevant evidence. Thus, the acquisition of the restrictions on CSS in Japanese represents a case of the learnability paradox that I discussed in Chapter 1.

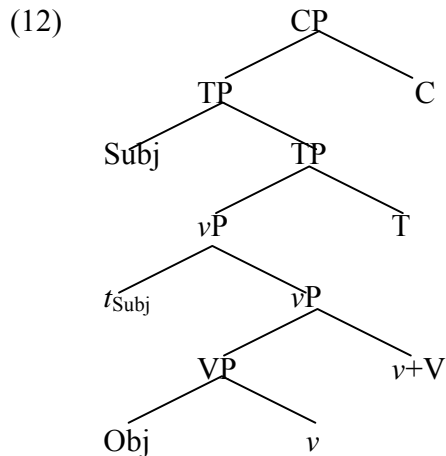
This chapter is organized as follows. Section 2.2 provides a few preliminaries before I start the discussion on the main issue. Section 2.3 briefly introduces “scope rigidity” effect in Japanese. In section 2.4, I discuss experimental studies that investigated scope interpretations in canonical order sentences by Japanese and English speakers. It turns out that Japanese children allow inverse scope interpretations that Japanese adults do not allow. Section 2.5 provides experimental data and discussion on Japanese children’s scope interpretations in scrambled order sentences. The results again reveal that Japanese children access non-adult inverse scope interpretations. In section 2.6, I consider the nature of Japanese children’s non-adult behaviors, and argue that the “freedom of scope” shown by Japanese children cannot be regarded as a version of previously observed non-adult behavior by young children. Section 2.7 examines the learnability problem that the acquisition of scope rigidity poses to a theory of language acquisition.

## **2.2 A few preliminaries**

### *2.2.1 Phrase structure in Japanese*

Japanese is a strictly head-final language: a head always follows its complement. In this thesis, I assume that the phrase structure of Japanese sentences is basically the same as that of the corresponding English sentences, except for the ordering between

a head and its complement. Thus, an S-O-V order transitive sentence in Japanese receives the following structural analysis:



I am not going to fully justify the structure in (12), and will remain neutral on the issues about the positions that lexical elements in Japanese occupy in surface syntactic representations. There are ongoing debates in the Japanese syntax literature as to whether lexical elements overtly raise to functional projections in Japanese (e.g., Koizumi 2000 Fukui 1986; Fukui and Sakai 2003, etc.). For my purposes, however, it suffices to determine the relative hierarchical relations between relevant elements, without specifying the exact positions that the elements occupy. To this end, a relevant empirical observation is that pronominal subjects in transitive sentences show the familiar Condition C effect in Japanese:

- (13) a. John<sub>i</sub>-ga [Mary-ga kare<sub>i</sub>-ni okutta tegami]-o mada yonde inai (koto)  
 John-NOM Mary-NOM he-DAT sent letter-ACC yet read have-not (fact)  
 “John has not read the letter Mary sent to him”
- b. \*Kare<sub>i</sub>-ga [Mary-ga John<sub>i</sub>-ni okutta tegami]-o mada yonde inai (koto)  
 John-NOM Mary-NOM he-DAT sent letter-ACC yet read have-not (fact)  
 “He has not read the letter Mary sent to John”

This observation suggests that the subject position of a transitive sentence in Japanese c-commands the object position. I thus conclude that the subject position of a Japanese transitive sentence is hierarchically higher than the object position. Therefore, if an object QP takes scope over its subject QP in an S-O-V transitive sentence, it is to be understood as an inverse scope reading in the sense that a hierarchically lower QP takes wider scope than a higher one.

### 2.2.2 *Scope of indefinites*

One of the most prominent approaches to CSS assumes that there is a covert syntactic movement operation, which is often referred to as *Quantifier Raising (QR)*, that alters hierarchical relations between quantificational elements without making any audible consequences. One of the strongest arguments for this syntactic movement approach is a correlation between the possible range of overt movements and the range of CSS interpretations. For example, when a QP appears within a syntactic island that blocks overt extraction from it, the QP cannot take scope out of the island<sup>5</sup>:

- (14) a. A doctor will examine the possibility that we give every new patient a tranquilizer.  $(\exists \gg \forall / * \forall \gg \exists)$
- b. A doctor should worry if we sedate every new patient.  $(\exists \gg \forall / * \forall \gg \exists)$

---

<sup>5</sup> The scope of (universal) QPs is actually more restricted. For example, *every* in *someone believes that John criticized every professor* cannot take scope over *someone*, suggesting that a QP cannot take wide scope out of a tensed clause, even though overt extraction from this position is fine, as in *which professor does someone believe that John criticized?*. Given this fact, approaches that treat CSS as covert syntactic movement must make it clear what kind of movement CSS is, so that the additional constraint on CSS follows from the property of the particular type of movement operation. See Johnson and Tomioka (1997); Johnson (2000) on this issue.

- (15) a. \*Which patients will a doctor examine the possibility that we give *e* a tranquilizer?  
 b. \*Which patients should a doctor worry if we sedate *e*?

(examples taken from Reinhart 1997: 336)

It has been widely observed, however, that the scope of indefinites does not show the correlation with overt movement, i.e., it does not obey island constraints. For example, indefinite QPs in (16) are embedded within syntactic islands, yet they are able to scope out of the islands:

- (16) a. John gave an A to *every student* who recited *a difficult poem* by Pindar.  
 ( $\forall >> \exists / \exists >> \forall$ )  
 b. If some relative of mine dies, I will inherit a house.  
 (IF  $>> \exists / \exists >>$  IF)

(Reinhart 1997: 342)

(16)a can mean that there is a specific poem by Pindar such that John gave an A to every student who recited it<sup>6</sup>. (16)b can mean that there is some specific relative of mine such that if he dies, I will inherit a house. Thus, in contrast with the definite universal quantifier *every*, the scope of the indefinite *some* does not show sensitivity to island constraints. Furthermore, the same type of asymmetry was found with another type of CSS. Lasnik (1997), attributing the original observation to Zubizarreta (1982) and Chomsky (1995), noted that while indefinites that have undergone A-movement can take scope at the base position, other types of QPs

---

<sup>6</sup> The example is originally due to Farkas (1981). Note that the inverse scope interpretation ( $\exists >> \forall$ ) does not entail the narrow scope interpretation: the inverse scope interpretation does not mean that every student got an A by reciting *any* difficult poem by Pindar.

cannot. First, observe the following example by May (1997). The sentence has two scope interpretations, one of which does not correspond to the surface hierarchical relations:

(17) Some politician is likely to address John's constituency.

(17) can either mean that there is some specific politician who is likely to address John's constituency, or that it is likely that some politician will address John's constituency. This kind of ambiguity fails to manifest itself when the raised QP is not an indefinite:

- (18) a. No one is certain to solve the problem  
b. Every coin is 3% likely to land heads

According to Lasnik, (18)a does not mean that it is certain that no one will solve the problem, i.e., the problem is way too difficult for anyone. Likewise, (18)b cannot mean that it is 3% likely that every coin will land heads, leaving only the far less plausible interpretation available (every coin is weighted in such a way that it is 33 times more likely to land heads than tails). Thus, in these so-called "reconstruction" cases, indefinites show a wider range of possible scope interpretations as well as in the "QR" cases discussed above.

In the literature that has tackled this exceptional scope behavior of indefinites, it is often claimed that the exceptional scope interpretations of indefinites are derived by an independent interpretive mechanism that is available only to indefinites. In this thesis, I will not address the issues concerning the nature of the mechanism that derives the exceptional scope of indefinites, as it goes beyond the scope of this

research<sup>7</sup>. The purpose for bringing up this issue here is to raise a methodological concern for using indefinites when testing scope possibilities. Specifically, it is dangerous to make any sweeping generalization solely on the basis of observations regarding the scope of indefinites, because other types of quantifiers may show different behaviors, as we have seen above. In what follows, I will avoid using indefinite QPs in the hierarchically lower position when we test the availability of inverse scope in general.

A related issue concerns indefinite pronouns in Japanese. Japanese indefinite pronouns consist of a *wh*-phrase and *ka*, a morpheme used as a disjunction connective and also as a question particle. Thus, *nani* “what” with *ka* makes *nanika* “something”, *dare* “who” with *ka* makes *dareka* “someone”, and so on. At first glance, those indefinite pronouns appear to resist taking scope out of a syntactic island.<sup>8</sup> Observe the following cases that involve conditional and relative clause islands:

- (19) Mosi paati-ni *dareka-o* yobuto, Tanaka sensei-wa okoru.  
 If party-to someone-ACC invite Prof. Tanaka-TOP get-mad  
 “If we invite someone to the party, Prof. Tanaka will get mad”
- (20) *Nanika-o* motteiru jyoukyaku-wa minna hikouki-ni nore-nai.  
 something-ACC have-ing passenger-TOP all plane-DAT board-NEG  
 “Every passenger who is carrying something is not allowed to board a plane”

In (19), the interpretation in which the indefinite takes scope over the conditional is very hard to obtain. Thus the sentence is most likely to be interpreted as meaning that Prof. Tanaka will get mad if we invite any person to the party. Similarly, (20) can

---

<sup>7</sup> Interested readers should refer to Reinhart (1997; 2006), Winter (1997), Kratzer (1995), and references therein.

<sup>8</sup> Note that the following discussion applies only to *indefinite pronouns* in Japanese, not indefinite NPs in general



only describe an unusual situation where a passenger cannot carry anything on board a plane. One may be tempted to interpret these observations as showing that Japanese indefinite pronouns do obey island constraints, suggesting that the interpretive mechanism that is necessary to derive the widest scope interpretation is not available to them. However, such a conclusion turns out to be too hasty. When the sentences in (19) and (20) are embedded within a “sluicing” context, the widest scope of Japanese indefinite pronouns can easily be obtained<sup>9</sup>:

- (21) Mosi paati-ni *dareka-o* yobuto, Tanaka sensei-wa okoru rasii ga,  
 If party-to someone-ACC invite Prof. Tanaka-TOP get-mad MOOD but  
 sore-ga dare ka wakaranai.  
 that-NOM who Q know-NEG  
 “(I heard that) Prof. Tanaka will get mad if we invite someone to the party,  
 but I don’t know who”
- (22) *Nanika-o* motteiru jyoukyaku-wa minna hikouki-ni nore-nai rasii ga,  
 something-ACC have-ing passenger-TOP all plane-DAT board-NEG MOOD but  
 sore-ga nani ka wakaranai  
 that-NOM what Q know-NEG  
 “(I heard that) every passenger who is carrying something is not allowed to  
 board a plane, but I don’t know what”

In order to see what is responsible for the change in the judgments, it is necessary to observe that there are two different kinds of “specific” interpretation of indefinites, as pointed out by Haspelmath (1997). One type of specificity presupposes the existence of a uniquely identifiable referent and conveys the speaker’s uncertainty about its identity. The other type of specificity is not associated with the speaker’s uncertainty,

---

<sup>9</sup> As the English translations of those examples suggest, sluicing in English does not seem to obey island constraints (Ross 1969; Chung et al 1995; Merchant 2001). We leave the issue on the derivation of Japanese “sluicing” open here, as it is not relevant to the present discussion.

and appears in contexts where the speaker actually knows the referent of the indefinite he used.<sup>10</sup> *Someone* in English can be used in both of those two contexts:

- (23) I heard that Norbert wanted to introduce *someone* to you, but I don't know who.  
(specific, unknown-to-speaker)
- (24) I wanted to introduce *someone* to you. Here, this is Norbert.  
(specific, known-to-speaker)

According to Haspelmath, his typological study revealed that there is an implicational universal relation between those two specific interpretations. That is, if an indefinite pronoun in a given language allows the specific, speaker-known interpretation, it also allows the specific, speaker-unknown interpretation. English indefinite pronouns obviously allow both interpretations. Japanese indefinite pronouns, in contrast, seem to be excluded from the “speaker-known” contexts:

- (25) #Kimi-ni dareka-o shoukaishi-you. Goro Takuya-san desu.  
you-DAT someone-ACC introduce-MOOD. Goro Takuya-Mr. COP  
“I am going to introduce someone to you. This is Goro Takuya.”
- (26) A: Gogo-wa isogashii-desu-ka?  
afternoon-TOP busy-COP-Q

---

<sup>10</sup> Jeff Lidz (Personal Communication) pointed out to me that the speaker known-unknown distinction may correspond to *epistemic specificity* in Farkas (1994). Epistemic specificity is illustrated in the following example by Fodor and Sag (1982):

- a. A student in Syntax 1 cheated on the exam.  
b. His name is John.  
c. We are all trying to figure out who he is.

When the sentence (a) is continued by (b), the speaker has a unique referent of the indefinite *a student in Syntax 1*. In contrast, when the sentence (a) is continued by (c), the indefinite subject only expresses an existential commitment. The former specificity is referred to as epistemic specificity by Farkas. It appears that Japanese indefinite pronouns do not allow epistemically specific interpretations, as illustrated by the awkwardness of the following example:

- d. #Dareka-ga siken-de husei-o sita. Kare-no namae-wa Taroo da.  
Someone-NOM exam-on cheat-ACC did he-GEN name-TOP Taroo COP  
“Someone cheated on the exam. His name is Taroo.”

“Are you busy this afternoon?”

B: #Hai. Dareka-to yakusoku-ga arimasu.<sup>11</sup>  
Yes someone-with appointment-NOM exist  
“Yes, I have an appointment with someone”

The use of indefinite pronouns in those contexts invokes strong awkwardness.<sup>12</sup> Given this, I assume that Japanese indefinite pronouns can only be used when the speaker is not sure about the identity of the “referent” of indefinites<sup>13</sup>. This characteristic of Japanese indefinite pronouns suggests a possible account for the difficulty for them to have the widest scope in sentences like (21)/(22). In a declarative form, those sentences are felicitously used when the speaker commits to presenting the information regarding the conditions under which Prof. Tanaka will get mad or one will be denied permission to board a plane, etc. Under the speaker-unknown construal of indefinites, however, the wide-scope interpretation of indefinites implies that the speaker only has incomplete information about the conditions, since he does not know the identity of the specific referent of the indefinite. I assume that this implication renders the wide-scope interpretation pragmatically awkward, given the

---

<sup>11</sup> The sentence sounds natural in a context where the speaker actually does not know the identity of the person who he has an appointment with, e.g., the person is waiting for a secretary to confirm who it is. (Colin Phillips, Personal Communication)

<sup>12</sup> Null arguments, instead of overt arguments, would most naturally be used in those contexts.

<sup>13</sup> Haspelmath (1997) describes those Japanese indefinite pronouns as having the ability to occur in the “specific-known” contexts. I believe this characterization is inaccurate, given the consistency of the native-speaker judgments I have obtained with examples like (25)/(26). One possible factor that could have interfered with Haspelmath’s observation is the fact that Japanese indefinite pronouns are not excluded from, for example, “guess who?” type contexts:

(i) Dareka-ga kimi-ni denwa-o yokosimasita. Dare da to omou?  
someone-NOM you-DAT call-ACC did-polite who COP COMP think  
“Someone called you. Guess who?”

This sentence can be felicitously used in a situation where the speaker knows the identity of the person who made the call, but is trying to avoid giving the information to the listener right away. I, however, believe this should not be classified as a “speaker-known” context, as this type of context is generally associated with a particular type of speech act in which the speaker “pretends” not to know the identity of the referent of indefinites.

felicity condition associated with the sentences. In other words, it is pragmatically infelicitous for one to commit to presenting the information regarding a condition without knowing how the condition is met. Since Japanese indefinite pronouns cannot have the “speaker-known” interpretation, the widest-scope (thus necessarily “specific”) interpretation of indefinites always creates pragmatic awkwardness in declarative sentences like (21)/(22), overshadowing the interpretation from the listener’s consideration. In sluicing contexts, however, the felicity condition is explicitly cancelled, and the widest-scope interpretation becomes natural and easy to access.

Given this account, we conclude that the difference between Japanese and English indefinite pronouns is not the availability of wide-scope out of syntactic islands, but the ability to occur in “specific-known” contexts. In other words, Japanese indefinite pronouns can be interpreted using the special mechanism that allows them to take wider range of scope than other quantifiers do (e.g., universal quantifiers). Consequently, Japanese indefinite pronouns are not exceptions to the methodological concern discussed in the earlier part of this section. Therefore, the same caution needs to be raised against making sweeping generalizations on the basis of tests relying solely on the scope of Japanese indefinite pronouns.

### **2.3 Scope rigidity**

In the Japanese syntactic literature, there is a long-standing observation that surface word order and quantifier scope in Japanese are tightly related (Kuroda, 1970; Kuno, 1973). Hoji (1985) renewed interest in this topic by bringing up the issue of cross-linguistic contrasts between Japanese and English. Hoji pointed out that scope

interpretations in Japanese appear to be more restricted than in English in that inverse-scope interpretations are disallowed in sentences like (27):

- (27) Dareka-ga daremo-o semeta  
 someone-NOM everyone-ACC criticized  
 “Someone criticized everyone”  
 $\exists \gg \forall / * \forall \gg \exists$  (Hoji 1985: 336)

Since May (1977), the scope ambiguity obtained in the English counterpart of (27) has often been taken as an argument for covert syntactic movement that may shift scope of an element without affecting phonological representations. As Hoji pointed out, such an approach to inverse scope in English cannot be directly transferred to the analysis of Japanese scope interpretations, as it would predict more scope ambiguity than Japanese sentences actually exhibit. This property of Japanese is often referred to as *scope rigidity*, and a number of studies report that the same observation holds in other languages, such as Chinese (Huang, 1982; Aoun and Li, 1993), Korean (Hoji, 1985; Kim, 1989; Sohn 1995), and German (Krifka, 1998; Pafel, 2005).

Earlier approaches to this cross-linguistic contrast regarded scope rigidity as a property of languages, and accordingly tried to formulate the cross-linguistic contrast in terms of the contrast between “scope-rigid languages” and “free scope languages” (e.g., Hoji, 1985; Aoun and Li, 1993). This characterization of the cross-linguistic contrast invites a very simple model of the acquisition of possible scope interpretations in Japanese. For example, if Japanese children learn possible scope interpretations conservatively, then as long as children can correctly identify intended scope interpretations, a conservative learning mechanism leads them to block inverse scope interpretations in sentences like (27). Another possibility is that there is some

parameter that distinguishes scope-rigid languages and free scope languages, where one setting only generates surface scope interpretations, and the other setting generates both surface and inverse scope interpretations. Thus, with respect to possible scope interpretations, the former setting generates a subset of the interpretations that the latter setting generates. If children start with the subset setting, then Japanese children would not encounter positive evidence that forces them to re-set the default setting, and accordingly their grammar only generates surface scope interpretations.

These models assume that some conservative learning mechanism restricts Japanese children's hypothesis about possible scope interpretations. Consequently, it is predicted that Japanese children never allow inverse scope interpretations that Japanese adults do not allow. If this is actually the case, then the acquisition of scope rigidity does not create a learnability paradox: Japanese children do not overgenerate scope interpretations. Given this, it becomes important to test the prediction empirically. The next section presents a series of experiments that aimed to address the issue: do Japanese children overgenerate inverse scope interpretations?

## 2.4 Experiments: Inverse scope in canonical order sentences

The experiments seek to determine whether Japanese and English speaking children access the inverse scope interpretations of sentences like (28):

- (28) a. *Japanese*  
Dareka-ga dono tabemono mo tabeta  
someone-NOM every food ate  
“Someone ate every food”
- b. *English*

## Someone ate every food

The Japanese sentence (28)a is scopally unambiguous for adult speakers, allowing only the interpretation in which the subject quantifier takes scope over the object quantifier (that is, the  $\exists \gg \forall$  interpretation). In contrast, the English counterpart (28)b allows the inverse scope interpretation (the  $\forall \gg \exists$  interpretation) as well. The surface scope interpretation of the sentence is false, for example, in the situation where each food was eaten by a different individual. The inverse scope interpretation of the sentence is in contrast true under the same situation. This discrepancy between the two scope interpretations in their truth values allows us to test the availability of the inverse scope interpretation using the Truth Value Judgment Task (Crain and McKee 1985; Crain and Thornton 1998). Suppose the experimental participant accepts the sentence in (28) presented in the situation where each of the foods was eaten by a different individual. The response suggests that the participant accessed the interpretation that makes the sentence true: the inverse scope interpretation. Conversely, if the participant does not allow the inverse scope interpretation, then s/he should reject the sentence in the same situation, because the only interpretation that is possible – the surface scope interpretation – is false. Our goal is to compare the acceptance rate and patterns of Japanese and English speaking children, in order to determine whether or not the difference in adult grammars (which leads to the difference in input) affects children's behavior. If children learn possible scope interpretations conservatively, then it is predicted that Japanese children adhere to the surface scope interpretation, disallowing the inverse scope interpretation. English children may or may not allow the inverse scope interpretation, depending on how

often they encounter positive evidence for inverse scope interpretations in input data. As a point of departure, I review some previous studies on the acquisition of scope interpretations. Among the experimental studies in this area of research, Marsden (2004) and Sano (2003) are particularly relevant for our concerns. I will discuss those studies in turn.

#### 2.4.1 Marsden (2004)

Marsden (2004) investigated scope interpretations of adult L2 learners of Japanese. Roughly speaking, Marsden found that the properties of the learner's L1 scope assignments affect possible scope interpretations of intermediate L2 Japanese, and English / Chinese / Korean learners of Japanese show divergent developmental patterns with respect to scope interpretations in Japanese. What I would like to discuss here, however, is not those results from Marsden's main experiments, but rather the results of her control experiments with adult native speakers. I am particularly interested in how native speakers of Japanese / English treat inverse scope in sentences like (28).

With both L2 and L1 subjects, Marsden used a picture-matching acceptability judgment task. In the task, pairs of a picture and a sentence were presented to the participant, and for each picture the participant was asked to judge how well the sentence matched the picture. The participant was given a scale with four points (from completely acceptable to completely unacceptable, +2, +1, -1, -2; the participant could also choose "Can't decide"), and used the scale to evaluate the relative acceptability of a sentence as a description of the corresponding picture. In one of the crucial conditions, a transitive sentence with *dareka/someone* as the subject,



and *dono N mo/every N* as the object was presented with a picture that describes a distributive event that only matches the inverse scope interpretation of the sentence. For example, the following Japanese/English sentence was presented with a picture in which there are three children, and a different adult is scolding each of the three children:

- (29) a. Dareka-ga dono kodomo mo sikatta  
 someone-NOM every child scolded  
 b. Someone scolded every child

If the participant judged the sentence to be an acceptable description of the situation in the picture, then that response was interpreted as reflecting the availability of the inverse scope interpretation.

The table below summarizes the results of Marsden (2004), focusing on Japanese/English native data of inverse scope readings of sentences like (29). In the table, the “Accept” row has the percentages and numbers of the participants who selected ratings of +1 or +2 on at least four of the five test tokens. Similarly, “Reject” is the participants who selected ratings of -1 or -2 on at least four of the five test tokens. “Inconsistent” is those who do not fall in either category.

(30)

|                      | Japanese (n=20) | English (n=24) |
|----------------------|-----------------|----------------|
| Accept (% (n))       | 5% (1)          | 54.2% (13)     |
| Reject (% (n))       | 80% (16)        | 12.5% (3)      |
| Inconsistent (% (n)) | 15% (3)         | 33.3% (8)      |

The results are for the most part consistent with the claims in the theoretical literature. Japanese native speakers rejected the inverse scope interpretations quite consistently,

and the acceptance rate shows a contrast with that of English native speakers. However, the native English data involve a degree of inconsistency. Theoretically, the crucial test sentences are scopally ambiguous and therefore English speakers should consistently accept the inverse scope interpretations. The actual acceptance rate for inverse scope was, however, not quite as high. This lack of consistent acceptance of inverse scope resembles the results in other psycholinguistic studies on scope interpretations (e.g., Kurtzman and MacDonald 1993; also see Frazier 2000; Anderson 2005 for reading time experiments), and those studies conclude that inverse scope interpretations are generally dispreferred and require more processing resources. Marsden also argues that the lack of consistent acceptance of inverse scope in her experiment reflects the processing costs associated with the computation of inverse scope interpretations.

Now, suppose that Japanese children share whatever property of the processing system gives rise to the general dispreference for inverse scope interpretations with English adults, and therefore do not prefer inverse scope interpretations. Given the results of other studies, it is expected that such children would not consistently accept the inverse scope interpretation of sentences like (28) in judgment experiments, even if their grammar generates representations for inverse scope. In other words, even if Japanese children lack the knowledge of scope rigidity in Japanese, children's actual performance may not straightforwardly reflect their grammar, and we may obtain inconsistent acceptances of inverse scope from Japanese children. In such a case, a control experiment with English-speaking adults and comparison of the data would be quite useful. If the response patterns of English-speaking adults and Japanese children

are significantly similar, then we would be able to argue that they share the same grammatical basis for inverse scope, and consequently, conclude that Japanese children allow CSS in the context where Japanese adults do not allow inverse scope interpretations.

#### 2.4.2 Sano (2004)

Sano (2004) investigated Japanese children's scope interpretations in canonical and scrambled word order sentences. Test sentences like those in (31) were used in his TVJT experiment.

- (31) a. Dareka-ga dono neko mo tukamaeta  
          someone-NOM every cat caught  
          “Someone caught every cat”
- b. [Dono neko mo]<sub>i</sub> dareka-ga *t<sub>i</sub>* tukamaeta  
          every cat                    someone-NOM caught  
          “Every cat, someone caught”

The sentences were presented to 20 Japanese-speaking children (aged 4;1-6;5) with two types of scenarios: one scenario made the test sentence true under the surface  $\exists \gg \forall$  interpretation (i.e., a specific individual caught all the cats), and the other scenario made the test sentence true under the inverse  $\forall \gg \exists$  interpretation (each of the cats was caught by a different individual). Under adults' readings, the canonical order sentence lacks the inverse scope interpretation, and therefore is false in the  $\forall \gg \exists$  scenario; in contrast, the scrambled version has the  $\forall \gg \exists$  interpretation, and is true under the same scenario. With the surface  $\exists \gg \forall$  scenario, children consistently accepted the canonical order sentence (31)a 90% of the time. With the inverse  $\forall \gg \exists$

scenario, however, children's performance was rather more complex. First, 14 of 20 children incorrectly accepted the canonical order test sentence in the inverse  $\forall \gg \exists$  scenario, i.e., they showed no sensitivity to the adult restriction on inverse scope (an adult control group rejected the test sentence in the scenario 80% of the time). Furthermore, even among the 6 children who correctly rejected the test sentence in the inverse  $\forall \gg \exists$  scenario, 5 did not accept the scrambled version of the test sentence with that scenario. Only one child behaved like adults in Sano's experiment.

Although Sano's study provides an interesting initial set of data, there are several reasons why follow-up research is called for. First, little attention was paid to the felicity conditions for using indefinite existential QPs in Sano's experimental context. Sano's story involves four characters: three children whose names are known to the child, and one "nameless" boy who turns his back to the child. In the  $\exists \gg \forall$  scenario, this nameless boy ends up catching all the cats. Under the wide scope interpretation of *dareka*, the indefinite pronoun in the test sentences should thus be interpreted as referring to this "nameless" boy. However, this use of the indefinite creates awkwardness, and it would be more natural to say something like "this boy" pointing to the nameless boy, or simply say "the nameless boy". This is because in the experimental scenario the speaker (i.e., the puppet) can be more specific rather than using an indefinite, because the specific identity of the person that caught every cat is known to the speaker. This pragmatically infelicitous use of the indefinite pronoun might have confused children, forcing them to resort to random guessing without actually judging the truth of the test sentences. Given that several experimental studies have observed that failure to satisfy felicity conditions in fact greatly affects

children's performance in TVJT (e.g., Crain et al. 1996; Gualmini 2003), it would be useful to test children in an experiment with improved pragmatics. Second, Sano's dataset was relatively small, with only one trial per condition: that is, each child was given only one chance to reject the inverse scope interpretation of (31)a. Thus, it is important to expand the study, in order to see how robust and how consistent Japanese children's (in)sensitivity to the scope restriction in Japanese is. Third, the scrambled sentences like (31)b involve several confounding factors. The inverse scope interpretation ( $\exists \gg \forall$ ) entails the surface scope interpretation ( $\forall \gg \exists$ ), and therefore, it is not clear whether one can logically determine if the inverse scope interpretation is possible with the sentence. Furthermore, even if we decide to ignore the entailment problem, the fact that the hierarchically lower subject is an indefinite (i.e., *dareka*) makes the nature of the "inverse scope interpretation" obscure. If one assigns a "referential" interpretation in the sense of Fodor and Sag (1982) to the indefinite, the same truth values obtain, but the interpretation is no longer "inverse scope" in the proper sense of the term. In fact, the referential interpretation seems to be the intended interpretation in Sano's scenarios: the indefinite pronoun refers to the nameless boy. Thus, sentences like (31)b do not provide an ideal test case for children's scope interpretations, and some different combination of quantifiers is needed to investigate children's scope interpretations in scrambled sentences.

Since the issue on children's scope interpretations with scrambled sentences will be independently addressed in our second set of experiments that is reviewed in section 2.5, I decided to exclude sentences with the scrambled word order from the set of test sentences in the current experiment. The second issue can also be

straightforwardly addressed by simply increasing the number of crucial test trials. However, the first issue about the felicity condition associated with uses of indefinites requires some serious elaboration of the experimental design. In the next section I discuss experimental contexts that can remove the possible interfering factor in Sano's experiment.

### 2.4.3 *Felicitous uses of indefinites*

Our challenge here is to create a context in which test sentences with the indefinite pronoun *dareka/someone* are used felicitously. In this connection it is important to observe that the use of Japanese indefinite pronouns is a little more restricted than their English counterparts. The point was discussed in 2.2.2, and I repeat the crucial part of the relevant empirical data. English indefinite pronouns like *someone* can be used even in a context where the speaker knows the specific identity of the “referent” of the indefinite. The example in (32) illustrates the point:

(32) I wanted to introduce *someone* to you. Here, this is Takuya Goro.

In this example, *someone* was used felicitously even though the speaker obviously knows who s/he is. In contrast to this, the Japanese counterpart of *someone*, *dareka*, is excluded in this context:

(33) #Kimi-ni dareka-wo shoukaishi-you. Goro Takuya-san desu.  
you-dat someone-ACC introduce-mood. Goro Takuya-Mr. cop

(34) A: Gogo-wa isogashii-desu-ka?  
afternoon-TOP busy-cop-Q  
“Are you busy this afternoon?”

B: #Hai. Dareka-to yakusoku-ga arimasu.  
Yes someone-with appointment-NOM exist

“Yes, I have an appointment with someone”

Thus, Japanese indefinite pronouns strongly imply the speaker’s uncertainty, and can only be used felicitously in contexts where the speaker is unsure of the identity of the individual that the indefinite refers to. Accordingly, to meet the felicity condition, the test sentences with *dareka* must be presented in a context where the speaker (in a TVJT, a puppet) is unsure of the identity of the referent.

In collaborative work with Sachie Akiba, we constructed an experimental context to satisfy the felicity conditions for Japanese indefinite pronouns (Goro and Akiba 2004a/b). Those studies primarily concern Japanese children’s interpretation of disjunction in negative sentences, and will be extensively discussed in Chapter 4. In one of these experiments, we investigated the scope interaction between object indefinite QPs and sentential negation. We sought to determine whether Japanese children allow the wide scope interpretation of the indefinite pronoun *nanika* with sentences like (35):

- (35) Butasan-wa nanika tabe-nakatta  
pig-TOP something eat-NEG  
“The pig didn’t eat something”

It has been observed that English-speaking children often fail to assign the wide scope interpretation to the object indefinite in English counterparts for (35) if the sentence is presented in a pragmatically infelicitous way (e.g., Gualmini, 2003). To create a context in which indefinite pronouns are used felicitously, we divided the experimental context into two phases. The first phase was a partial “story”. One experimenter acted out this part of the story using paper-crafted props. The second

phase was the Truth Value Judgment part. Here, a puppet, Kermit the Frog, was manipulated by a second experimenter. The puppet uttered the target sentences.

The central theme of the stories was an eating-contest. There were twelve different animals, who were each invited to eat the following foods: an eggplant, a carrot, and a green pepper. The child was first told that not all of the animals like vegetables (just like many children). Then the rules of the contest were introduced. First, if an animal eats all of the vegetables, then it receives a shining gold medal. Second, if an animal eats some of the vegetables but not all of them, then it receives a blue medal. Finally, if an animal does not eat any vegetables, then it gets a black cross. After explaining the rules, the story begins. One of the experimenters acts out the eating trials for each animal. Among the twelve animals, four got a gold medal; four got a blue medal; and four got a black cross. The story phase continued until all twelve animals finished their trials and were presented with their rewards.

After the story phase was finished, attention returned to the first animal, and the puppet started to guess how well each animal did in the game. First, the puppet said that he didn't remember exactly what each animal had eaten, then he started to make guesses, based on the color of the prizes the animals had received as awards. In the crucial condition, the puppet uttered a sentence like (35) as a guess about an animal with a blue medal. Recall that the puppet started to make its guesses after the "contest" phase had been completed. It is crucial here that a blue medal was awarded only to those animals who had only eaten some of the vegetables - it did not indicate which vegetable the animals had actually eaten. Given this incomplete information, all that the puppet could reasonably guess was something like "it is not the case that



the animal ate all of the vegetables, there is some vegetable that he didn't eat", which corresponds to the wide scope interpretation of the indefinite *nanika*. At the same time, a blue medal indicates that the animal ate at least some vegetables, and therefore if children assign the narrow scope interpretation to the indefinite pronoun, they should reject the puppet's guess. In this experiment, 30 Japanese children (3;7 - 6;3, Mean: 5;4) accepted the crucial test sentences 88% of the time (adult control: 100% acceptance), allowing an adult-like wide scope interpretation of indefinites relative to negation.

The crucial property of the design is that test sentences are not presented as descriptions of the event that just happened. Rather, they are the puppet's guesses based on incomplete information that leaves room for uncertainty.<sup>14</sup> This creates an appropriate context to use indefinite pronouns in Japanese, and also indefinite pronouns in English. Given the successful results of Goro and Akiba's experiment, I decided to adopt the same two-phase design in our experiment that uses indefinite pronouns.

#### 2.4.4 Experiments: design and participants

The experimental design employs Goro and Akiba's two-phase structure. The first phase was a partial "story", and the second phase was the Truth Value Judgment part.

The crucial test sentences in Japanese and English are repeated here as (36):

- (36) a. *Japanese*  
Dareka-ga dono tabemono mo tabeta  
someone-NOM every food ate

---

<sup>14</sup> See Jing (2006) for a modified and improved version of this experimental paradigm.

“Someone ate every food”

- b. *English*  
Someone ate every food

The central theme of the stories was an “eating-game”. There were twelve groups of animals; each consists of 3 animals of the same kind (e.g., 3 pigs, 3 raccoons, 3 elephants...). Each of those groups was invited to eat three pieces of food (e.g., a cream puff, banana, and a pepper). First, the child was told that there were two important rules in the game. The first rule is that all foods must be eaten. The second rule is that each one of the members of a team must get to eat something. Thus, if each animal in a group is generous and shares the snacks with his friends, making sure that every one of them gets to eat something, then the group "wins" the game and receives a shining gold medal as a prize. However, if one of the animals in a group is greedy and eats all of the foods all by himself, then the group receives a black cross (a symbol of failure that Japanese children are familiar with). Also, if a group refuses to eat one of the foods (e.g., a pepper) because they don't like it, the group receives a black cross. In the experiment with English-speaking children, the rewards for success and failure were replaced by a happy face mark and a sad face mark, respectively.

Among the twelve groups, four appropriately observed the rules and got a gold medal. This pattern matches the inverse scope interpretation of the sentences in (36): each food got eaten by a different individual. The other four groups had a greedy member who ate everything and got a cross. This pattern models the surface scope interpretation of the test sentences: there is a specific individual who ate everything.

Finally, each of the remaining four groups ate two of the foods but did not finish the last one, and get a cross. This pattern was included in the paradigm to illuminate the importance of eating up all the foods. The three patterns of outcome are schematically represented in (37):

- (37) a. *Success: a gold medal*  
 Animal<sub>1</sub>    Animal<sub>2</sub>    Animal<sub>3</sub>  
 ↓            ↓            ↓  
 Food<sub>1</sub>    Food<sub>2</sub>    Food<sub>3</sub>  
 (matches the  $\forall >> \exists$  interpretation)
- b. *Failure type I: a black cross*  
 Animal<sub>1</sub>    Animal<sub>2</sub>    Animal<sub>3</sub>  
 ↓            ↘            ↘  
 Food<sub>1</sub>    Food<sub>2</sub>    Food<sub>3</sub>  
 (matches the  $\exists >> \forall$  interpretation)
- c. *Failure type II: a black cross*  
 Animal<sub>1</sub>    Animal<sub>2</sub>    Animal<sub>3</sub>  
 ↓            ↓            ⊗  
 Food<sub>1</sub>    Food<sub>2</sub>    Food<sub>3</sub>

To make sure that the participant understood the rules, we asked him/her to present a reward to each animal group, and corrected if s/he made a mistake. The story phase continued until all of the groups finished.

After the story phase we returned to the first group, and the puppet manipulated by one of the experimenters started to guess how well each group did in the game. The puppet said that he didn't remember exactly what each group did, and then started making guesses based on the reward that each group had. The crucial test sentence in (36) was presented as the puppet's guess about a group with a gold medal. Thus, the sentence is true under the inverse scope interpretation, but is false under the surface scope interpretation.

The failure patterns were used for filler trials, and also have the function of properly conditioning the alternative interpretations of the crucial test sentence. First, the existence of failure pattern I makes the surface scope interpretation of the test sentence salient and plausible in the experimental context: there are indeed groups of animals who failed to win the game because one of the members ate all the foods. Making the alternative interpretations equally salient and plausible is crucial in eliciting reliable performance from children (Crain and Thornton 1998; Conroy et al. 2007; see also Elbourne 2005). Second, the existence of failure pattern II serves the function of reducing a bias for the surface scope interpretation. In failure pattern II, the event initially proceeds in accordance with the inverse  $\forall > \exists$  interpretation, but in the end it unfolds in a way that makes the interpretation false (i.e., the first two animals each ate a different food, but the last one didn't eat the remaining food). Without the failure pattern II, the story revolves around the question about *who ate the foods* (i.e., each of the animals vs. a single animal): in both the success pattern and failure pattern I every food got eaten, and therefore the question about *what foods were eaten* is irrelevant to the difference in outcome (i.e., the different rewards). In such a case, since the crucial information for the question about who ate the foods is provided by the subject of the test sentence, the subject is likely to receive a "focused" interpretation, which may bias the participant towards the surface scope interpretation (e.g., "It was some, not all the animals, who ate every food!"). To circumvent this potential interfering factor, we made the question about what were eaten (i.e., all of the foods vs. only some of them) relevant in the experimental context by adding failure pattern II. Given the added contrast between the success

pattern and failure pattern II, both the subject and the object of the test sentence now provide the crucial information for the underlying questions in the experimental context. With this manipulation, the chance of the subject being interpreted as a focus is expected to be reduced, and consequently, the bias towards the surface scope interpretation is expected to be reduced.

The two-phase structure of this experimental design motivates the use of the indefinite pronoun *dareka* in the test sentence. By observing that a group of animals has a black cross with no foods left, for example, the puppet (and the child) can successfully conclude that there was a greedy individual in the group, but due to the two-phase structure of the experiment, he cannot remember who the greedy one was. Thus, he has no choice but to use an indefinite pronoun (rather than, for example, a demonstrative "this animal" with pointing) to refer to the greedy animal who ate everything.

There are four crucial trials (i.e., (36) is presented with the success pattern) interspersed with eight fillers. Four different groups participated in the main experiment: (i) Japanese-speaking children, (ii) Japanese-speaking adults, (iii) English-speaking children, and (iv) English-speaking adults. The first group consisted of 16 Japanese children (Age 4;10-5;9, Mean: 5;4) who were recruited at Miyagi Gakuin Kindergarden, Sendai, and were tested individually. The second group consisted of 16 adult native speakers of Japanese who were either graduate or undergraduate students of Tohoku University, Sendai. The group watched a video-taped version of the TVJT experiment, and was tested in small groups (1 to 4 participants at a time). The third group consisted of 16 English-speaking children

(Age 5;0-5;10, Mean: 5;4) who were recruited at the Center for Young Children at University of Maryland at College Park. Those children were tested individually. Finally, the fourth group was a group of 29 English-speaking adults who were undergraduate students at the University of Maryland at College Park. Those adult subjects were also tested individually by a native English speaker. I thank Annie Gagliardi for running those experiments in English, and for her various suggestions and efforts to make the English experiments better.<sup>15</sup> In addition to those main groups, another group of 16 Japanese-speaking children (Age: 4;9-5;9, Mean: 5;3) participated in a control experiment. In the control experiment, the test sentence in (36) was presented as a puppet's guess about failure pattern I: that is, the sentence was true under the surface scope interpretation. The purpose of conducting this control was to make sure that children have no problem with the surface scope interpretation. In all the experiments, participants who made more than two errors in filler trials were excluded from final analysis.

#### 2.4.5 Results

Let us first briefly report the results from the control group. In the control experiment, children consistently accepted the crucial test sentences (acceptance rate=90.6%, 58/64): that is, they accepted the surface scope interpretation of the test

---

<sup>15</sup> As a part of our effort to elicit inverse scope interpretations from English-speaking adults, we tried several slightly different ways of presenting the experimental story. Thus, the English adult participants actually consist of three groups. For the first group (N=10), the puppet watched the eating-game trials; for the second group (N=9, one participant was excluded because the participant answered "you (the puppet) are partially right" in all of the four crucial trials), the puppet fell asleep while the animal groups was on their trials; for the third group (N=10), the puppet went over the rules before he started making guesses using passive "if every food was eaten by a different person...". The three groups showed no difference in their acceptance rates of the inverse scope interpretation of the test sentences (group 1= 37.5%, group 2 = 31.3%, group 3 = 32.5%). I thus choose to combine the data from all the groups. For Japanese participants and English-speaking children, we uniformly used the protocol used for the first group (i.e., the puppet watched the eating-game trials).

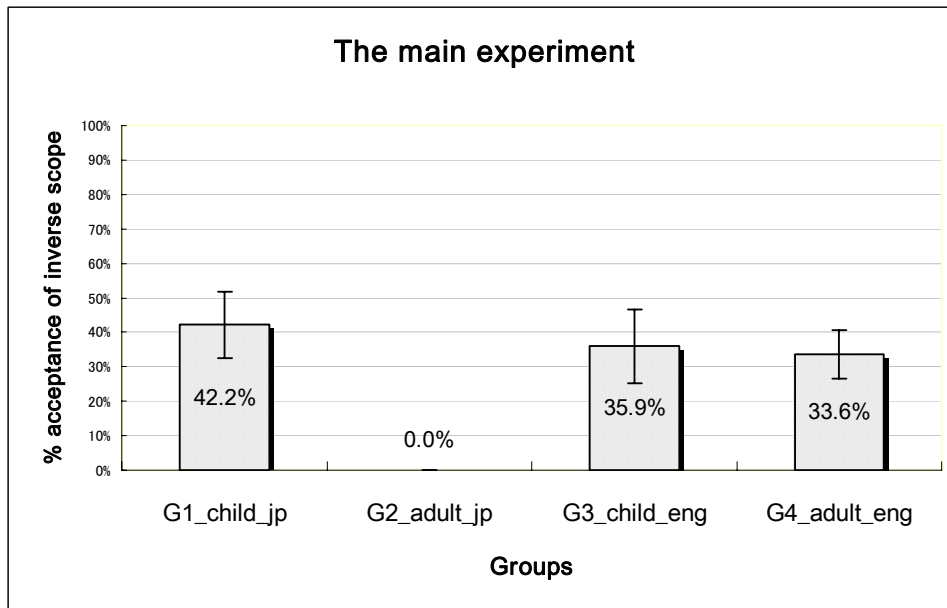
sentence. Combined with Sano's (2003) results, the result leads us to conclude that Japanese children do not have a problem with the surface scope interpretation of sentences like (36)a. This conclusion is reminiscent of that of other previous studies on young children's scope interpretations (e.g., Musolino et al 2000; Lidz and Musolino 2002). Generally speaking, young children do not show difficulties with surface scope interpretations (but see Krämer 2000 for a possible exception to this generalization).

The results from the main experiments are analyzed in terms of the acceptance rate of the inverse scope reading of the crucial test sentences (i.e., the rate of "yes" response to the test sentence presented as a puppet's guess about the success pattern in (37)). These percentages are presented in the table and the figure below.

(38)

|                              | Acceptance %/n of the inverse scope |
|------------------------------|-------------------------------------|
| G1 (Japanese children, N=16) | 42.2% (27/64)                       |
| G2 (Japanese adults, N=16)   | 0% (0/64)                           |
| G3 (English children, N=16)  | 35.9% (23/64)                       |
| G4 (English adults, N=29)    | 33.6% (39/116)                      |

(39) Figure 1: Percentages of inverse scope acceptances in the main experiments



A 2 x 2 ANOVA (language x age) revealed a significant main effect of age ( $\pm$ adult) ( $F(1, 73) = 7.2, P < 0.01$ ) and a significant interaction of language and age ( $F(1, 73) = 5.8, P = 0.018$ ). There was a marginal main effect of language ( $F(1, 73) = 2.7, p = 0.102$ ). Simple main effect tests showed that a simple main effect of language was significant for the adult groups ( $F(1, 73) = 8.2, p < 0.01$ ), and a simple main effect of age was significant for the Japanese groups ( $F(1, 73) = 13.0, p < 0.01$ ).

#### 2.4.6 Discussion

The purpose of the main experiment was to determine whether Japanese and English-speaking children access inverse scope interpretations. To begin, let us consider the adults' behaviors. First, Japanese adults consistently rejected the inverse scope interpretation of the crucial test sentences. This replicates Marsden's (2004) and Sano's (2003) results, and supports the empirical claim that has been made in the



theoretical literature. English adults, in contrast, accepted the inverse scope interpretation significantly more often than Japanese adults, but the acceptance pattern is subject to inconsistency, and the overall acceptance rate (33.6%) resembles the data observed in Kurtzman and MacDonald (1993). I assume, following Marsden (2004) and others, that this inconsistency reflects a general dispreference for inverse scope interpretations. Also, a design feature of the TVJT may have further enhanced the dispreference. Generally, inverse scope interpretations become easier to access when the corresponding surface scope readings result in contextually implausible interpretations.<sup>16</sup> However, this kind of facilitation of inverse scope interpretations cannot be implemented in a TVJT. As we discussed in the previous subsection, the alternative interpretations of the test sentence (in our case, the surface and inverse scope interpretation) must be equally plausible and salient in experimental stories for TVJT. This design feature is necessary to reduce the possibility that the participant rejects one of the interpretations simply because that interpretation is less plausible/salient, rather than because the interpretation is blocked by the participant's grammar. In our experimental story, the fact that some animal groups lost the game because one greedy member ate all the foods (i.e., failure pattern I) made the surface scope interpretation plausible and salient in the context. Given that the surface scope was easily accessible in the experiment, the participants may have got stuck with that interpretation without considering the other possible interpretation.

I now turn to the results from children. Here, children in both languages showed similar behaviors, and their acceptance rates resemble that of English adults. The

---

<sup>16</sup> This point will be closely discussed in section 3.2.3.

parallelism between children and English adults can be made clear by comparing the distribution of individual acceptance rates. There were four crucial test trials in the main experiments, thus the possible probabilities of accepting the inverse scope interpretation for a participant were 0%, 25%, 50%, 75% or 100%. The following table plots the distribution of the individual participants in each group across the possible probabilities of accepting the inverse scope interpretation.

(40)

| <i>% acceptance of inverse scope</i> | <b>0%</b> | <b>25%</b> | <b>50%</b> | <b>75%</b> | <b>100%</b> | <b>Total N</b> |
|--------------------------------------|-----------|------------|------------|------------|-------------|----------------|
| <b>Japanese children (n)</b>         | 5         | 3          | 3          | 2          | 3           | <b>16</b>      |
| <b>English children (n)</b>          | 7         | 4          | 0          | 1          | 4           | <b>16</b>      |
| <b>English adults (n)</b>            | <b>14</b> | <b>3</b>   | <b>3</b>   | <b>6</b>   | <b>3</b>    | <b>29</b>      |

A Chi-square analysis comparing each of the children's distributions with English adults' distribution found no significant differences (Japanese children vs. English adults:  $\chi^2 = 2.74$ ,  $p = 0.603$ ; English children vs. English adults:  $\chi^2 = 5.93$ ,  $p = 0.204$ ). Thus, it is unlikely that different mechanisms (e.g., random guessing for children, CSS for adults) underlie the children's behavior and the adults' behavior. Given these results, I conclude that both Japanese and English children have access to CSS, and also have adultlike bias towards the surface scope interpretation.

The main finding of the experiments is that Japanese children did not show sensitivity to the restriction on CSS in the language, and allowed the inverse scope interpretation as often as English children/adults did. The fact Japanese adults never accepted the inverse scope interpretation of the relevant test sentences suggests that there is indeed a difference between adult grammars of Japanese and English, which presumably are reflected on input data available to children. Given this, the result that

Japanese children's behavior was more similar to English adults behavior than to Japanese adults is unexpected if children learn possible scope interpretations through some conservative learning process. Children overgenerate scope interpretations in the course of development, which in turn demonstrates the need for a non-conservative learning mechanism that allows children to purge the non-adult scope interpretation solely based on positive evidence. Given this, it becomes important to find out if the scope flexibility exhibited by Japanese children is restricted to the particular construction and/or combination of quantifiers, or is more robust. If children show the same kind of overgeneration errors with a different construction and/or combination of quantifiers, then it becomes more likely that the non-adult scope flexibility of children reflects their general assumption about possible scope interpretations. In order to examine the robustness of children's scope flexibility, I turn to sentences that involve scrambling.

## **2.5 Experiments: Inverse scope in scrambled order sentences**

### *2.5.1 Scrambling and scope interpretations*

It has often been pointed out that scrambled sentences in Japanese show scope ambiguity that their canonical order counterparts lack. For example, Hoji (1985) provides the following pair of canonical and scrambled order sentences, pointing out that only the scrambled version shows ambiguity:

- (41) a. Dareka-ga daremo-o sementa  
          someone-NOM everyone-ACC criticized  
          “someone criticized everyone” (unambiguous)
- b. Daremo-o<sub>i</sub> dareka-ga *t<sub>i</sub>* semeta

everyone-ACC someone-NOM criticized  
 Lit. “Everyone, someone criticized” (ambiguous)

However, since the “surface scope”  $\forall \gg \exists$  interpretation of (41)b is entailed by the inverse scope the inverse scope  $\exists \gg \forall$  interpretation, the contrast in (41) does not provide conclusive evidence for the availability of the inverse scope interpretation in the scrambled version. The sentence in (41)a should thus be compared with (42), which in fact shows scope ambiguity:

- (42) Dareka- $o_i$  daremo-ga  $t_i$  semeta  
 someone-ACC everyone-NOM criticized  
 Lit. “Someone, everyone criticized”  
 $\exists \gg \forall / \forall \gg \exists$

The sentence can be truthfully uttered in a situation where everyone criticized a different individual. Since the surface scope  $\exists \gg \forall$  interpretation should make the sentence false in the situation, this fact shows that the inverse scope interpretation is indeed available with the scrambled sentence.

However, not all scrambled sentences show scope ambiguity. For example, in (43), both the canonical order sentence and the scrambled order sentence only allow the scope interpretation that matches surface word order:

- (43) a. Taroo-dake-ga furansugo mo supeingo mo hanasu  
 Taroo-only-NOM both French and Spanish speak  
 “Only Taroo speaks both French and Spanish”  
 ONLY  $\gg$  BOTH / \*BOTH  $\gg$  ONLY
- b. [Furansugo mo supeingo mo] $_i$  Taroo-dake-ga  $t_i$  hanasu  
 Lit. “Both French and Spanish, only Taroo speaks”  
 \*ONLY  $\gg$  BOTH / BOTH  $\gg$  ONLY

The interpretation of the canonical order sentence (43)a can be paraphrased as “Taroo is the only one who speaks both French and Spanish”. Thus, the sentence is true in the situation illustrated in (44), where Hanako speaks French but not Spanish, and Jiro speaks Spanish but not French:

|      |         |       |        |      |
|------|---------|-------|--------|------|
| (44) |         | Taroo | Hanako | Jiro |
|      | French  | √     | √      | *    |
|      | Spanish | √     | *      | √    |

In contrast, the scrambled version (43)b can only mean that “Only Taroo speaks French and only Taroo speaks Spanish”, and hence, is false under the situation in (44). This shows that the scrambled conjunction cannot be interpreted under the scope of the subject *dake* “only”. The nature of this scope constraint will be discussed closely in section 3.6.

Our second set of experiments targets this construction. Specifically, we are interested in whether or not Japanese children permit the inverse scope interpretation of the sentence-initial QNP in sentences like (43)b. In adult Japanese, the sentence only allows the surface scope interpretation: the object QNP in the sentence-initial position must be interpreted with its scope in the surface position. Since only the inverse scope interpretation of (43)b makes the sentence true in the situation in (44), the availability of the inverse scope interpretation should determine the participant’s truth value judgment of the sentence presented in the situation: the participant may accept the sentence only if s/he accesses the inverse scope interpretation. Since adult Japanese do not allow inverse scope interpretations with sentences like (43)b, a conservative learning approach would predict that children also avoid assigning inverse scope interpretations to sentences like (43)b. However, within canonical word

order sentences, Japanese children allow inverse scope interpretations that Japanese adults do not allow, contrary to the prediction that a conservative learning approach would make. Based on the results, the current experiment seeks to determine whether this overgeneration error is an isolated case that occurs in a specific construction or is a part of more general phenomenon.

Such an experiment would require the following premises: (i) the target children have acquired the grammar of scrambling, and (ii) the target children are able to compute the scope interaction between *dake* "only" and *A mo B mo* "both A and B". We begin with reviewing some previous studies that provide empirical support for those premises.

### 2.5.2 *Children's grammar of scrambling*

Scrambling has often been analyzed as a movement phenomenon: scrambled word orders are derived from canonical order sentences by applying optional movement to a phrase/phrases. Under movement approaches, scope ambiguity with cases like (42) is taken to be evidence for the availability of "reconstruction" of the scrambled phrase to the lower base position (e.g., Saito 1985). The crucial part of the analysis is the assumption that there is an abstract and inaudible link between the scrambled phrase and the lower "base" position of the phrase, and the inverse scope interpretation is obtained via the abstract link. It is thus important for our purpose to make sure that children's representations of scrambled sentences involve the same kind of abstract link. Otsu (1994) showed that young Japanese children (age 3-4) were able to assign adultlike thematic interpretations for scrambled arguments. Under the assumption that thematic roles are assigned on the basis of syntactic sisterhood,

Otsu's results can be interpreted as providing support for the argument that scrambled phrases in children's representations are linked to their base positions (e.g., a scrambled object is linked to the sister position of V, etc.). Sano's (2003) study on children's interpretation of floating quantifiers added further support to this argument.

It is well known that Japanese quantifiers can be "floated" from their host NP (e.g., Miyagawa 1989). In simple transitive sentences, both the nominative-marked subject and the accusative-marked object can launch a floating quantifier (FQ):

(45) *FQ from the subject*

- a. [*Futari-no* gakusei-ga] kyoujyu-o hihansita  
two-cl-GEN student-NOM professor-ACC criticized
- b. [Gakusei-ga] *hutari* kyoujyu-o hihansita  
student-NOM two professor-ACC criticized  
"Two students criticized a professor"

(46) *FQ from the object*

- a. Gakusei-ga [*hutari-no* kyoujyu-o] hihansita  
student-NOM two-GEN professor-ACC criticized
- b. Gakusei-ga [kyoujyu-o] *hutari* hihansita  
"A student criticized two professors"

In (45)a and (46)a, the quantifier *hutari* is marked by genitive case and appears inside a NP.<sup>17</sup> In contrast, *hutari* follows its host NP in (45)b and (46)b, without being

---

<sup>17</sup> A prenominal quantifier may lack a genitive case marker, as in the following sentence:

- (i) Gakusei-ga *hutari* kyoujyu-o hihansita  
student-NOM two professor-ACC criticized  
"A student criticized two professors"

Such a quantifier without a genitive marker is a floated quantifier and is outside of its host NP. Within a NP, the genitive case marker cannot be dropped. These points are illustrated by the following pair of sentences that shows a genitive-less quantifier may not appear in between its host NP and another prenominal modifier:

- (ii) a. \*Gakusei-ga [kono gakkou-no *hutari* kyoujyu]-o hihansita  
student-NOM this school-GEN two professor-ACC criticized
- b. <sup>OK</sup>Gakusei-ga [kono gakkou-no *hutari-no* kyoujyu]-o hihansita

followed by a case marker. The relation between a FQ and its host NP is subject to some kind of locality constraint. For example, in canonical word order sentences, a FQ that follows the object cannot be linked to the subject. Thus (47) is unacceptable, because the FQ *hutari* cannot be linked to the subject, and the object is a proper name:

- (47) \*Gakusei-ga Taroo-o *hutari* hihansita  
student-NOM Taroo-ACC two criticized  
"A student criticized two Taroo"

Interestingly, the locality effect disappears in scrambled order sentences. That is, a FQ can be linked to the sentence-initial scrambled object, even if the subject NP intervenes between them:

- (48) Gakusei-o Taroo-ga *hutari* hihansita  
student-ACC Taroo-NOM two criticized  
"Two students, Taroo criticized"

This contrast between canonical and scrambled word order has been taken to be an argument for the claim that the OSV word order is derived from underlying SOV order via movement (e.g., Kuroda 1980; Saito 1985; Miyagawa 1989). Under the overt movement theory of scrambling, the object and the FQ in (48) are adjacent to each other in the underlying SOV structure. The movement of the object leaves a trace/copy, and the adjacency is preserved between the trace/copy and the FQ. Recent base-generation theories of scrambling (e.g., Bošković & Takahashi 2001) can easily be reconciled with the contrast: the sentence-initial object is lowered to a position in

---

student-NOM this school-GEN two-GEN professor-ACC criticized  
"A student criticized two professors in this school"



which the object is adjacent to the FQ. In any case, some kind of abstract link between the scrambled object and its "base" position is necessary. Otherwise, cases like (48) cannot be distinguished from SOV order sentences like (47).

Sano (2007) sought to determine whether children are sensitive to the contrast between SOV and OSV sentences with respect to the interpretation of FQ. In Sano's TVJT experiment, the OSV-order sentence in (49) was presented in a situation where a pig is brushing two bears:

- (49) Sono kuma-o buta-ga *nihiki*<sup>18</sup> kosutteiru yo  
that bear-ACC pig-NOM two brush-ing  
can mean: "Two of the bears, a pig is brushing"

The FQ *nihiki* can be linked to the sentence-initial object, and therefore the sentence can have the interpretation given in the translation. As a control condition, Sano used the SOV-order sentence in (50).

- (50) Sono kuma-ga buta-o *nihiki* kosutteiru yo  
that bear-NOM pig-ACC two brush-ing  
cannot mean: "Two of the bears are brushing a pig"

In this sentence the FQ cannot be linked to the non-adjacent subject, and consequently it must be interpreted as being linked to the adjacent object – that is, there have to be two pigs being brushed in order for the sentence to be true. Sano presented the sentence in a situation where two of the bears are brushing only one pig. If children have adultlike abstract representations for scrambled sentences, then they should accept sentence (49) in a situation that involves two bears and one pig. At the

---

<sup>18</sup> The numeral looks different from the one in previous examples, because a different classifier is required for host nouns that refer to humans and for host nouns that refer to animals.

same time, children should reject sentence (50) when two bears and only one pig are involved in the event described by the sentence. That is precisely what Sano found: 25 Japanese children (age 4-5) consistently accepted the scrambled sentence in the crucial test condition (86% of the time, 43/50), and they consistently rejected the canonical order sentence in the control condition (98% of the time, 49/50).

The results of Sano's experiment provide a strong argument for the claim that Japanese children at the age of 4-5 have adultlike abstract representation of scrambled sentences. Specifically, children's representation of scrambled sentences must involve some kind of abstract link between the scrambled phrase and its base position, as schematically shown in (51):

(51) NP-o NP-ga [ $e$ ] FQ V

Presumably, this kind of abstract representational resource is what underlies the inverse scope, “reconstructed” interpretations of scrambled QNPs. Given this presumption, we expect that Japanese children have access to the representational resources that are required to derive inverse scope readings in scrambled sentences. The question about whether or not children overgenerate scope interpretations in scrambled sentences becomes legitimate with this background. The availability of the grammatical resources that generate inverse scope interpretations in scrambled sentences would make children prone to overgeneration of inverse scope interpretations.

### 2.5.3 *The scope interaction between dake and A mo B mo*

In collaboration with Stephen Crain and Utako Minai, we investigated English and Japanese-speaking children's interpretation of sentences that involve *dake/only* and a conjunction. The experiments concerned an independent issue that I will fully discuss in Chapter 4 and 5. Here I will briefly review some relevant data from Japanese children to set up the necessary background for our present experiment. The issue and experimental results will be fully discussed in the later chapters.

The purpose of the experiments was to determine whether or not young children can correctly compute truth conditions associated with sentences containing *dake/only* and a conjunction. (52) is a sample of test sentences that were used in the experiments:

- (52) Pikachu-dake-ga aoi hako mo kuroi hako mo ake-ta  
Pikachu-only-NOM both blue box and black box open-PAST  
“Only Pikachu opened the blue box and the black box”

The truth condition of the sentence consists of two parts. First, it must be the case that Pikachu opened both the blue box and the black box; second, it must be the case that everyone other than Pikachu did not open both of the boxes. Crucially, someone else's opening only one of the boxes does not make the sentence false. We sought to determine whether or not Japanese children can associate the correct truth condition for the test sentence. In our TVJT experiment, children witnessed a (computer generated) ‘PSI power’ demonstration by three Pokemon (Pikachu, Zenigame, and Hitokage), who used their PSI powers to attempt to perform several feats, e.g., open boxes, flip over cars, etc. Each test trials involved two objects that the characters attempted to use PSI on. and there are 3 test conditions:

|      |               |          |           |
|------|---------------|----------|-----------|
| (53) | Condition I   |          |           |
|      |               | Blue box | Black box |
|      | Pikachu       | √        | √         |
|      | Zenigame      | *        | *         |
|      | Hitokage      | √        | *         |
| (54) | Condition II  |          |           |
|      |               | Blue box | Black box |
|      | Pikachu       | *        | √         |
|      | Zenigame      | *        | *         |
|      | Hitokage      | √        | *         |
| (55) | Condition III |          |           |
|      |               | Blue box | Black box |
|      | Pikachu       | √        | √         |
|      | Zenigame      | *        | *         |
|      | Hitokage      | √        | √         |

The sentence is true in Condition I because nobody other than Pikachu succeeded in opening both boxes. In contrast the sentence is false in Condition III, because in this case Hitokage also opened both of the boxes. Condition II also makes the sentence false, because in this case Pikachu also failed to open both boxes<sup>19</sup>. Children's behavior in the experiment was fully adultlike: 20 children (Age: 4;1 - 6;2, Mean: 5;4) consistently accepted the test sentence in Condition I (95% of the time, 38/40), while they rejected the test sentence in Conditions II and III just as often. The results were interpreted as evidence that Japanese children can correctly compute the truth conditions that result from scope interaction between *dake* and *A mo B mo*.

Given the successful results of this experiment, I decided to adopt the experimental stories in our current experiment, and combine the stories with the scrambled versions of the test sentences. The choice of the test items should reduce

---

<sup>19</sup> Depending on one's theory of the nature of the semantics of sentences with *dake*, the test sentence under the condition II may not technically be false, but rather a case of presupposition failure. See Horn (1969), Atlas (1993;1996) about the issue.

the possibility that children show poor performance due to some independent difficulty with computing a particular scope relation.

#### *2.5.4 Experiments: design and participants*

The experiment employs a standard TVJT. The theme of the experimental story-line was a PSI-power demonstration, in which three cartoon characters (Pikachu, Doraemon, and Anpan-man) attempted to perform feats using their PSI power. Toy figures of the three characters were manipulated by one experimenter, and he also coordinated a computer-generated animation presentation of feats of PSI-power, which was implemented as the toy figures pronounced their "signature phrases" (e.g., "Pika-pika-pi!" by Pikachu). The subject witnessed the figures uttering their signature phrases as they gestured towards objects displayed on a computer screen. Subsequently, objects were animated by the experimenter (e.g., boxes shook and opened, cars flipped over, a frog turned into a princess, etc.). Each of the characters was awarded with prizes each time he succeeded in performing one of the feats. For example, a small red car was awarded if a character successfully flipped over the red car. These prizes served as reminders for children whose task was to judge the truth or falsity of test sentences. The test sentences were produced by a puppet, Kermit the Frog (manipulated by a second experimenter) who watched the magic competition along with the child subject. There were ten trials, presented to children in a fixed order. Four were test trials and six were filler trials. In one of the test trials, the three characters attempt to open two boxes, the blue box and the black box. In the story, Pikachu was the first one to attempt to perform the feat of opening those boxes. He first opened the blue box successfully, and then opened the black box as well. Next,

Doraemon began his attempt, but he failed to open the blue box. He moved on to the black box, but he failed again. Anpan-man was the last one, and he failed to open the blue box. Nevertheless he did not give up, and managed to open the black box. The final outcome of the story is illustrated in (56):

|      |           |          |           |
|------|-----------|----------|-----------|
| (56) |           | blue box | black box |
|      | Pikachu   | √        | √         |
|      | Doraemon  | *        | *         |
|      | Anpan-man | *        | √         |

At the end of the story, the experimenter manipulating toys and computer asked Kermit the Frog what happened in the story in the following way:

- (57) Ima-no ohanasi-wa, hako-o chounouryoku-de akeru ohanasi datta yo ne.  
 now-GEN story-TOP box-ACC PSI power-inst open story was mood  
 "That was a story about opening boxes using PSI power, right?"  
 Nani-ga okotta ka na?  
 what-NOM happened Q  
 "What happened?"

Responding to the experimenter's question, Kermit stated what he thought happened on the trial, using the test sentences in (58):

- (58) Aoi hako mo Kuroi hako mo Pikachu-dake-ga aketa  
 both blue box and black box Pikachu-only-NOM opened  
 "Both the blue box and the black box, only Pikachu opened"

Note that the lead-in by the experimenter only mentions the boxes, and does not say anything about the agents of opening the boxes. This is because we wanted to control the discourse structure so that the test sentence with scrambling can be used felicitously. Generally speaking, scrambled phrases express old information in the discourse (e.g., Otsu 1994). The lead-in only introduces the boxes into the discourse,

and accordingly the subject of the test sentence expresses new information, while the object corresponds to old information. This feature of the discourse structure motivates the use of scrambled word order in the test sentence.

Under the surface scope interpretation of the test sentence (58), the conjunction operator takes wider scope than *dake*, and the test sentence means that "for both the blue box and black box, only Pikachu opened it". Under this interpretation the sentence is false in the situation in (56), because Anpan-man also opened the black box. In contrast, the inverse "reconstructed" interpretation makes the sentence true in the same situation. The inverse scope interpretation asserts that everyone other than Pikachu didn't open both of the boxes, which is indeed the case in (56). The surface scope interpretation is the only interpretation that is available for adults, and therefore adult speakers should reject the test sentence in the situation. Children should do the same if they obey the same restriction on scope-reconstruction as adults. However if children lack the restriction, then they should accept the test sentence, just as they did in our previous experiment using canonical-order test sentences.

The experimental stories initially proceed in the way that is consistent with the surface scope interpretation of the corresponding test sentence until the last moment (e.g., until Anpan-man opened the black box). Thus, the surface scope interpretation of the test sentence was almost true in the stories. This structure of the experimental stories has the function of making the surface scope interpretation plausible, satisfying the Condition of Plausible Denial (e.g., Crain and Thornton 1998).

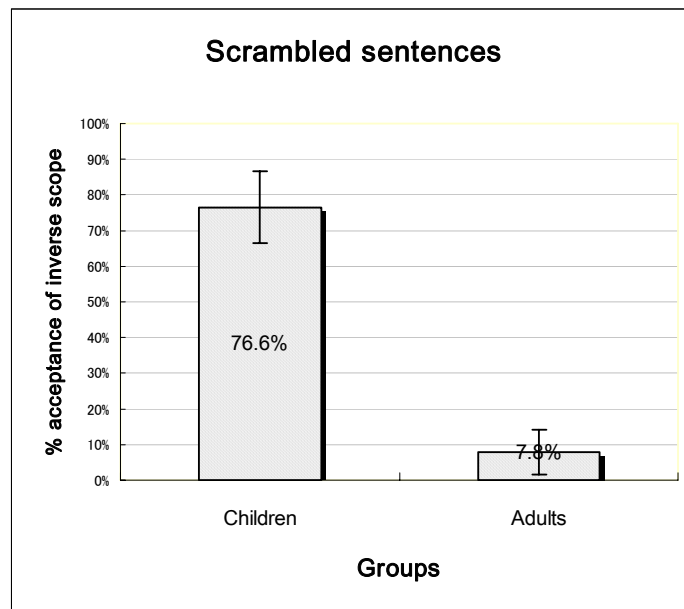
16 Japanese children (Age 4;11-5;10, Mean 5;6) and 16 Japanese adults participated in the experiment. The child participants were recruited at Miyagi Gakuin

Kindergarten and Takamori Meisen Kindergarten in Sendai, and were tested individually. The adult participants are undergraduate and graduate students of Tohoku University. The adult group watched a video-taped version of the TVJT experiment, and was tested in small groups (1 to 4 participants at a time). All participants who made more than two errors in the filler trials were excluded from the final analysis.

### 2.5.5 Results

The results from the experiment are analyzed in terms of the acceptance rate of the crucial test sentences. These percentages are presented in the table and the figure below.

(59) Figure 2: Percentages of inverse scope acceptances with scrambled test sentences



As shown in the figure, the acceptance rates from children and adults showed a sharp contrast. Children accepted the crucial test sentences reliably more often than adults



(Wilcoxon Signed Ranks,  $Z = 3.945$ ,  $p < 0.01$ ). The fact that adults rarely accepted the test sentence (5/64 trials) suggests that the inverse scope/reconstructed interpretations of the test sentences are indeed impossible for adult Japanese speakers. In contrast, children are a lot more lenient about accepting the test sentences in the experiment (accepting them in 49/64 trials), and the distribution of individual response patterns is bimodal. Three children were adultlike in that they consistently rejected the test sentence, and the remaining 13 children consistently accepted the test sentence (94.2% acceptance, 49/52). In order to determine if this high acceptance rate truly reflected children's ability to access the inverse scope interpretation, we decided to run two additional control experiments.

#### 2.5.6 *Control experiments*

First, let us consider the possibility that the children in the experiment had a problem with interpreting the focus operator *dake*. Previous research on the acquisition of the focus operator only in English have often reported that young children frequently assigned non-adult interpretations to sentences that involve only. For example, Crain et al. (1994) observed that children often associate pre-subject only with VP, and interpret, for example, *only John speaks Spanish* as meaning that John only speaks Spanish. On the other hand, Paterson et al. (2003) argued that children sometimes ignored only in a given test sentence. Under the "VP-oriented interpretation", our test sentences would mean something like "Pikachu only opened both the blue box and the black box". If children were ignoring *dake*, then the test sentence in (58) should have been interpreted as meaning "Pikachu opened both the blue box and the black box". Both of the non-adult interpretations make the test

sentence true in the test condition illustrated in (56). In order to determine whether the high acceptance of the test sentences in the original experiment was due to those non-adult interpretations of the focus operator, we conducted a control experiment using a slightly different experimental condition, which is illustrated in (60):

|      |           |          |           |
|------|-----------|----------|-----------|
| (60) |           | blue box | black box |
|      | Pikachu   | √        | √         |
|      | Doraemon  | *        | *         |
|      | Anpan-man | √        | √         |

In this situation, Pikachu and Anpan-man opened both the blue box and the black box. Therefore, the test sentence in (58) is false under the inverse scope/reconstructed interpretation: the interpretation asserts that Pikachu was the only individual who opened both of the boxes, but in reality Anpan-man also opened both of the boxes. In contrast, the possible non-adult interpretations of the focus particle *dake* continue to make the sentence true. Under those interpretations, what Anpan-man did does not affect the truth value of the test sentence. Thus, if the high acceptance rate of the test sentence in the original experiment was due to non-adult interpretations of *dake*, then children should continue to accept the test sentence in the control experiment as often as they did in the original experiment.

The control experiment used exactly the same materials as the original experiment, except for the changes in the crucial conditions as illustrated in (60). 12 Japanese children (Age 5;1-5;10, Mean 5;4) participated in the control experiment. Those children were recruited in Miyagi Gakuin Kindergarten and Takamori Meisen Kindergarten, Sendai. They were tested individually.

The results were quite straightforward: children never accepted the test sentences in the control experiment (0/48). The results clearly show that the non-adult behavior in the original experiment was not caused by children's problems with *dake*.

Another possible source of the non-adult behavior in the original experiment is adherence to a non-adult strategy in interpreting the test sentences. Recall that in the crucial conditions of the original experiment, there were always two objects on which the main characters attempted to perform some feat. Given this structure of the experimental stories, children might have considered the goal of the "PSI-demonstration" to be to successfully perform a feat with both of the objects. In the situation in (56), Pikachu was the only one who achieved such a goal. If children were using a strategy of making judgments on the basis of who achieved the goal, the strategy should have made them accept the test sentence in the original experiment, but reject the same sentence in the first control experiment. For those children who were resorting to the strategy, the test sentence should have meant something like "only Pikachu succeeded / won" (where success/winning means opening both of the boxes, etc.), and the conjunction phrase was effectively ignored.

In order to test this possibility, the second control experiment modified the leads and the test sentences, replacing the object conjunction phrase with a null argument:

- (61) Ima-no ohanasi-wa, hako-o chounouryoku-de akeru ohanasi datta yo ne.  
 now-GEN story-TOP box-ACC PSI power-inst open story was mood  
 "That was a story about opening boxes using PSI power, right?"  
 Dare-ga sono hako-o aketa ka na?  
 who-NOM that box-ACC opened Q  
 "Who opened those boxes?"
- (62) Pikachu-dake-ga [*e*] aketa

Pikachu-only-NOM opened  
Lit. "Only Pikachu opened"

If children are using the strategy of making judgment on the basis of who successfully did a feat with both of the objects, the modification on the test sentence should not affect their behavior. The modification simply took out the object phrase which had already been ignored<sup>20</sup> if children were resorting to the strategy.

The second control experiment used exactly the same materials as the original experiment, except for the changes in the crucial test sentences as illustrated in (61) and (62). 16 Japanese children (Age 5;0-5;11, Mean 5;5) participated in the control experiment. Those children were recruited in Miyagi Gakuin Kindergarten and Takamori Meisen Kindergarten, Sendai. They were tested individually.

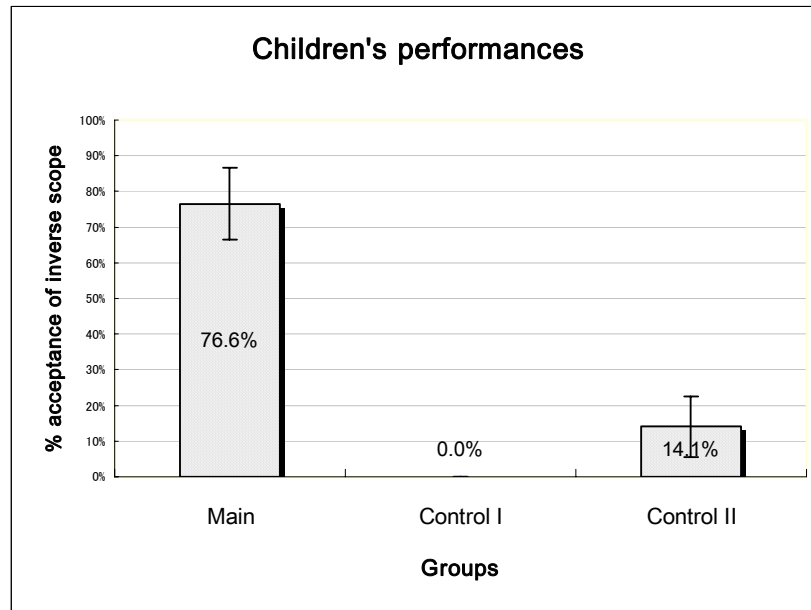
The results showed a clear contrast with the results from the original experiment: Children's acceptance rate of the crucial test sentences like (62) were only 14% (9/64). The difference between the original group and the second control group was statistically significant (Wilcoxon Signed Ranks  $Z = 3.541$ ,  $p < 0.01$ ). The contrasting performances of children in the two groups strongly suggest that they were not ignoring the object of the crucial test sentences. The following figure summarizes

---

<sup>20</sup> The exact interpretation of (62) is hard to specify. The antecedent of the null argument in the test sentence is the NP *sono hako* "that box" in the lead-in (61), which is ambiguous between singular and plural interpretations. The lack of a grammatical number system in Japanese makes it hard to control the interpretation of the antecedent NP, and consequently, the interpretation of the null argument in the test sentence. In theory, the sentence should be able to mean "only Pikachu opened the box" or "only Pikachu opened those boxes" but the former interpretation is pragmatically odd, because it is not clear which of the two boxes *the box* refers to. Adult Japanese speakers have a strong intuition that the sentence (62) is false under the situation in (56), suggesting that only those interpretations that make the test sentence false under the situation are available to adult speakers. In any case, this possible ambiguity of the null object should not matter for our current purpose. The control experiment aims to determine whether children were ignoring the object of the test sentences, and if they were indeed doing so, the null object should also be ignored.

children's acceptance rate of crucial test sentences in the main and control experiments:

(63) Figure 3: percentages of children's acceptances of crucial test sentences in the main and control experiments



In sum, the results of the two control experiments did not support the alternative explanations for children's non-adult behavior in the original experiment. Given this, I conclude that the non-adult behavior was in fact due to the availability of the inverse scope/reconstructed interpretation to (a vast majority of) children. Thus, we once again obtained evidence that Japanese children accessed inverse scope interpretations that Japanese adults do not allow. This in turn provides additional evidence that children do not rely on a conservative learning strategy in discovering what scope interpretation is impossible. At the same time, these findings call for a non-conservative learning mechanism that allows children to recover from overgeneralization about possible scope interpretations.

## 2.6 Freedom of Scope

Our experimental results have revealed that Japanese children access inverse scope interpretations that Japanese adults do not allow. Let us call the scope flexibility that Japanese children showed in our experiments *Freedom of Scope*. In this section, I will consider the nature of Freedom of Scope by comparing it with children's non-adult behaviors observed in other studies on the acquisition of scope interpretations. The main question is whether or not Freedom of Scope can be reduced to an instance of a previously observed non-adult scope behavior by young children.

Studies on children's interpretations of quantificational sentences have revolved around non-adult responses that children produce under certain experimental conditions. In the 1990s, children's non-adultlike behavior with universally quantified sentences attracted much attention (e.g., Crain et al. 1996; Drozd and Philip 1993; Drozd and van Loosbroek 1998; Philip 1995; Phillip and Aurelio 1991, among others). Various studies showed that when presented with a sentence like "is every boy riding a pony?" with a picture showing three boys on a pony with an extra riderless pony, 3-5 year-olds often respond "no", pointing to the extra pony (e.g., Philip 1995; cf. Inhelder and Piaget 1964). This non-adult behavior is often referred to as *symmetrical response*, and the source of this non-adult behavior is still under active debate (e.g., Drozd 2000; Gualmini et al. 2003; Philip and Lynch, 2000).

The debate bears a relevance to the question as to whether children's CSS is the same as adults' CSS. One possibility is that children derive inverse scope interpretations using the same mechanism as adults, e.g., covert movement of a

quantificational argument. Under this view, it is possible to maintain that the syntactic (i.e., LF) representations that underlie children's inverse scope interpretations are identical to corresponding representations in adults' grammar. Another possibility is that children's grammar allows more freedom in syntax-semantics mapping than adults' grammar does in the sense that it allows a quantificational element to take scope independently of its syntactic position. The latter view has often been proposed as an account for children's symmetrical responses. For example, Philip (1995) argues that children's grammar may allow the determiner *every* in sentences like *every boy is riding an elephant* to quantify over events, rather than over individuals. If such event quantification by a determiner is possible, then our test sentence *someone ate every food* would yield truth conditions that are not distinguishable from the inverse scope interpretation by adults.<sup>21</sup>

The latter view, however, has faced some serious empirical challenges. First, it has often been observed that the symmetrical response by children can be reduced significantly by simply manipulating experimental design (Crain et al. 1996; Sugisaki and Isobe 2001; Gouro et al. 2002). The results have been taken as showing that the non-adultlike behavior of children is not due to their grammar, but is an experimental artifact. Moreover, Gualmini et al. (2003) observed that children assigned different interpretations to *or* within the first argument (i.e., the restriction) and the second argument (i.e., the nuclear scope) of *every*. This is unexpected if children interpret *every* as taking sentential scope, as predicted by the Event Quantification Account by

---

<sup>21</sup> Under Philip's (1995) theory, the truth condition with event quantification by *every* is analyzed as follows: For every event *e* in which either an animal or a food participates, or which is a possible sub-event of an animal-eating-a-food, an animal ate a food *e*. This truth condition makes the test sentence true in the crucial test condition, in which in every eating event an animal ate a food.

Philip. In addition, in computing scope relations between negation and a quantificational element, children are found to be sensitive to abstract syntactic notions such as c-command (Lidz and Musolino 2002; Gualmini and Crain 2005). In short, there is evidence that children's scope interpretations are constrained by syntactic configurations. Given these empirical problems with the latter view, I am led to assume that children's grammar do not allow a quantificational element to take scope independently of its syntactic position, and consequently, that children use the same mechanism as adults in deriving inverse scope interpretations.

In the 2000s, more direct interest in the acquisition of scope relations was brought about by a study by Musolino et al. (2000) that claimed that young children's scope interpretations are restricted to those that match surface word orders. In their TVJT experiments, Musolino et al. found that young children often failed to assign inverse scope readings to test sentences like those in (64): resulting in a failure to accept a sentence like (64), for example, in a situation where the detective found two of his friends but missed one.

- (64) a. The detective didn't find someone/some guy  
b. Every horse didn't jump over the fence

In their experiments, young children often failed to accept a sentence like (64)a in a situation where the detective found two of his friends but missed one. Similarly, (64)b was rejected by children in a situation where two of the horses jumped over the fence but the other one didn't. Children's justifications of their negative judgments suggested that they were adhering to "isomorphic" scope interpretations, the interpretations that match surface word orders. This finding is called the *Observation*



*of Isomorphism*. Lidz and Musolino (2002) extended these findings to Kannada, a language with SOV word order. They found that Kannada-speaking children have the same problem as English-speaking children in accessing wide-scope interpretations of object quantifiers, despite the difference in word order – negation follows the object in Kannada. Given this, Lidz and Musolino argued that children's scope interpretations are constrained by surface c-command relations between negation and quantifiers, not by linear word order.

In more recent experimental work, however, it has been found that children's performance with negation-quantifier scope interpretations is greatly improved by implementing certain changes in the context in which these sentences are presented. For example, Gualmini (2003) found that children showed significantly less difficulty in accepting the inverse scope interpretation of sentences like (64)a when these negative sentences are used to point out the discrepancy between a contextual expectation and what actually happened. Musolino and Lidz (2002) also showed that children's performance on inverse scope is greatly improved when negative test sentences are preceded by a positive lead-in (e.g., *Every horse jumped over the fence but every horse didn't jump over the barn*), possibly illustrating the same phenomenon. In light of these new findings, there is an emerging consensus that the original observation of isomorphism is not due to a problem in children's representations. In other words, children do not lack the grammatical device that inverts scope of quantificational elements (i.e., CSS in our terms), and therefore they are able to construct inverse scope representations, provided that the experimental context is properly controlled.

Given the conclusion that children have the ability to compute non-isomorphic scope interpretations, the remaining question about the Observation of Isomorphism is why they do not systematically use this ability. One background assumption of the TVJT is that when a given test sentence is ambiguous to the participant, s/he respects the Principle of Charity (the bias to give the speaker credit for speaking truthfully whenever that is possible) and chooses the interpretation that makes the sentence true (e.g., Crain and Thornton 1998). However, for children who show the adherence to isomorphic interpretations, the Principle of Charity appears to be overridden by some independent factor, given the assumption that their grammar generates inverse scope interpretations. Several proposals have been made about the overriding factor. Musolino and Lidz (2003; 2005) suggest that the computation of non-isomorphic/inverse scope interpretations involves revision of the initial syntactic parse of a sentence, and the processing cost involved in the reanalysis process is so high for children that it sometimes outweighs the Principle of Charity. Following Hulseley et al. (2004), we call this view Isomorphism-by-Default. Hulseley et al. (2004), in contrast, argue that children do not consider the scope interpretation that does not address the question under discussion in a given experimental context. The crucial factor under this view is the pragmatic felicity of the possible scope interpretations, and the "isomorphism bias" results only when the non-isomorphic interpretation happens to be pragmatically infelicitous. The pragmatic principle that determines the relative felicity of a given scope interpretation is called the Question-Answer Requirement (QAR).

It is clear that the Observation of Isomorphism and the Freedom of Scope effect encompass quite different problems. The problem of isomorphism is that children sometimes fail to access the scope interpretations that their grammar can generate. In contrast, the problem of the Freedom of Scope is that children fail to avoid accessing scope interpretations that are prohibited in their target language (i.e., Japanese). Nonetheless, it is worthwhile to consider if we can develop a uniform explanation for those non-adult behaviors. If we can argue that the same factor that biases children towards isomorphic interpretations also forced Japanese children to accept the non-adult interpretations, then the two observations can be regarded as different manifestations of the same problem that children have.

The crucial test sentences in our experiments are repeated here as (65) and (66).

- (65) a. *Japanese*  
 Dareka-ga dono tabemono mo tabeta  
 someone-NOM every food ate  
 “Someone ate every food”
- b. *English*  
 Someone ate every food
- (66) Aoi hako mo Kuroi hako mo Pikachu-dake-ga aketa  
 both blue box and black box Pikachu-only-NOM opened  
 “Both the blue box and the black box, only Pikachu opened”

Both in canonical and scrambled word order, Japanese children accessed the inverse scope interpretations, i.e., the interpretations that do not match surface word order/hierarchical structure. Given this, it is clear that the Isomorphism-by-Default view cannot explain the Freedom of Scope effect: the non-adult interpretations that Japanese children accessed are non-isomorphic interpretations that should lead to higher processing load under the Isomorphism-by-Default view. In fact, Japanese

children (and also English children/adults) did sometimes show a preference towards the isomorphic interpretation. In the experiment with canonical order sentences, Japanese children's acceptance rate of the inverse scope interpretation was around 40%. The number resembles the typical acceptance rates of inverse scope interpretations that were taken as showing children's bias towards isomorphic interpretations (e.g., Musolino et al. 2000; Lidz and Musolino 2002). Thus, the processing cost that is involved in the computation of inverse scope interpretations may have affected Japanese children's performance,<sup>22</sup> but it cannot be the reason why Japanese children accessed the non-adult interpretations.

The QAR view requires a closer inspection. Let us consider each of our experiments in turn. First, in the "eating game" story, the goal is to win the prize by satisfying the two rules of the game. The question is then whether each animal group can satisfy the two rules. The Question under Discussion in Hulseley et al.'s (2004) sense would consist of the following two questions:

- (67) a. Were all the foods eaten?  
b. Did everyone get to eat something?

Given these questions, we now consider whether each of the interpretations of the test sentence addresses the questions. The two interpretations of the test sentence are paraphrased as (68)a and (68)b:

---

<sup>22</sup> This line of reasoning would require careful elaboration of the notion of "processing cost". In normal cases of Isomorphism that involve negation and a quantifier, adults generally do not have problems in accessing inverse scope interpretations (but see Musolino and Lidz 2003), but in the current case, English adults showed the same degree of reluctance in accepting the inverse scope interpretation of the test sentences. Clearly, surface syntactic configuration is not the unique determining factor of the scope preference, and in order to account for the full range of empirical observations, a lot of different factors must be taken into account.

- (68) a. *Surface scope*  
A specific individual ate all the foods
- b. *Inverse scope*  
Every food was eaten by someone

The two interpretations equally address the question in (67)a: under either interpretation, the answer to (67)a is "no". The question in (67)b is a little more tricky. The surface scope interpretation straightforwardly addresses the question, but the inverse scope interpretation may not, if we allow the truth condition to be satisfied with a non-distributive model (i.e., each of the foods was eaten by someone, and that "someone" happens to be the same individual in each of the eating events). But in any case, the inverse scope interpretation either fails to address the question or addresses the question to the same extent that the surface scope interpretation does. In no circumstances does only the inverse scope interpretation satisfy the QAR. Thus according to the QAR, children should either show no scope bias at all or show a bias towards the surface scope interpretation. As we have discussed, Japanese children did show a bias towards the surface scope interpretation, but the QAR does not explain why Japanese children nonetheless accessed the inverse scope interpretation as well.

Second, let us take the "opening-the-boxes" story as an example story from the second experiment. In the story, the intended Question under Discussion was something like (69)a, but as I pointed out in 3.3.3.3, children might have considered (69)b to be the underlying question. Let us consider both of those two possibilities.

- (69) a. Who opened each of the boxes?
- b. Who opened both of the boxes?

The surface and inverse scope interpretations of the test sentence are paraphrased in (70):

- (70) a. *Surface scope*  
Only Pikachu opened the blue box, and only Pikachu opened the black box
- b. *Inverse scope*  
Only Pikachu opened both of the boxes

The surface scope interpretation addresses both of the questions in (69): the interpretation specifies who opened each of the boxes, and also who opened both of the boxes – it was Pikachu. In contrast, while the inverse scope interpretation addresses question (70)b, it does not address question (70)a: the interpretation does not specify the individuals who opened each of the boxes. Thus again, in no circumstances did only the inverse scope interpretation satisfy the QAR. Therefore, the QAR does not explain why Japanese children accessed the inverse scope interpretation of the test sentence.

In sum, neither Isomorphism-by-Default nor the QAR motivate Japanese children's bias towards non-adult scope interpretations. Given this, we conclude that Japanese children accessed the non-adult scope interpretations not because some independent factor biased them towards those interpretations, but because those interpretations were simply available to them (given the effect of the Principle of the Charity). This entails that Japanese children lack the language-specific restrictions that make the relevant interpretations impossible in the adult language. Consequently,

Freedom of Scope cannot be subsumed under the non-adultlike scope bias of children that has been observed in previous research, and requires an independent treatment.

## **2.7 A learnability problem**

In this section, I consider the learnability problem that the freedom of scope poses to a theory of language acquisition. In Chapter 1, I reviewed the three components that create a learnability paradox, discussed in Pinker (1989). The three components are: (i) productivity, (ii) no negative evidence, and (iii) arbitrariness. With all the three components, an acquisition task presents a learnability paradox, making it impossible to explain. I argue that the first two components are undeniably present in the acquisition of scope rigidity in Japanese, and therefore, the third component must be denied in order to solve the learning problem.

First, given the freedom of scope observed in our experiments, it is now clear that Japanese children's scope assignments are productive. The fact that children allowed inverse scope interpretations that adults do not allow suggests that they do not simply stick with scope interpretations that were exemplified in adult speech, that is, children are not conservative learners of possible scope interpretations. Rather, children's grammar involves a mechanism that productively generates inverse scope interpretations (i.e., CSS): children's scope flexibility was observed both in canonical word order sentences and in scrambled word order sentences, with different combinations of quantifiers. Given this, it is necessary for Japanese children to learn how to expunge their non-adult scope interpretations.

The second component is no negative evidence. The relevant question here is whether or not input data provide the learner a basis for identifying scope

interpretations that are impossible in the language. Within the current case, it is rather straightforward to assume that direct negative evidence is not available for the learners of scope rigidity in Japanese. Direct negative evidence against inverse scope could only arise when (i) the child uses a doubly-quantified sentence with intended inverse scope, (ii) the caretaker notices that the sentence does not match the situation under the surface scope interpretation, and (iii) the caretaker corrects the child in a way that the child can understand and remember. Such a situation is not likely to be common at all, and it is extremely unrealistic to assume that all Japanese children must encounter such a situation in order to acquire the adult grammar of scope. Given this, I conclude that direct negative evidence does not play a crucial role in making children abandon their non-adult inverse scope interpretations.

I now turn to the possibility of taking advantage of indirect negative evidence. Given the constraints on scope, it is presumably the case that Japanese adults do not use the relevant sentences with intended inverse scope interpretation. If a probabilistic learner can detect the lack of intended inverse scope in adult speech, then he may be able to use the absence of supporting evidence as evidence against his overly permissive grammar. In order to test this possibility empirically, it is necessary to test a probabilistic learning model with realistic input data, as it has been pointed out that the success of a probabilistic learning model depends highly on the structure of the input data (e.g., Pearl 2007; Pearl and Lidz 2006). In this thesis, I am not going to seriously investigate the issue, as it is beyond the scope of this research. Nonetheless, I would like to give my current thoughts about the potential of probabilistic learning models for the acquisition of scope rigidity in Japanese.



A first potential problem for a probabilistic learning scenario is that it requires an assumption that children can reliably identify the intended scope interpretations of input sentences. As I pointed out in Chapter 1, input linguistic signals do not uniquely specify scope interpretations. Thus, given that children's grammar overgenerates inverse scope interpretations, it seems possible that their grammar wrongly assigns inverse scope interpretations to random input sentences that are uttered with intended surface scope. In such a case, the learner must reject the inverse scope assignments, because it would lead to a "fabrication" of supporting evidence for inverse scope interpretations that would interfere with a probabilistic learning mechanism. However, it is not clear how the learner can reliably correct unintended inverse scope assignments. In order to do so, the situation in which the relevant sentence is uttered must explicitly contradict the learner's generated inverse scope interpretation. This requires that the relevant sentence contains a specific combination of quantifiers with which only the surface scope interpretation makes the sentence true in the situation, but presumably input sentences are not restricted to those that contain such combinations of quantifiers. Moreover, the relevant sentence can be a description of events that the learner did not directly witness (e.g., the speaker describes a past event that occurred in the learner's absence). In such a situation, the learner may lack any grounds to judge if the inverse scope interpretation truthfully describes the event. Furthermore, it is possible that the learner simply concludes that the speaker said something that is false, sticking to his wrong inverse scope interpretation. Given all these considerations, it is not straightforward to assume that the learner can reliably detect the absence of inverse scope interpretations in input data.

A second problem for a probabilistic learning scenario is that potentially informative input data can be very sparse. First, only sentences that involve two overt quantificational arguments can be relevant to the learners of scope rigidity. Second, among the possible combinations of quantificational elements, only a small subset of them is informative for learners: for example, *someone read a book* is not informative, because the surface and inverse scope interpretations are truth-conditionally indistinguishable. The data sparseness problem is even more acute with scrambled sentences. Miyamoto and Nakamura's (2005) corpus study revealed that in actual language use scrambled word order is much less frequent than canonical word order. This observation naturally leads to an expectation that scrambled sentences that are informative for learners of scope are accordingly rare. Furthermore, some properties of Japanese make the problems even worse. Japanese does not have a grammatical distinction of number or definiteness. Thus, for example, a bare noun *inu* "dog" is four ways ambiguous: singular definite/indefinite, plural definite/indefinite. This ambiguity sometimes makes it impossible to uniquely determine scope relations. In English, the sentence "A dog ate every food" uttered in a situation where each food was eaten by a different dog can provide evidence for the inverse scope interpretation. The Japanese counterpart of the sentence, in contrast, does not unambiguously signal the necessity of inverse scope: assigning a (collective) plural interpretation to the subject *inu* makes the sentence potentially compatible with the situation under the surface scope interpretation. Therefore, it is possible that an adult uses the sentence with intended surface scope with a plural interpretation of the subject, and nonetheless the learner takes the sentence as evidence for the inverse scope

interpretation because he assigned a singular interpretation to the subject. Making the learner ignore such potentially ambiguous cases comes at the cost of significantly reducing the size of potentially informative input data, leading to an even worse data sparseness problem.

A third problem is that the grammar of Japanese does not completely exclude inverse scope interpretations. As I pointed out above, some scrambled sentences allow scope ambiguity. The relevant example is repeated here as (71):

- (71) Dareka-o<sub>i</sub> daremo-ga *t<sub>i</sub>* semeta  
 someone-ACC everyone-NOM criticized  
 Lit. “Someone, everyone criticized”  
 $\exists >> \forall / \forall >> \exists$

Given this, children must learn to distinguish cases like (71) from cases that do not allow an inverse scope interpretation, such as (72):

- (72) [Furansugo mo supeingo mo]<sub>i</sub> Taroo-dake-ga *t<sub>i</sub>* hanasu  
 Lit. “Both French and Spanish, only Taroo speaks”  
 \*ONLY >> BOTH / BOTH >> ONLY

In order for a probabilistic learning mechanism to learn the contrast between (71) and (72), an absence of inverse scope interpretations with cases like (72) is not enough: it must be accompanied by substantial evidence for inverse scope interpretations in cases like (71). Otherwise, a probabilistic learning mechanism would simply conclude that there is no difference between (71) and (72) with respect to possible scope interpretations. However, there are several reasons to suspect that such positive evidence for inverse scope interpretations in cases like (71) is vanishingly rare. First, as I pointed out above, scrambled order sentences are much less frequent than

canonical order sentences. Second, given that the inverse scope interpretation of a scrambled sentence can be expressed by its canonical order counterpart, speakers are likely to choose to express the scope interpretation with the canonical order counterpart. Moreover, discourse factors that motivate scrambled word order can be incompatible with inverse scope interpretations. For example, scrambled word order can be felicitously used when the scrambled phrase refers to an entity that has been introduced in the preceding discourse (i.e., old information). Thus, the sentence in (71) can be naturally used in the following context (e.g., Otsu 1994):

(73) Dareka-ga okurete haitte-kita.  
someone-NOM late came-in  
“Someone came in late”

Sono dareka-o daremo-ga semeta.  
that someone-ACC everyone-NOM criticized  
Lit. “That someone, everyone criticized”

However, within the second sentence of (73), the scrambled indefinite refers to a specific individual (as the demonstrative shows) introduced in the preceding discourse, and therefore is not compatible with the distributive inverse scope interpretation. Thus, in discourse contexts where the speaker would choose to scramble an indefinite object, the scrambled indefinite would be likely to favor the surface scope interpretation. Thirdly, even if a child is fortunate enough to encounter such an exceptional example, evidence for inverse scope may only be obtained if the learner actually chooses to compute the interpretation, which may not always occur. Given all these considerations, I suspect that the actual probability of positive evidence for inverse scope in cases like (71) is very close to zero.

If my conjecture about the low probability of positive evidence for inverse scope in scrambled sentences is correct, then probabilistic learning models would face a serious challenge in discriminating cases like (71) from cases like (72). The input data simply do not provide enough relevant cases that a probabilistic learning algorithm can work on, and the two hypotheses are not different with respect to the amount of supporting evidence they receive from the input. In short, the inherent sparseness of positive evidence for inverse scope may trivialize the significance of the absence of certain evidence. With sparse data, positive evidence for grammatically possible scope interpretations can be equally absent as positive evidence for grammatically impossible scope interpretations, making it impossible to distinguish the two classes of scope interpretations on the basis of absence of positive evidence. In other words, probabilistic comparisons of different data sets would not yield a reliable conclusion when the overall data size is so small.

Summarizing, given the specific properties of the relevant input and evidence taken by the learner, probabilistic learning of scope rigidity taking advantage of indirect negative evidence appears to be quite unreliable. This discussion is not to deny the general potential of probabilistic learning in some domains. Rather, for this particular domain of grammar, I do not yet see how a probabilistic learning account that relies on indirect negative evidence for inverse scope could provide a realistic model of the acquisition of the restrictions on CSS in Japanese, i.e., how Japanese children purge their non-adult inverse scope interpretations.

So far, I have pointed out that (i) Japanese children make overgeneration errors with respect to possible scope interpretations, and therefore they must learn to purge

their non-adult interpretations, and (ii) input data do not provide reliable negative evidence (direct or indirect) against children's non-adult interpretations, and therefore children cannot rely on negative evidence against a certain scope interpretation to fix their grammar. If the constraints on scope interpretation in Japanese are arbitrary in the sense that they are totally independent components of grammar and do not interact with any observable properties of the language, then the learnability problem becomes a learnability paradox: there seems to be no logical way to explain how Japanese children learn the scope grammar of Japanese. Accordingly, at least one of the three components must be denied to provide any account for the learning problem. Since the first two components are fairly well established, I choose to challenge the third component: arbitrariness. In the next chapter, I will examine CSS in Japanese and constraints imposed on the process, and propose an analysis that derives the effects of scope rigidity from independently observable properties of the language.

## **Chapter 3: Covert Scope-Shifting in Japanese**

### **3.1 Introduction**

In the previous chapter, I reviewed the results of experimental investigations on Japanese children's interpretations of sentences that contain two quantified arguments. The result show that Japanese children allow inverse scope interpretations that Japanese adults do not allow, raising a learnability problem. Children's non-adult behaviors are unexpected under a conservative learning scenario, and demonstrate the need of some learning mechanism that allows children to figure out how to expunge their non-adult scope interpretations. In this connection, it is important to determine what exactly Japanese children need to learn. In section 2.7, I argued that negative evidence (direct or indirect) against certain scope interpretations is too unreliable and would not provide a basis for children to purge their non-adult scope interpretations. It must therefore be the case that the scope constraints in Japanese are related to some observable properties of the language. In other words, the interaction of grammatical properties of Japanese must make it be the case that the effects of the scope constraints are derived by learning some independently observable properties.

The main purpose of this chapter is to examine the nature of CSS in Japanese and the locus of the cross-linguistic contrast in possible scope interpretations. In section 2.2 and 2.3, I point out, on the basis of recently uncovered data, that i) scope interpretation in Japanese is not always rigid, and ii) scope interpretations in English are not always free. These observations will lead us to conclude that the mechanisms that govern inverse scope in Japanese and English are strikingly similar. Section 2.4

reviews several proposed analyses of constraints on CSS, and combining those analyses together, I propose a theory of CSS in English and Japanese in section 2.5. Section 2.6 and 2.7 explore the possibility of attributing Japanese-specific restrictions on scope interpretations to some independent property of the language. In section 2.8, I come back to the learnability problem, and attempt to provide an account of the problem using the theoretical analysis of the language-specific constraints on scope interpretation.

### 3.2 Not-so-rigid scope in Japanese

In this subsection, we review cases in which Japanese sentences allow inverse scope interpretations. We restrict our attention to cases that are minimally different from typical examples that show the scope rigidity effect, and show that inverse scope readings become available either by replacing one quantifier by some other one, or by manipulating contexts without changing the quantifier combination.

#### 3.2.1 *Specificity of the subject*

Sentences like (74) are the paradigm case of scope rigidity in Japanese. Such an example typically uses the indefinite pronoun *dareka* as the subject, and the distributive universal *dono X mo* as the object. Native speakers' judgment of this type of sentences is quite robust<sup>23</sup>: the inverse scope interpretation is disallowed.

- (74) Dareka-ga dono kyoujyu-mo hihan-sita  
someone-NOM every professor criticize-did  
“Someone criticized every professor”

---

<sup>23</sup> Experimental investigations in Marsden (2004) and in the current project confirmed this. We will return to this point later.



\* $\forall \gg \exists$

Under the surface scope interpretation, the subject indefinite *dareka* receives a specific interpretation. That is, it presupposes that there exists a uniquely identifiable individual who admires every professor (although the speaker is not sure about the person's identity: see 2.2.2)<sup>24</sup>. However, replacing the subject quantifier with an indefinite that inherently lacks this kind of specific interpretation results in scope ambiguity<sup>25</sup>, as shown in (75):

- (75) a. *Hutari ijyou-no*      *gakusei-ga dono kyoujyu-mo hihan-sita*  
two greater-than-GEN student-NOM every professor criticize-did  
“More than two students criticized every professor”  
 $\forall \gg$  more than two
- b. *Sannin ika-no*      *gakusei-ga dono kyoujyu-mo hihan-sita*  
three smaller-than-GEN student-NOM every professor criticize-did  
“Less than three students criticized every professor”  
 $\forall \gg$  less than three
- c. *Sukunakutomo hutari-no* *gakusei-ga dono kyoujyu-mo hihan-sita*  
at-least      two-GEN student-NOM every professor criticize-did  
“At least two students criticized every professor”  
 $\forall \gg$  at least two

Modified numerical quantifiers such as *hutari ijyou* “more than two”, *sannin ika* “less than three”, and *sukunakutomo hutari* “at least two” do not specify the exact cardinality, thus do not ensure the unique identifiability of the referents<sup>26</sup>. In examples

---

<sup>24</sup> This definition of specificity follows Haspelmath (1997). The concept of unique identifiability is akin to “numerical identity” by Croft (1983).

<sup>25</sup> Although my informants agreed that inverse scope interpretations are possible with the sentences in (75), they noted that the interpretations are still less preferred as compared to the corresponding surface scope interpretations.

<sup>26</sup> Note that the lack of unique identifiability, which by definition is the lack of specificity, does not preclude a non-distributive (that is, surface scope) interpretation of the sentences. See also fn. 29. In contrast, distributive interpretations do require a non-specific interpretation of indefinites. The value of distributively interpreted indefinites varies over the domain of quantification, and therefore does not pick up a unique referent independently of the domain of quantification (e.g., Farkas 1994).

with those quantifiers as the subject, inverse scope interpretations are much easier to obtain than in (74)<sup>27</sup>. The availability of inverse scope in sentences like (75) is a *prima facie* counterexample to theories that posit a constraint that blocks CSS in general in Japanese. But why does subject specificity matter for the availability of inverse scope? In fact, an apparently similar observation can be made in English.

- (76) a. Some student criticized every professor  
b. At least two students criticized every professor

Although the theoretical literature generally holds the view that inverse scope is possible with sentences like (76)a, actual judgments by native speakers are subject to variation, and there are individuals who find it relatively hard to assign an inverse scope interpretation to sentences like (76)a (e.g., Reinhart 1976). In contrast, sentences like (76)b elicit inverse scope interpretations quite easily and robustly.<sup>28</sup> Thus, we observe that subject specificity affects the relative ease of accessing inverse scope interpretations in English. In Japanese, on the other hand, subject specificity affects the basic availability of inverse scope.

Theories of the semantics of indefinites often argue that the specificity of indefinites is encoded in syntactic representations (e.g., Diesing 1993). Abstracting away from details for now, it is proposed that specific indefinites occupy a higher syntactic position than non-specific indefinites do. Under this theory of syntactic encoding of specificity, combined with the assumption that scope is determined by

---

<sup>27</sup> Hayashishita (2004) discusses similar examples from a somewhat different perspective. Hayashishita focuses on the semantic property of the object QP, and argues that only quantificational expressions that can refer to a specific group can yield inverse scope interpretations (cf. Liu 1990). We will come back to this point.

<sup>28</sup> The contrast in English was pointed out to me by Jeff Lidz (Personal Communication)

syntactic hierarchical orders that result from covert syntactic movement, it is possible to argue that the syntactic position that specific indefinites occupy is higher than the target landing site of a covert movement operation that raises the object QP. Non-specific indefinites, in contrast, stay in a lower position than the target landing site. This approach may provide a successful description of syntactic representations that correspond to each of the possible interpretations, but it does not explain the cross-linguistic contrast as is originally defined. Both English *some* and Japanese *dareka* allow non-specific interpretations as well as specific interpretations, drawing forth the conclusion that both of them can appear in the lower “non-specific position”. If so, the fact that *dareka* never allows another quantifier to take scope above it in sentences like (74) remains mysterious. The locus of the cross-linguistic contrast should thus reside somewhere else.

### 3.2.2 *Irrealis contexts*

The last subsection presented a case where inverse scope becomes possible by replacing the subject with another QP. In the following subsections, we show that even with the original *dareka + dono X mo* combination, inverse scope becomes possible by some context manipulations. Observe in (77) that the subjunctive complement allows the inverse scope interpretation, as opposed to the factive complement clause in (78):

(77) Taroo-wa [dareka-ga dono heya mo souji-suru youni] sita/meijita/negatta  
 Taroo-TOP someone-NOM every room clean-do COMP made sure/order/hope  
 “Taroo made sure/ordered/hoped that someone would clean every room”  
 $OK \forall >> \exists$

(78) Taroo-wa [dareka-ga dono heya-mo souji-suru no]-o mita

Taroo-TOP someone-NOM every room clean-do COMP acc saw  
 “Taroo saw someone cleaning every room”  
 \* $\forall >> \exists$

(77) can be truthfully uttered in a situation where Taroo assigned a different person to every room so that each room would be cleaned by someone<sup>29</sup>. In contrast, (78) cannot be used to describe a situation where Taroo observed that each room was getting cleaned by a different person. In general, inverse scope becomes a lot easier to access in modal contexts that can be roughly categorized as “irrealis”:

- (79) a. *Imperative/subjunctive*  
 Dareka-ga dono heya mo souji-si nakereba naranai  
 someone-NOM every room clean-do unless MOOD  
 “It is imperative that someone cleans every room”  
 $OK \forall >> \exists$
- b. *Counterfactual/subjunctive*  
 Dareka-ga dono heya mo souji-suru hazu datta  
 Someone-NOM every room clean-do MOOD COP-PAST  
 “Someone should have cleaned every room”  
 $OK \forall >> \exists$
- c. *Assumptive*  
 (Sonouchi) dareka-ga dono heya mo souji-suru darou  
 (In the meantime) someone-NOM every room clean-do MOOD  
 “I assume someone will clean every room in the meantime”  
 $OK \forall >> \exists$
- d. *Speculative*  
 (Sonouchi) dareka-ga dono heya mo souji-suru ka-mo shirenai  
 (in the meantime) someone-NOM every room clean-do COMP-also MOOD  
 “It is possible that someone will clean every room in the meantime”  
 $OK \forall >> \exists$

---

<sup>29</sup> The sentence is in fact three ways ambiguous. In one reading, *dareka* takes the widest scope and is interpreted as specific, meaning that there is a uniquely identifiable individual *x* such that Taroo made sure *x* would clean every room. Another reading does not presuppose the existence of unique referent of *dareka*, while *dareka* takes wider scope than the universal quantifier: Taroo made sure that one person would clean every room, without specifying who the person is. This reading shows that non-specific indefinites can take scope over universals, yielding a non-distributive interpretation.

In contrast, contexts of the “realis” variety generally resist inverse scope assignment:

- (80) a. *Factive*  
Taroo-wa [dareka-ga dono heya mo souji-sita koto]-ni kizuita  
Taroo-TOP someone-NOM every room clean-did COMP DAT realized  
“Taroo realized that someone cleaned every room”  
\* $\forall >> \exists$
- b. *Non-factive/indicative*  
Taroo-wa [dareka-ga dono heya mo souji-sita to] shuchou-sita  
Taroo-TOP someone-NOM every room clean-past COMP claim-did  
“Taroo claimed that someone cleaned every room”  
\* $\forall >> \exists$
- c. *Implicative*  
Dareka-ga dono heya mo souji-site noketa  
someone-NOM every room clean-do managed  
“Someone managed to clean every room”  
\* $\forall >> \exists$

These contrasts are reminiscent of the effect of subject specificity seen above. In prototypical realis contexts, indefinites have a strong tendency to have a specific interpretation, and in languages that make morphological distinctions between specific and non-specific indefinites, the non-specific series are generally excluded from those contexts. Irrealis contexts, in contrast, easily allow a non-specific interpretation of indefinites and morphologically non-specific indefinites to appear (Croft 1983; Haspelmath 1997). Note, however, that these observations do not entail that realis contexts completely exclude non-specific indefinites. As long as a non-specific interpretation of an indefinite yields an informative set of truth conditions for the sentence, realis contexts tolerate that interpretation. Such is the case, in particular, with distributive interpretations of a non-specific indefinite. For example, in the

affirmative declarative (i.e., a prototypical realis) sentence in (81), the indefinite *dareka* can easily have a non-specific, distributive interpretation.

- (81) Dono gakusei mo dareka-o hihan-sita  
every student someone-ACC criticize-did  
“Every student criticized someone”

The contrast between (77)/(79) and (78)/(80) makes it tempting to relate subject specificity with the availability of inverse scope interpretation. However, we cannot attribute the unavailability of inverse scope in (78)/(80) to, for example, the unavailability of a non-specific interpretation of the subject, due to some pragmatic felicity conditions. If the inverse scope interpretation were indeed possible, the subject *dareka* with a non-specific interpretation could provide pragmatically felicitous truth-conditions. Thus, there has to be an independent mechanism that imposes a specific interpretation on irrealis subjects in Japanese. The remaining question, then, is why the contexts in (77)/(79) obviate the effect of such a mechanism.

### 3.2.3 *Implausible surface interpretation*

As I alluded to above, inverse scope interpretations in English are subject to varying judgments. One contextual factor that has been known to affect scope interpretations is the plausibility of the available interpretations. The example (82) is originally due to Hirschbühler (1982), and was discussed by Reinhart (1995; 2006) with regard to its scope possibilities:

- (82) An American flag is hanging over in front of every building.

The surface scope interpretation of the sentence describes an implausible situation where a single specific flag is hanging over in front of different buildings. Reinhart points out that inverse scope is much easier to access in such contexts where surface scope results in a contextually and/or pragmatically implausible interpretation.

A parallel contextual manipulation in Japanese affects the basic availability of inverse scope. While keeping the same quantifier combination (*dareka + dono X mo*), the sentence in (83) allows the inverse scope interpretation:

- (83) Dareka-ga dono biru no mae-ni mo tat-teiru  
 someone-NOM every building front-DAT also stand-ing  
 “Someone is standing in front of every building”  
 $OK \forall > \exists$

A possible confounding factor with (83) is that the universally quantified NP may be an adjunct, rather than an argument. The next example controls this point, using a verb that takes an accusative-marked argument:

- (84) (Choudo ima) dareka-ga dono oudan hodou mo watat-teiru  
 right now someone-NOM every crosswalk cross-ing  
 “Right now, someone is crossing every crosswalk”  
 $OK \forall > \exists$

cf. dareka-ga kono oudan hodou-o watat-teiru  
 someone this crosswalk-ACC cross-ing  
 “Someone is crossing this crosswalk”

Compare (84) with (85), in which the past/perfect tense makes the surface scope interpretation implausible. I assume that this is because with the past/perfect tense, the surface scope interpretation is plausible: it is entirely possible for some specific

person to have crossed every crosswalk, with each crossing event occurring separately.

- (85) Dareka-ga dono oudan hodou mo watatta  
someone-NOM every crosswalk crossed  
“Someone crossed / has crossed every crosswalk”  
\* $\forall > \exists$

While the inverse scope interpretation of (84) is possible, (85) only allows the surface scope interpretation. Thus, an implausible surface scope interpretation makes corresponding inverse scope interpretation possible for Japanese speakers. In short, the plausibility of the surface scope interpretation affects the relative ease of accessing inverse scope in English, and the basic availability of inverse scope in Japanese.

### 3.3 Not-so-free scope interpretations in English and Japanese

So far we have observed that inverse scope in Japanese is not totally impossible. Even with a minimal manipulation on the subject quantifier or on the context, inverse scope interpretations surface in the language. These observations necessarily lead to the conclusion that some kind of CSS is operative in Japanese. This conclusion, however, does not entail that CSS in Japanese is the same as CSS in English: the two languages might make use of two distinct mechanisms that derive inverse scope in a different way. In the following subsections, I consider how Japanese and English CSS are different. I will first review cases in English where inverse scope is disallowed. Each case will be followed by an examination of the corresponding Japanese sentences. I will apply the manipulations that I have established in the preceding



subsections to test if I can observe the effect of the same constraints in both Japanese and English.

### 3.3.1 *Locality*

One well-known constraint on inverse scope (of non-indefinite quantifiers) in English is that it does not expand the scope of a quantifier out of certain syntactic domains. For example, a universal quantifier embedded in a complex NP, in an indirect question, and in an adverbial clause cannot take scope over the matrix subject.

- (86) a. Someone met the child that talked to everyone  
b. Someone wondered whether I talked to everyone  
c. Someone left the meeting before I talked to everyone  
\* $\forall >> \exists$  (Johnson 2000)

The domains that trap the scope of *everyone* inside the lower clause in (86) are the domains that block overt movement: syntactic islands. Such a correlation between inverse scope and overt movement is often taken as an argument for the approach that claims that CSS is essentially invisible syntactic movement (e.g., May, 1977). I now seek to find out whether Japanese CSS respects the same kind of constraints.

The first point we need to confirm is that Japanese covert scope-shifting can in principle cross a clause boundary, because otherwise it would be pointless to ask whether it can cross syntactic islands, which typically involve a clause boundary. I use syntactic causative construction in Japanese as a test. The causative construction in Japanese is productively formed by putting the causative morpheme *-(s)ase* onto a non-tensed transitive verb:

- (87) *Simple transitive*  
 Hanako-ga heya-o souji-sita  
 Hanako-NOM room-ACC clean-did  
 “Hanako cleaned a/her room”
- (88) *Causative*  
 Taroo-ga [Hanako-ni heya-o souji-s]-ase-ta  
 Taroo-NOM Hanako-DAT room-ACC clean-do-cause-past  
 “Taroo made Hanako clean a/her room”

The embedded subject of the causative construction is marked by dative *ni*. Thus, the surface array of case-marked NPs in causative constructions is superficially identical with that of ditransitive constructions, as in (89):

- (89) *Ditransitive*  
 Taroo-ga Hanako-ni shashin-o ageta  
 Taroo-NOM Hanako-DAT picture-ACC gave  
 “Taroo gave Hanako a picture”

However, the two constructions are structurally distinct. One well-known test is *zibun*-binding. Japanese *zibun* “self” is an anaphor that must be bound by a subject (e.g., Kuroda 1965). For example, in (90) *zibun* can be bound by the subject *Taroo*, but not by the object *Hanako*<sup>30</sup>:

- (90) Taroo<sub>i</sub>-wa Hanako<sub>j</sub>-o zibun<sub>i/\*j</sub>-no gakusei-ni shoukaisita  
 Taroo-TOP Hanako-ACC self-GEN student-DAT introduced  
 “Taro introduced Hanako to his/\*her student

The fact that the *ni* marked argument in the causative can bind *zibun* suggests that it has a property of subjects:

- (91) *Causative*  
 Taroo<sub>i</sub>-ga [Hanako<sub>j</sub>-ni zibun<sub>i/j</sub>-no heya-o souji-s]-ase-ta

---

<sup>30</sup> *Taroo* is a prototypical masculine name, and *Hanako* is a prototypical feminine name.

Taroo-NOM Hanako-DAT self-GEN room-ACC clean-do-cause-past  
 “Taroo made Hanako clean his/her room”

(92) *Ditransitive*

Taroo<sub>i</sub>-ga Hanako<sub>i</sub>-ni zibun<sub>i/\*j</sub>-no shashin-o ageta  
 Taroo-NOM Hanako-DAT self-GEN picture-ACC gave  
 “Taroo gave Hanako his/\*her picture”

Given this contrast, it would be reasonable to assume that the causative construction has a bi-clausal structure, with the *ni* marked argument serving as the embedded subject.

Now we turn to inverse scope in causatives. As in (93), in a simple declarative context the embedded object QP does not scope out of the embedded clause, resulting in the impossibility of the inverse scope interpretation:

(93) Dareka-ga [Taroo-ni dono heya mo souji-s]-ase-ta  
 someone-NOM Taroo-DAT every room clean-do-cause-past  
 “Someone made Taroo clean every room”  
 \* $\forall >> \exists$

This just replicates the so-called scope rigidity effect in Japanese. What is interesting here is that the inverse scope interpretation can be made possible by embedding the sentence in an irrealis context:

(94) Hanako-wa dareka-ga [Taroo-ni dono heya mo souji-s]-aseru youni sita  
 Hanako-TOP someone-NOM Taroo-DAT every room clean-do-cause COMP made  
 “Hanako made sure that someone would make Taroo clean every room”  
<sup>OK</sup> $\forall >> \exists$

This observation establishes that Japanese CSS can cross a clause boundary, with an appropriate context manipulation (which is in any case necessary to derive inverse

scope, even within a simple clause). Given this, whether or not Japanese CSS obeys island constraints now becomes a meaningful question.

Relative clauses, indirect questions, and adverbial clauses in Japanese all show the properties of islands, blocking covert extraction of *naze* “why” (e.g., Huang 1982, Lasnik and Saito 1992):

- (95) *Relative clause*  
 \*Taroo-wa [kono heya-o naze souji-sita] gakusei-o mituketa-no?  
 Taroo-TOP this room-ACC why clean-did student-ACC found-Q  
 “Why<sub>i</sub> did Taroo find the/a student [who cleaned this room *t<sub>i</sub>]*”
- (96) *Indirect question*  
 \*Taroo-wa [Hanako-ga naze kono heya-o souji-sita kadouka] sitteiru-no?  
 Taroo-TOP Hanako-NOM why this room-ACC clean-did whether know-Q  
 “Why<sub>i</sub> did Taroo know [whether Hanako cleaned this room *t<sub>i</sub>]*”
- (97) *Adverbial clause*  
 \*Taroo-wa [kono heya-o naze souji-suru mae]-ni gakkou-ni itta-no?  
 Taroo-TOP this room-ACC why clean-do before-DAT school-DAT went-Q  
 “Why<sub>i</sub> did Taroo go to school [before he cleaned this room *t<sub>i</sub>]*”

The crucial test involves the following steps: (i) replace the matrix subject with *dareka*, (ii) replace the embedded object with *dono X mo*, and (iii) embed the whole sentence into an irrealis context:

- (98) *Relative clause*  
 Taroo-wa dareka-ga [dono heya mo souji-sita] gakusei-o mitukeru youni sita  
 Taroo-TOP someone-NOM every room clean-did student-ACC find COMP made  
 “Taroo made sure that someone would find a student who cleaned every room”  
 \* $\forall >> \exists$
- (99) *Indirect question*  
 Taroo-wa dareka-ga [Hanako-ga dono heya mo souji-sita kadouka] sitteiru  
 Taroo-TOP someone-NOM Hanako-NOM every room clean-did whether know  
 youni sita  
 COMP did  
 “Taro made sure that someone knew whether Hanako cleaned every room”  
 \* $\forall >> \exists$

(100) *Adverbial clause*

Taroo-wa dareka-ga [dono heya mo souji-suru mae]-ni gakkou-ni iku youni  
Taroo-TOP someone-NOM every room clean-do before-DAT school-DAT go COMP  
sita  
made  
“Taroo made sure that someone went to school before he cleaned every room”  
\*∀ >> ∃

In contrast with (94), inverse scope in (98)-(100) is strictly disallowed. A significant observation here is that *dareka* in (98)-(100) can easily be interpreted as non-specific: for example, (98) can mean that Taroo made sure that one person would find a student who cleaned every room, without specifying who the person is. Still, even when *dareka* receives a non-specific interpretation, it must take wider scope than *dono X mo* in (98)-(100). I thus conclude that the contrast between (94) and (98)-(100) provides evidence that Japanese CSS obeys island constraints. In this respect, Japanese CSS is similar to English CSS.<sup>31</sup>

### 3.3.2 *Quantifiers that do not invert*

Liu (1990, 1997), Beghelli (1995), and Beghelli and Stowell (1997) (also see Hayashishita 2004) discussed the scope behavior of *modified numerals* (e.g., *more than five*, *fewer than five*, *at least two*, etc.) and pointed out that those quantificational expressions may never scope over a certain type<sup>32</sup> of QP in a hierarchically higher

---

<sup>31</sup> Jeff Lidz (Personal Communication) correctly points out that there is a potential problem for the argument. English overt *wh*-movement and Japanese covert *wh*-movement are not identical: covert *wh*-movement of a *wh*-argument in Japanese generally fails to show island sensitivity (e.g., Nishigauchi 1990; Lasnik and Saito 1995). Therefore, if I assume that inverse scope interpretations are derived by covert movement of the lower QP, then it amounts to the claim that covert movement of argument QPs shares some property only with covert movement of adjunct *wh*-phrases. However, I will not take this approach: In 3.5.1, I will propose a theory of CSS that assumes that reconstruction of A-moved subjects is crucially responsible for deriving inverse scope interpretations. Given that A-movement never crosses an island boundary, reconstruction of A-movement into an island never happens, both in Japanese and English.

<sup>32</sup> Beghelli and Stowell call this type of QPs Group-Denoting QPs (GQP). Under their definition, the class involves QPs headed by *a*, *some*, *several*, bare-numeral QPs like *one student*, and definite QPs.

position. For example, in the following examples, modified numerals in the object position cannot take inverse scope:

- (101) Some/one of the students visited more than two girls.  
\*more than two >> ∃ (Beghelli and Stowell 1997: 83)

In section 2.3.1.1, we observed that modified numerals in the subject position affect the basic availability of inverse scope in Japanese. In this section, we examine the scope behavior of Japanese modified numerals in the object position.

As a point of departure, let us examine the scope behavior of *non*-modified numerals in Japanese, such as *itutu-no heya* “five rooms”. Not surprisingly, in an affirmative declarative sentence, a bare numeral in the object position cannot scope over the subject.

- (102) Dareka-ga itutu-no heya-o souji-sita  
someone-NOM five-GEN room-ACC clean-did  
“Someone cleaned five rooms”  
\*FIVE>>∃

Thus the sentence is false when there are five persons who each cleaned a room. The inverse scope becomes possible, however, when the sentence is embedded within an irrealis context:

- (103) Taroo-wa dareka-ga itutu-no heya-o souji-suru youni meijita  
Taroo-TOP someone-NOM five-GEN room-ACC clean-did COMP ordered  
“Taroo ordered that someone clean five rooms”  
<sup>OK</sup>FIVE>>∃

The sentence in (103) can be interpreted as meaning that “Taroo ordered that it be the case that five rooms are going to be cleaned by someone”. The availability of this

interpretation shows that Japanese CSS can shift the scope of *itutu-no heya* over the subject *dareka* in the sentence. Now, we replace the bare numeral with a modified numeral. The result is in (104):

- (104) Taroo-wa dareka-ga sukunakutomo itutu-no / itutu ijyou-no / itutu ika-no  
 Taroo-TOP someone-NOM at least five-GEN more than five-GEN less than five-GEN  
 heya-o souji-suru youni meijita  
 room-ACC clean-do COMP ordered  
 “Taroo ordered that someone clean at least five / more than five / less than  
 five rooms”  
 \*at least five/more than five/less than five >>  $\exists$

Inverse scope becomes unavailable: the sentence can only mean that it is Taroo’s intention that a single person clean at least five/more than five/less than five rooms. Thus, a parallelism between English and Japanese manifests itself again. CSS in both languages does not shift the scope of modified numerals.

### 3.3.3 *Scope freezing effect*

Double object constructions in English are curious in that they enforce “scope rigidity” over the two objects. In double object constructions the second object cannot take scope over the first object, even when the second object is a “wide-scope oriented” quantifier such as *each* (e.g., Bruening 2001). This phenomenon is dubbed “scope freezing”:

- (105) I gave a child each doll  
 \*EACH >> A (Bruening 2001: 234)
- (106) The teacher assigned one student every problem  
 \* $\forall$  >> ONE (Nakanishi 2001a: 456)

In the Japanese syntactic literature, the same phenomenon in Japanese has been widely acknowledged for quite a long time (e.g., Kuno 1973; Hoji 1985). However, this particular case has been considered as an instantiation of the general scope rigidity of the language, and therefore has not received an independent treatment (at least until Nakanishi, 2001a; 2001b). In the present context, however, this phenomenon deserves special attention. We have established the ways to override the general scope rigidity effect holding between the subject and the object of simple transitive constructions. I now move on to ask whether these manipulations can also circumvent the scope freezing scope effect in double object constructions.

As a baseline, let us first observe that in affirmative declarative ditransitive constructions in Japanese, the direct object cannot take scope over the indirect object when the surface word order is IO-DO:

- (107) Taroo-wa dareka-ni dono heya mo miseta  
 Taroo-TOP someone-DAT every room showed  
 “Taroo showed someone every room”  
 \* $\forall > \exists$
- (108) Taroo-wa dareka-ni dono gakusei mo shoukai-sita  
 Taroo-TOP someone-DAT every student introduce-did  
 “Taro introduced every student to someone”  
 $\exists < \forall$ \*

Now I apply the manipulations to the sentences. It turns out that neither using a non-specific quantifier nor embedding into an irrealis context, or even a combination of both, make the inverse scope possible:

- (109) a. *Nonspecific quantifier*  
 Taroo-wa sukunakutomo hutari-no gakusei-ni dono heya mo miseta  
 Taroo-TOP at least two-GEN student-DAT every room showed  
 “Taroo showed every room to at least two students”



\* $\forall >>$  at least two

b. *Irrealis context*

Hanako-wa Taroo-ga dareka-ni dono heya mo miseru youni sita  
Hanako-TOP Taroo-NOM someone-DAT every room show COMP made  
“Hanako made sure that Taroo would show every room to someone”  
\* $\forall >> \exists$

c. *Nonspecific quantifier + irrealis context*

Hanako-wa Taroo-ga sukunakutomo hutari-no gakusei-ni dono heya mo  
Hanako-TOP Taroo-NOM at least two-GEN student-DAT every room  
miseru youni sita  
show COMP made  
“Hanako made sure that Taroo would show every room to at least two  
students”  
\* $\forall >>$  at least two

(110) a. *Nonspecific quantifier*

Taroo-wa sukunakutomo hutari-no sensei-ni dono gakusei mo shoukai-sita  
Taroo-TOP at least two-GEN professor-DAT every student introduce-did  
“Taroo introduce every student to at least two professors”  
\* $\forall >>$  at least two

b. *Irrealis context*

Hanako-wa Taroo-ga dareka-ni dono gakusei mo shoukai-suru youni sita  
Hanako-TOP Taroo-NOM someone-DAT every student introduce-do COMP made  
“Hanako made sure that Taroo would introduce every student to someone”  
\* $\forall >> \exists$

c. *Nonspecific quantifier + irrealis context*

Hanako-wa Taroo-ga sukunakutomo hutari-no sensei-ni dono gakusei mo  
Hanako-TOP Taroo-NOM at least two-GEN professor dat every student  
shoukai-suru youni sita  
introduce-do COMP made  
“Hanako made sure that Taroo would introduce every student to at least  
two professors”  
\* $\forall >>$  at least two

Furthermore, these examples contrast with syntactic causative constructions, which have a superficially identical array of case-marked NPs with ditransitive constructions. When a causative sentence is embedded within an irrealis context, the object QP can take scope over the *ni* (dative) marked QP:

- (111) Hanako-wa Taroo-ga dareka-ni dono heya mo souji-s-aseru youni sita  
 Hanako-TOP Taroo-NOM someone-DAT every room clean-do-cause COMP made  
 “Hanako made sure that Taroo makes someone clean every room”  
 $\text{OK} \forall >> \exists$

Thus, the ditransitive constructions are indeed exceptional in that they never allow their objects to part in inverse scope interpretations. These observations would give us a ground for supposing that the scope freezing is operative in Japanese, independently of the general scope rigidity effect.

### 3.3.4 Summary

So far, our examination of Japanese scope interpretations has revealed two significant facts. First, inverse scope in Japanese can systematically be made available with a simple manipulation of a quantifier or contexts. This has led us to conclude that the grammar of Japanese is not completely immune to CSS. Second, constraints on English CSS systematically apply to Japanese CSS: we found no instance where Japanese CSS derives inverse scope in a context in which English CSS cannot shift the surface scope. Based on these observations, I argue that Japanese CSS and English CSS are governed by the same constraints, thereby inviting the conclusion that they are essentially the same kind of operation. A remaining puzzle which has been mentioned in passing is the original contrast that we began the discussion with: the unavailability of inverse scope in sentences like (74), which we repeat here as (112):

- (112) Dareka-ga dono kyoujyu-mo hihan-sita  
 someone-NOM every professor criticize-did  
 “Someone criticized every professor”  
 $*\forall >> \exists$

In fact, our conclusion that the same mechanism governs inverse scope in both Japanese and English now highlights the significance of the original contrast. Why is it that Japanese CSS cannot shift the surface scope in sentences like (112)? This question now needs to be answered in a way that does not propose a fundamental distinction between Japanese CSS and English CSS. Our task for the next part is, then, to explain the original Japanese-English contrast by providing an independent mechanism that blocks inverse scope in certain restricted cases.

### **3.4 Ways of restricting scope**

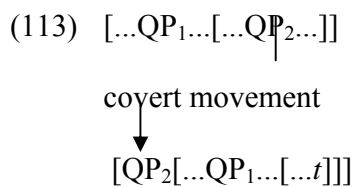
The goal of this section is to provide an account for the Japanese-English contrast shown in examples like (112). Before attempting to provide an explanation of the contrast, I first review some proposed theories of the constraints on English CSS. My purpose here is not to critically review those theories, and I will adopt many of them for an expository purpose, without committing to it. I then add my own theory for the Japanese-English contrast on top of those existing theories.

#### *3.4.1 Locality: CSS as syntactic movement*

Since May (1977), many researchers have argued that CSS is a consequence of syntactic movement. An important background assumption for this variety of theories is that syntactic representations uniquely determine the relative scope of quantificational elements. That is, there are no “scope ambiguities” in the proper sense of the term, just structural ambiguities within a level of syntactic representation that is not interpreted by phonology. The covert level of syntactic representations is

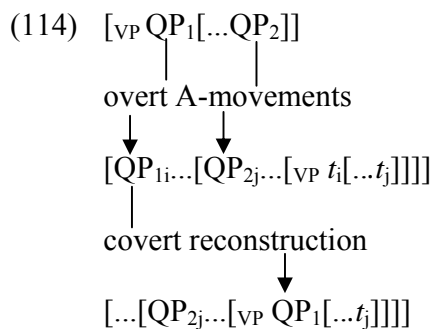
usually referred to as LF/Logical Form. The idea that inverse scope is derived via applications of syntactic movement naturally explains the fact that CSS cannot shift the scope of an element within a syntactic island: syntactic movements cannot move something across an island boundary. Although it is now well known that the possible ranges of overt movements and CSS do not completely overlap (e.g., Reinhart 1997, Johnson 2000), I regard the thesis that (at least some part of) CSS is a consequence of syntactic movement as still tenable. In what follows, I will simply adopt the thesis so that later discussion can be based on a specific theory that yields specific predictions. As was alluded to above, establishing a comprehensive theory of CSS is beyond the scope of this thesis.

There are, roughly, two variations of the actual implementation of the idea that CSS is a consequence of syntactic movements. Earlier approaches (e.g., May 1977, 1985; Huang 1982) assumed that inverse scope is derived by *raising* operations that covertly move a QP across another one. A derivation that involves such a raising operation can be schematized as in (113). The raising operation is of course sensitive to island constraints, therefore the covert movement cannot shift the scope of an element that is embedded within an island.



The other version, first proposed by Hornstein (1995), argues that CSS is derived by *reconstruction* operations which in a sense “undo” applications of overt movements. This move was enabled by the development of A-movement (i.e., case-driven

movements) theories in the 1990s (e.g., Chomsky 1995). The crucial assumption is that DP arguments have their case checked in the specifier positions of functional projections that are distinct from their thematic positions. Thus in simple transitive constructions, for example, both the subject and the object overtly raise to functional projections above VP, leaving traces in their base positions. Inverse scope results from the reconstruction of the subject to its base position, without the reconstruction of the object. (114) schematizes such a derivation<sup>33</sup>:



Under the reconstruction approach, the locality effect of CSS is reduced to the island sensitivity of overt movement: since no overt movement can move an element across an island boundary, there is no way to construct a chain across an island boundary, and therefore there is no possible reconstruction.

A catch of the reconstruction approach is that it eliminates the necessity of a covert movement operation that is specific to a certain semantically closed class of lexical items: quantificational elements (Hornstein 1995). Case-driven overt movement and covert reconstruction are, in contrast, independently motivated by the behavior of argument DPs in general. Although this reductionism is quite attractive,

---

<sup>33</sup> The exact mechanism of reconstruction (i.e., whether it involves a lowering-type operation or LF deletion of higher copy) is not relevant here.

especially from the standpoint of the Minimalist Program (e.g., Chomsky 1995; Hornstein 1995), some empirical facts pose a serious problem for the complete elimination of covert raising operations. Kennedy (1997), for example, pointed out that in so-called “inverse linking” (e.g., May 1985) cases, inverse scope cannot be reduced to case-checking A-movement:

(115) I met a representative from every committee

(115) can mean that for every committee, I met a representative from that committee. However, there seems to be no way to reduce the inverse scope interpretation to case-checking movement and subsequent reconstruction: it is generally assumed that an NP in the complement of a preposition gets its case feature checked in situ, and hence no case-driven movement of *every committee* can be motivated. Given these facts, I conclude that the strong reductionist position is not possible to maintain, and some kind of covert raising operation is necessary. This conclusion, however, does not completely exclude the possibility that some inverse scope patterns are derived via reconstruction. In fact, several studies maintain that reconstruction, rather than covert raising, is responsible for inverse scope between the subject and the object of transitive constructions, without denying the existence of covert raising. Such theories will be reviewed in the following subsections.

### 3.4.2 *Quantifiers that do not invert: decomposition and shortest movement*

Recall that in 2.3.2.2, we observed that modified numeral objects do not take scope over an indefinite subject. Thus, in (116), inverse scope is disallowed:

(116) Some student read more than five books

\*more than five >> ∃

(Beghelli 1995: 48)

A simple account for this fact would assume that those modified numerals do not undergo the syntactic movement that derives shifted scope readings. This account is incompatible with a Hornstein-type theory of A-movement-based CSS. In the A-movement-based CSS theory, both the subject and the object move out of their VP internal positions to check their cases. Inverse scope results, as we saw, from applying reconstruction only to the subject. Thus, in order to block inverse scope with a modified numeral object, it is necessary to assume that DPs with modified numeral do not A-move to check their case – an assumption that does not seem to receive an independent motivation. In addition, even within an approach that assumes objects check their case-feature in situ (e.g., Chomsky 1981; 2000) and inverse scope is derived by covert raising, an important empirical problem arises. The problem concerns so-called Antecedent-Contained Deletion (ACD).

ACD is a specific version of VP-ellipsis in which an elided VP is structurally contained within its antecedent VP.

(117) John [<sub>VP</sub> speaks every language that Mary does [<sub>VP</sub> e]]

With this structure, an attempt to resolve the ellipsis in situ gives rise to an infinite regress. Because the antecedent VP includes the elided VP, ellipsis resolution targeting the antecedent VP ends up creating another elided VP once again, as in

(118):

(118) John [<sub>VP</sub> speaks every language that Mary does [<sub>VP</sub> speaks every language that Mary does [<sub>VP</sub> e]]]]

A widely appreciated account of this puzzle (e.g., Kennedy, 1997; May, 1985; Larson and May 1990) argues that the ellipsis resolution involves a covert raising of the object QP that contains the elided VP. Once the object QP moves outside the antecedent VP leaving a variable bound by the moved object,<sup>34</sup> the elided VP is no longer contained within its antecedent, and the ellipsis can successfully be resolved.

(119) *Covert raising*

John [every language that Mary does [<sub>VP</sub> e]]<sub>i</sub> [<sub>VP</sub> speaks *t<sub>i</sub>*]

*Ellipsis resolution*

John [every language that Mary does [<sub>VP</sub> speaks *t<sub>i</sub>*]]<sub>i</sub> [<sub>VP</sub> speaks *t<sub>i</sub>*]

Given this account, the ability to host ACD has often been used as a diagnosis for the availability of covert raising of the QP object. Takahashi (2006) points out that modified numerals can host ACD,<sup>35</sup> and argues that this shows that modified numerals can be covertly raised outside of VP:

(120) John speaks more than three of the languages that Mary does [~~speaks *t*~~]  
(Takahashi 2006: 61)

Let us adopt this argument and assume that modified numerals can be covertly raised. Under this assumption, in order to block the inverse scope interpretation in sentences like (116), we need an independent way to distinguish modified numerals from quantifiers that do invert, e.g., *every*. The ACD data suggest that as long as the

---

<sup>34</sup> See Fox (2002) on the issue of how to reconcile this account with the copy theory of movement.

<sup>35</sup> Takahashi (2006: fn4) notes that (120) is degraded if the object QP is not partitive. This is a potential problem for the argument that modified numerals *per se* can license ACD, and hence, a problem for concluding that they can covertly raise. I will leave the issue open here.

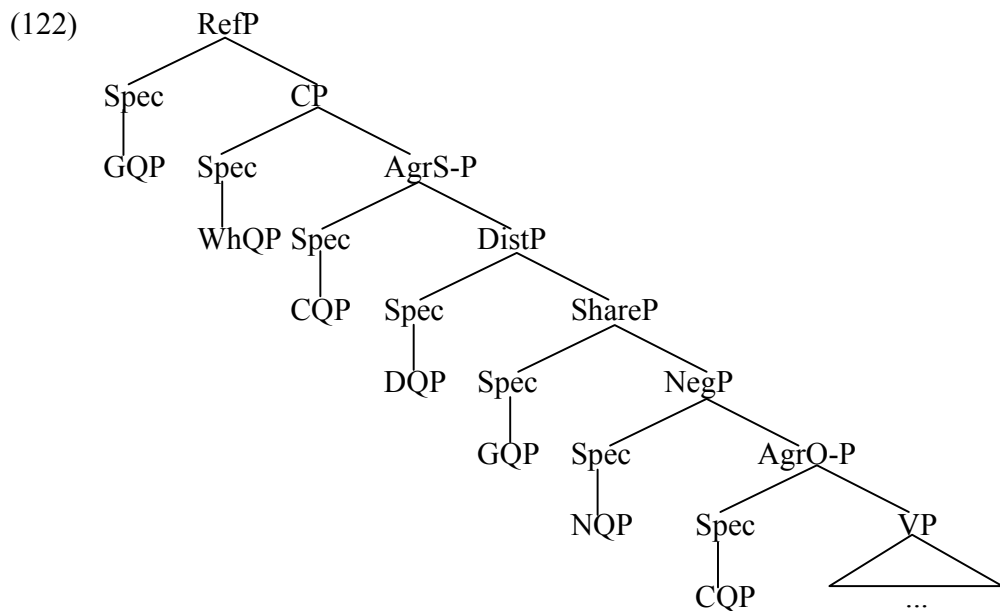


availability of covert raising to outside of VP is concerned, the two classes are indistinguishable.

Beghelli (1995) and Beghelli and Stowell (1997) put forth an approach that posits different landing sites for different types of quantifiers. First, they classify quantifying expressions into five types:

- (121) QP types: Beghelli and Stowell (1997)
- i. WhQPs: wh-phrases such as *what*, *which men*, etc.
  - ii. Negative QPs (NQPs): *nobody*, *no man*, etc.
  - iii. Distributive-Universal QPs (DQPs): *every* and *each*.
  - iv. Counting QPs (CQPs): decreasing QPs like *few*, *at most six*, and modified numerals such as *more than five*, etc.
  - v. Group-Denoting QPs (GQPs): *a*, *some*, *several* and bare numerals

Second, they posit an array of functional projections whose spec-position serves as a landing site for a specific type of QP:



(Beghelli and Stowell 1997: 76)

Beghelli and Stowell exploit this structure to capture various different scope facts, but let us restrict our attention to cases like (116). Here, the subject is a GQP, and the object is a CQP. The subject GQP must overtly raise to Spec-AgrSP to check its case, and from there it may further raise to Spec-RefP or reconstruct to Spec-ShareP. The object CQP, in contrast, can only raise to as high as Spec-AgrOP. Thus, there is no possible derivation in which the object CQP ends up in a higher position than the subject GQP. In contrast, an object DQP raises to Spec-DistP, and if the subject GQP reconstructs to Spec-ShareP, a configuration for inverse scope is obtained. In short, this account distinguishes between modified numerals (which do not invert) and distributive universals (which do invert) by postulating different final landing sites for the two types. One is higher than the lowest possible position of the subject (i.e., Spec-DistP), and the other is lower than that position (i.e., Spec-AgrOP).

A possible problem for this landing site theory is cases that concern scope interpretation between objects, not between a subject and an object. Takahashi (2006) pointed out that in (123), the *to*-dative objects, even though they are modified numerals, can take scope over the direct object:

- (123) a. John submitted some paper to more than five journals this month  
<sup>OK</sup>more than five >> ∃
- b. John donated two books to more than five churches this month  
<sup>OK</sup>more than five >> two (Takahashi 2006: 73)

Under Beghelli and Stowell's theory, the direct object presumably moves overtly to Spec-AgrOP, possibly followed by further raising to Spec-ShareP and/or Spec-RefP. Thus, the lowest possible scope position for the direct object is Spec-AgrOP (Beghelli and Stowell allows the possibility that a GQP is interpreted in its case-marked

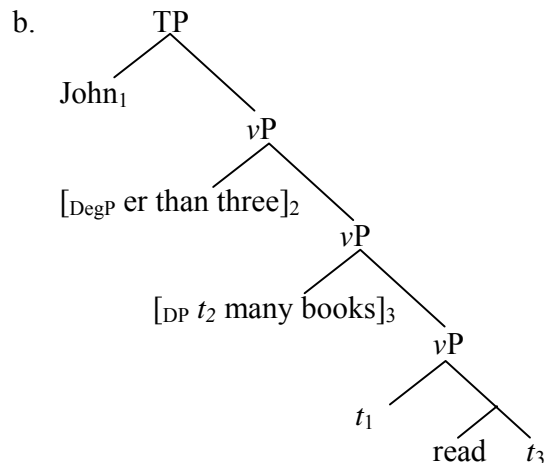
position). Now, it seems hard to posit a higher position that the dative CQP can move to: since it is a CQP it cannot use Spec-ShareP or Spec-RefP; positing a case-position above AgrOP for dative case checking does not seem to be motivated, given the surface word order.

Takahashi (2006) proposed an alternative approach to the lack of inverse scope in sentences like (116). His proposal consists of three components. First, he argues that modified numerals (specifically, “comparative QPs” such as *more than five X*) consist of two (syntactic) subparts: a comparative operator and a DP *many X*. Under this approach, the QP *more than three books* has the following syntactic representation:

(124) [DP [DegP er than three] many books]

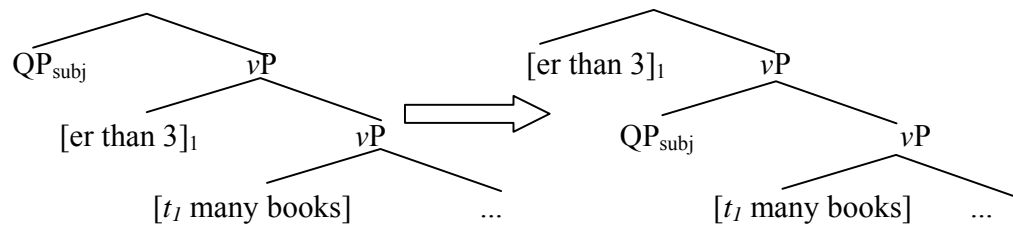
Takahashi assumes that a QP in the object position must undergo raising targeting *vP* (a node with type  $\langle t \rangle$ ) to resolve a type mismatch (cf. Heim and Kratzer 1998). Since there are two QPs within (124), they must independently be raised to *vP*. Consequently, the LF configuration of (125)a is represented as (125)b:

(125) a. John read more than three books



The second component is a locality condition on covert scope-shifting movement. Takahashi assumes that in order to obtain inverse scope, the subject QP must be lowered to the lowest  $\nu$ P (i.e., to the trace position of the subject). He then argues that the lowering of QPs must target the closest node of type  $\langle t \rangle$  (the constraint is a version of *Shortest Move*). Given this constraint, it follows that the first step of the lowering must place the subject QP between the comparative operator and the object DP, as illustrated in (126):

(126) Covert lowering of the subject



The third component is a constraint against this intermediate step. Takahashi proposes what he refers to as the *Heim-Kennedy Constraint* (obviously because the original idea comes from Heim, 2001 Kennedy, 1999):

(127) *The Heim-Kennedy Constraint*

A quantificational DP cannot intervene between a DegP and its trace.

(Takahashi 2006: 70)

The intermediate structure of the quantifier lowering which is necessary for inverse scope (i.e., the right-hand structure of (126)) violates the Heim-Kennedy Constraint. However, this intermediate step is necessary, given Takahashi's version of *Shortest Move* applying to the lowering. These constraints thus leave no possible derivation for inverse scope, and inverse scope is blocked.

Under Takahashi's theory, cases like (123) are not problematic. Since Takahashi assumes that the direct object has its case checked in situ, lowering is not necessary to obtain inverse scope configuration. The decomposition of the dative object CQP can occur at a position higher than the direct object (i.e., the edge of  $\nu$ P), and the decomposed QPs are interpreted at that position, taking higher scope than the direct object.

For the sake of explicitness in the discussion, I will adopt Takahashi's theory as an account for why modified numerals do not invert. One motivation for this choice is that Takahashi's theory is relatively simpler than Beghelli and Stowell's in the sense that it does not require classifying quantifiers into different types and postulating specific functional projections for each of the types. Nothing in the following discussion hinges on this choice, however.

### 3.4.3 *Scope freezing: covert raising and Shortest*

The last constraint we are concerned with here is the scope freezing with double object constructions. The relevant examples are repeated here as (128) and (129):

(128) I gave a child each doll  
\*EACH >> A (Bruening 2001: 234)

(129) The teacher assigned one student every problem  
\* $\forall$  >> ONE (Nakanishi 2001a: 456)

An interesting aspect of the effect is the fact that other diagnostics suggest that the second object can be raised covertly. Bruening (2001) points out, first, the second object licenses ACD:

(130) a. Ozzy gave someone everything

\* $\forall > > \exists$

b. Ozzy gave someone everything that Belinda did [<sub>VP</sub> e]

\* $\forall > > \exists$

(Bruening 2001: 240)

Under the assumption that the resolution of ACD involves covert raising of the QP that contains the elided VP, the fact that (130)b is perfectly acceptable leads to the conclusion that the second object must have been raised out of the antecedent VP. A puzzle arises here: if the second object can covertly raise to outside of the VP, then why is it that it cannot take scope over the first object? The VP-external landing site should be higher than the position of the first object.

Another relevant fact is that the second object can take scope over the subject. That is, as shown in the examples in (131), the second object can take part in inverse scope relations with the subject, even though inverse scope with the first object is impossible:

(131) a. A (different) teacher gave me every book

<sup>OK</sup> $\forall > > \exists$

b. At least two judges awarded me every medal

<sup>OK</sup> $\forall > > \text{at least two}$

c. The judges awarded a (#different) athlete every medal

\* $\forall > > a$

(Bruening 2001: 243)

This, again, presents a puzzle. The fact that the second object can take scope over the subject presumably suggests that the second object is able to undergo covert raising: but then, why can't it scope over the first object? Moving the second object higher

than the subject should put the second object in the higher position than the first object.

Bruening (2001) provided an account for this puzzle using an independently motivated constraint on syntactic movements. The relevant constraint, called *Shortest*, is stated as follows:

(132) *Shortest*

A pair P of elements  $[\alpha, \beta]$  obeys Shortest iff there is no well-formed pair P' which can be created by substituting  $\gamma$  for either  $\alpha$  or  $\beta$ , and the set of nodes c-commanded by one element of P' and dominating the other is smaller than the set of nodes c-commanded by one element of P and dominating the other.

(Bruening 2001: 247)

Thus the effect of Shortest, roughly, is to exclude a creation of a link between  $\alpha$  and  $\beta$  when a shorter link can be created between either  $\alpha$  or  $\beta$  and something else. When there are two elements targeting a same position as a landing site, Shortest constrains both which one must move first and how far the second movement can go. Let us assume, following Bruening (cf. Chomsky 2000; Richards 1997) that syntactic movement is triggered by a formal feature of a functional head that attracts elements in its c-command domain. Suppose, then, that the head K in (133) has a formal feature that can attract both  $\alpha$  and  $\beta$ :

(133) [ K [ ... $\alpha$  [ ... $\beta$  ] ] ]

Since  $\alpha$  is closer to K than  $\beta$  is, K must first attract  $\alpha$ .  $\alpha$  moves to K and the following configuration is constructed:

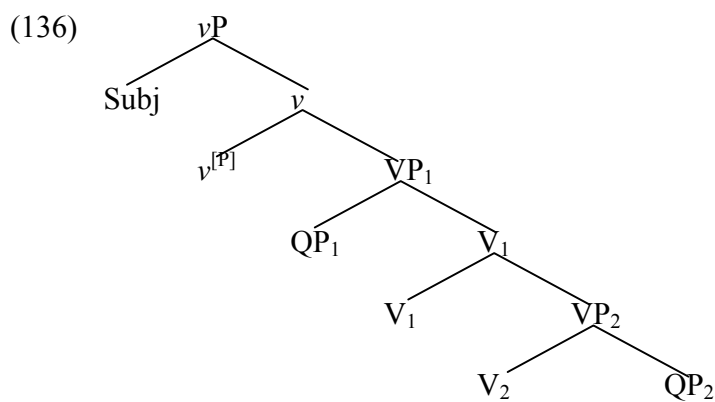
(134) [<sub>KP</sub>  $\alpha_i$  [ K [ ... $t_i$  [ ...  $\beta$  ] ] ] ]

Since  $\alpha$  has moved in (134),  $\beta$  is now the closest attractee to K. Given Shortest, the movement of  $\beta$  must be as short as possible, meaning that the landing site must be as close as possible to the head K. Thus, the derivation (135)b is ruled out, because a shorter movement is possible as in (135).

- (135) a.  $[_{KP} \alpha_i [_{KP} \beta_j [K [ \dots t_i [ \dots t_j ] ] ] ] ] ]$   
 b.  $*[_{KP} \beta_j [_{KP} \alpha_i [K [ \dots t_i [ \dots t_j ] ] ] ] ] ]$

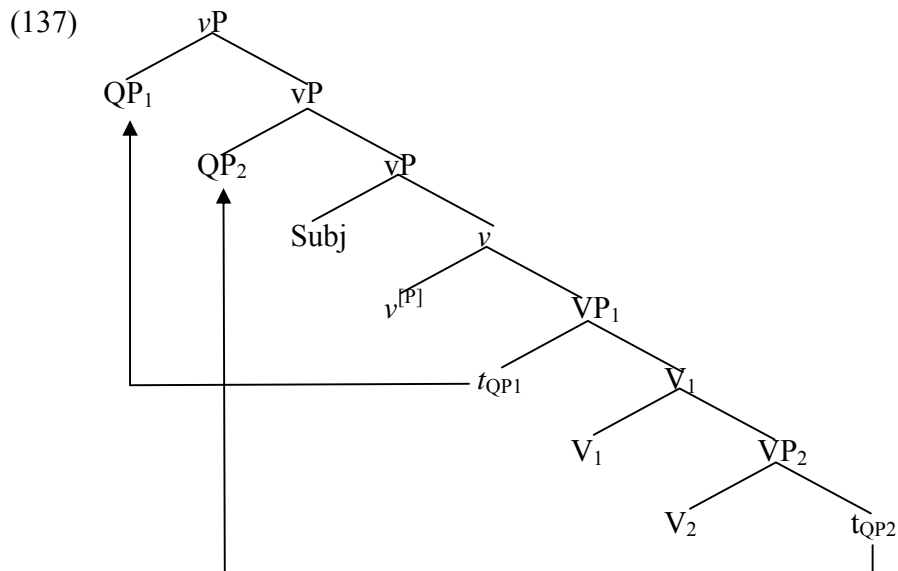
A major consequence of Shortest is that multiple movements targeting the same head cannot change the hierarchical order of the moved elements. This conclusion receives independent support from several overt movement phenomena: Multiple *wh*-fronting in languages like Bulgarian (e.g., Richards 1997), and multiple overt object shifts in several Germanic languages (e.g., Collins and Thrainsson 1996). See Bruening (2001) and references therein.

Given the assumption that Shortest constrains syntactic movements, the puzzle of scope freezing can be resolved. Bruening assumes that a double-object *v*P has the following configuration, and the *v* head can be assigned a P-feature that attracts QPs within the *v*P (cf. Chomsky 2000):





Movements of the QPs that are driven by the P-feature of the  $\nu$  obey Shortest, hence giving rise to a configuration in which the relative hierarchical order of the QPs has been preserved:



Given this configuration, ACD on  $QP_2$  can successfully be resolved: the elided VP contained in  $QP_2$  is now outside of the antecedent VP. Likewise, the narrow scope interpretation of the subject can be now obtained by reconstructing the subject from the Spec-TP to its base position: the base position is lower than the raised  $QP_2$ . But in both cases, scope freezing effect persists:  $QP_1$  and  $QP_2$  sustain the original hierarchical order throughout the derivation.

Note that this conclusion presupposes that those object QPs cannot reconstruct to their base positions. Bruening (2001), following Heim and Kratzer (1998), assumes that object quantifiers are uninterpretable in situ due to type mismatching. The same problem does not occur with a QP subject: the sister of the subject ( $\nu P$ ) is a node with the right semantic type. This motivates the reconstruction asymmetry between

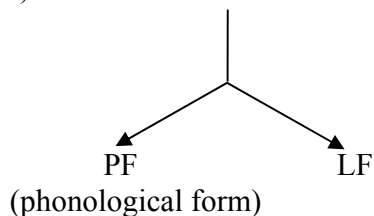
subjects and objects: while reconstructing objects into their base position results in uninterpretable representations, reconstruction of subjects does not create the same problem. I will follow the assumption that object quantifiers must move to  $\nu$ P for a semantic reason. This assumption will also become relevant in Chapter 6.

### 3.5 A theory of Japanese scope interpretations

#### 3.5.1 Basic assumptions

In this section, I combine the insights of the accounts that we have reviewed so far, and present a theory that is intended to capture both Japanese and English CSS. First, I take the position that syntactic representations determine the relative scope of quantificational elements. I assume, following the standard enterprise taken in the Principles and Parameters approach, that the mapping from surface syntactic representations to semantic representations is mediated by another level of syntactic representation, which is called LF. Operations that apply to LF do not have any audible consequences, given the so-called “Y-model” architecture of the Computational System of human language.

(138) *The Y-model architecture*



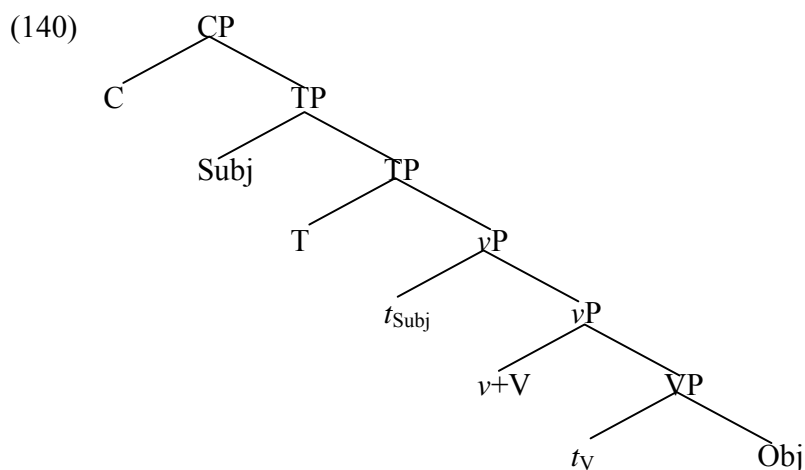
With respect to the mapping from LF to semantics, I assume that (139) holds. (139) states that hierarchical relations in the LF representation determine relative scope of

quantificational elements. (139) may not be an independent principle of grammar: it could be a consequence of the compositional computation of semantic interpretation procedure (cf. Heim and Kratzer 1998).

- (139) If a generalized quantifier (GQ)  $\alpha$  asymmetrically c-commands another GQ  $\beta$  at LF,  $\alpha$  takes scope over  $\beta$ .

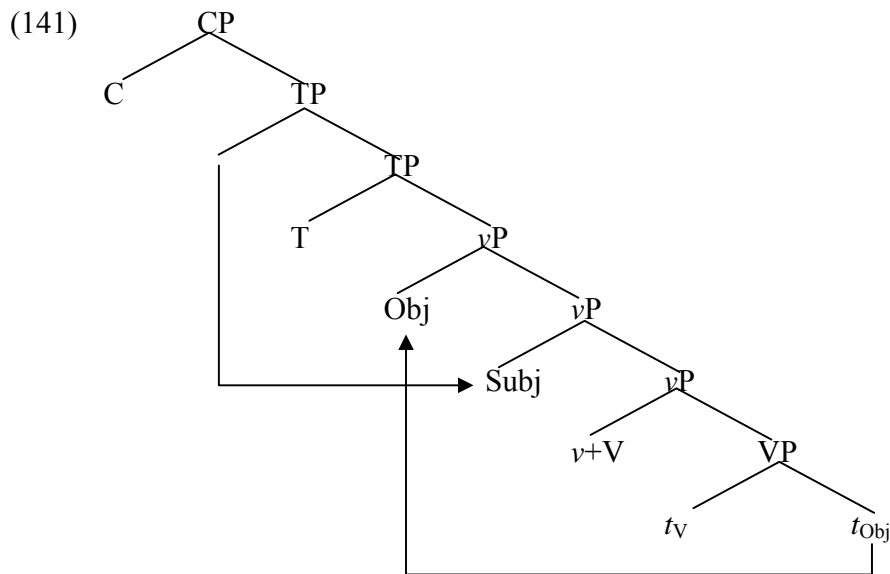
Note that we restrict (139) to generalized quantifiers. For the indefinites that can take unboundedly wide scope (see 2.2.2), we follow Reinhart (1997, 2006) and assume that they are ambiguous between GQ and choice-function denotations. The procedure of existential closure that binds choice-function variables applies freely, hence giving rise to the island insensitivity of indefinite wide scope. For details on the choice-function analysis of indefinites, see Reinhart (1997, 2006), and Winter (1997).

Second, let us assume that Japanese and English simple transitive sentences have the following surface representation (abstracting away the difference in head-complement orders):



The subject overtly raises to the spec of TP to check the EPP feature of T; the object and the  $v+V$  amalgamate head do not raise overtly. While this assumption is well-motivated for English because of the surface word order of the relevant elements, it is rather unclear whether the same conclusion holds for Japanese surface representation. This is because Japanese surface word order provides little clue with regard to the positions that each element occupies, due to the head-final structure of the language. Here I assume, for simplicity alone, that Japanese and English surface structures are basically identical. This theoretical choice is not crucially relevant to the data I am concerned with in this chapter. In the subsequent chapters, I will discuss cases where the theoretical choice (especially the V-raising part) actually affects empirical predictions.

The third component of our model is the assumptions on covert operations. Following Heim and Kratzer (1998), I assume that a GQ object must be covertly raised to  $vP$  in order to resolve type mismatching. Furthermore, as noted above, I assume that the object must be interpreted in the raised position (after all, the object is raised in order to be interpretable), and hence it cannot be reconstructed to the base position. Thus in this model, inverse scope between the subject and the object is obtained by reconstructing the subject into its  $vP$ -internal trace position. The reconstructed subject is now lower than the object that has been raised to  $vP$ :



Bruening’s and Takahashi’s accounts can be straightforwardly incorporated into this model. I assume that the covert operations (raising and reconstruction) obey Shortest<sup>36</sup> in (132): as illustrated above, the relevant facts follow from the assumption.

Overall, this theory is essentially a mosaic of existing theories of restrictions on CSS that attribute the restrictions to general constraints on syntactic movement. The theory correctly captures the relevant facts. First, the island sensitivity of CSS follows from the assumption that CSS is driven by covert syntactic movements: reconstruction of A-movement and/or semantically driven covert raising. Second, the restricted scope possibilities of modified numerals are accounted for along the lines of Takahashi’s theory: given the decomposed structure of raised modified numerals, reconstruction of the subject that is required for inverse scope is bound to violate some independent constraint of grammar. Lastly, the scope freezing effect follows

---

<sup>36</sup> The reconstruction of the subject actually involves two steps if it obeys shortest: it first reconstructs to the higher vP, and then to the lower vP.

from the assumption that the covert raising of objects to  $vP$  obeys a constraint on syntactic movement: Shortest. Thus, basic assumptions account for the restrictions on CSS that hold for both Japanese and English. Our next task is to provide an account for the Japanese-specific restriction on CSS.

### 3.5.2 “Scope rigidity” in Japanese

The discussion in the preceding sections can be summed up as follows: (i) Japanese has CSS, and (ii) Japanese CSS obeys the same constraints as English CSS does. These conclusions preclude the possibility of attributing the scope rigidity effect in Japanese directly to the lack of English-type CSS in the language. That is, the mechanism that is responsible for the lack of inverse scope in sentences like (142) should not block CSS in general in Japanese.

- (142) Dareka-ga dono kyoujyu-mo hihan-sita  
 someone-NOM every professor criticize-did  
 “Someone criticized every professor”  
 \* $\forall >> \exists$

Based on the conclusions that I have made so far, I maintain that the grammatical mechanism that generates LF representations is identical in Japanese and English. This means that the grammar of Japanese generates an LF representation for inverse scope of sentences like (142). Given this, there must be an extra mechanism in Japanese that “filters out” inverse scope interpretations of sentences like (142). In what follows, I consider several pragmatic factors that possibly contribute to such a filtering. The basic idea is as follows: even though the grammar of Japanese provides ways to shift scope covertly, some grammatical property of Japanese also gives rise to

a pragmatic implicature that blocks inverse scope interpretations in some contexts. Scope rigidity in Japanese is therefore a matter of pragmatics. Inverse scope becomes possible in contexts where the implicature does not arise, or where the implicature is canceled. I will first consider a blocking account that attributes scope rigidity to the existence of scrambling, and then next turn to the semantic/pragmatic properties of nominative subjects.

### 3.5.3 *Blocking effects*

It has often been claimed that pragmatics is responsible for blocking certain interpretive options that grammar provides. A simple illustration of such a pragmatic account can be made by using the interpretations of the disjunction operator *or* in English as an example. When the English disjunction *or* is used in sentences like (143), the hearer would normally infer that the speaker intended to mean “A or B, but not both A and B”:

- (143) a. You may take an apple or an orange  
b. I'll bring pizza or pasta to the party

This interpretation of *or* appears to suggest that the lexical item corresponds to exclusive disjunction in standard logic. However, in other contexts, *or* behaves as if it has the interpretation of inclusive disjunction:

- (144) a. I'm looking for a person who speaks French or Spanish  
b. You can find that book at Amazon.com or Half.com

We normally interpret (144)a as meaning that a person who can speak both Spanish and French would meet the speaker's requirements, exceeding the minimum requirements. Similarly, the statement in (144)b is certainly not excluding the possibility of finding the book both at amazon.com and half.com. This apparent polysemy of *or* can be explained by appealing to pragmatic implicature (e.g., Grice 1975). In contexts where the speaker is committed to providing the maximally specific information to the hearer, the speaker is expected to use the form that yields the most restricted truth conditions. Avoiding using a form that would yield a more restrictive interpretation would then make the hearer infer that the speaker is not in a position to provide a more restrictive, and thus informationally stronger statement. In the current case, using the conjunction *and* instead of the inclusive-disjunction *or* yields a more restrictive interpretation. Therefore, if the speaker avoids using *and*, the truth conditions that are associated with *and* are inferred to be inappropriate for expressing the speaker's intent, giving rise to the implicature of exclusivity with *or*. For example, hearing the sentence (143)a the hearer infers that the speaker does not want the hearer to take an apple AND an orange, given that the speaker could have used the conjunction *and* if s/he had the intention of permitting the hearer to take both. Given this analysis, it is possible to maintain that *or* is not lexically ambiguous, and it denotes inclusive disjunction. In a certain contexts, the form continues to supply its basic meaning as inclusive disjunction, but a derived exclusive implicature is computed and added onto the basic meaning.

Note that the model for deriving the implicature of exclusivity for *or* is built upon the logical entailment relation between inclusive disjunction and conjunction. Since



$P \wedge Q$  entails  $P \vee Q$ , disjunction is identified as a weaker term on the entailment scale which gives rise to a less restrictive truth condition. The reason why the truth conditions associated with *and* matter when interpreting *or* is that they are terms on the same scale. This type of pragmatic implicature is specifically referred to as *scalar implicature* (e.g., Horn 1972, 1989). But in principle, we should be able to extend the line of reasoning to other cases. As long as the hearer has a basis for inferring that the speaker intentionally avoided using an alternative form that would provide more specific interpretation, the same kind of pragmatic implicature is expected to offer itself. The question, then, is what counts as the “alternative form”.

In Japanese, scrambling can change the surface order of arguments quite freely. An application of scrambling to a quantified argument has a consequence of shifting its scope (e.g., Kuroda 1973; Kuno 1973; Hoji 1985 among many others). Thus in (145), the  $\forall \gg \exists$  interpretation which is impossible with canonical word order is expressed by a scrambled counterpart.

- (145) a. Dareka-ga dono kyoujyu mo hihan-sita  
 someone-NOM every professor criticize-did  
 $*\forall \gg \exists$
- b. [Dono kyoujyu mo]<sub>i</sub> dareka-ga <sub>t<sub>i</sub></sub> hihan-sita  
 every professor someone-NOM criticize-did  
<sup>OK</sup> $\forall \gg \exists$

Thus, scrambling in the sentence functions as “overt scope shift”: it changes the relative hierarchical order of QPs, creating a new configuration from which a different scope relation can be read off.

It is tempting to assume that the robust availability of “overt scope shift” in Japanese triggers a pragmatic implicature of the kind I sketched above. In our current theory, the grammar of Japanese generates both surface and inverse scope interpretations for canonical word order sentences. The inverse scope, however, can also be explicitly expressed by the corresponding scrambled word order. Moreover, an application of scrambling is not associated with addition/alternation of lexical items or grammatical morphemes (cf. passivization, clefting, etc.). Suppose, then, that when a sentence with multiple QP arguments is presented in the canonical word order, the hearer recognizes the existence of an alternative word order with the same lexical items. The hearer then wonders why the speaker avoided the alternative (i.e., scrambled) order, and this leads to a pragmatic inference that scope construal is the reason that the speaker avoided scrambled word order: the scope interpretation that is expressed by the alternative word order is not appropriate for expressing the speaker’s intent. It is possible that such a pragmatic implicature yields a general preference for surface scope interpretations over the corresponding inverse scope interpretations. A stronger claim would be that inverse scope interpretations in Japanese are blocked by such a pragmatic implicature that is triggered by the availability of scrambled word order. If this position can be maintained, then the lack of inverse scope in a certain set of sentences in Japanese is explained in terms of a pragmatic blocking effect.

The blocking account attributes the lack of inverse scope with Japanese sentences like (145)a to a blocking effect due to the existence of an alternative form (145)b. English, in contrast, does not have scrambling, hence inverse scope interpretations are not blocked. Thus under this account, it is predicted that the freedom of surface word

order crosslinguistically correlates with scope rigidity, which seems to receive a certain amount of empirical support<sup>37</sup> (e.g., German, Korean: “free-order” languages that show scope rigidity). Nonetheless, the blocking account faces some serious challenges. First, the account would predict strict scope rigidity: both in canonical and scrambled order sentences, scope interpretations must match surface word orders. However, this prediction is not borne out. As I pointed out in section 2.5.1, scrambled indefinites gives rise to scope ambiguity:

- (146) Dareka-o; daremo-ga  $t_i$  semeta  
 someone-ACC everyone-NOM criticized  
 Lit. “Someone, everyone criticized”  
 $\exists >> \forall / \forall >> \exists$

Furthermore, it offers no explanation for why in some contexts inverse scope becomes possible in Japanese even with canonical order. For example, scrambling is equally available to both (147) and (148) (=79)c), but inverse scope with canonical order is not blocked in (148):

- (147) a. Dareka-ga dono heya mo souji-sita  
 someone-NOM every room clean-did  
 $*\forall >> \exists$
- b. [Dono heya mo] <sub>$i$</sub>  dareka-ga  $t_i$  souji-sita  
 every room someone-NOM clean-did  
 $OK \forall >> \exists$
- (148) a. (Sonouchi) dareka-ga dono heya mo souji-suru darou  
 (In the meantime) someone-NOM every room clean-do MOOD  
 $OK \forall >> \exists$
- b. (Sonouchi) [dono heya mo] <sub>$i$</sub>  dareka-ga  $t_i$  souji-suru darou

---

<sup>37</sup> Note that under this approach, word order freedom is only a sufficient condition for scope rigidity. It does not exclude the possibility of a language that has rigid word order, and some independent property that gives rise to scope rigidity. Chinese is possibly such a language.

(In the meantime) every room someone-NOM clean-do MOOD  
<sup>OK</sup>∀ >> ∃

The same point can be made with all the cases that I discussed in 3.2: in those cases inverse scope is possible with the canonical order, even though overt scope shifting with scrambling is always an available option. These observations suggest that the availability of scrambling and blocking of inverse scope are not in a causal relation in Japanese. I therefore reject the blocking account for scope rigidity in Japanese. Accordingly the alleged cross-linguistic correlation between free word order and scope rigidity must be explained by some other means. The issue clearly awaits further empirical investigations.

#### 3.5.4 *Nominative subjects*

Since Kuroda (1965), there has been a long-standing discussion on a peculiar semantic characteristic that nominative(*ga*)-marked subjects in Japanese exhibit (e.g., Kuroda, 1965, 1972, 1992, 2005; Kuno, 1973; Shibatani, 1990, among many others). The property is often referred to as the *exhaustive listing* interpretation: a *ga*-marked subject is interpreted as if it represents an exhaustive list of entities that satisfy the predicate of the sentence in the relevant domain/context. To illustrate, consider the following example.

(149) Ano hito-wa yuumeina MLB-no senshu desu  
 That person-TOP famous MLB-GEN player COP  
 “That person is a famous MLB player”

Kare-wa/\*ga nihonjin desu  
 He-TOP/NOM Japanese COP  
 “He is Japanese”

The first sentence directs the hearer’s attention to a person who is presumably being seen by both the speaker and the hearer. The second sentence then gives a description of the person. In the second sentence, a *ga*-marked subject leads to an awkwardness: it sounds as if the speaker is trying to claim that “he” is the only one who is Japanese (in the universe), which is obviously false. In contrast, when the context delimits the domain to which the exhaustive listing interpretation applies, a *ga*-marked subject does not cause any awkwardness:

- (150) Ano hito-wa yuumeina MLB-no senshu desu  
 That person-TOP famous MLB-GEN player COP  
 “That person is a famous MLB player”

Kare-**wa/ga** kono chiimu-de tada hitori-no nihonjin desu  
 He-TOP/NOM this team-in only one-GEN Japanese COP  
 “He is the only Japanese player on this team”

Similarly, if the predicate of the second sentence uniquely determines the person to which the predicate applies to, an exhaustive listing *ga*-subject is perfectly acceptable:

- (151) Ano hito-wa yuumeina MLB-no senshu desu  
 That person-TOP famous MLB-GEN player COP  
 “That person is a famous MLB player”

Kare-**wa/ga** kyonen-no hoomuran ou desu  
 He-TOP/NOM last year-GEN homerun king COP  
 “He is last year’s homerun king”

- (152) Ano hito-wa yuumeina MLB-no senshu desu  
 That person-TOP famous MLB-GEN player COP  
 “That person is a famous MLB player”

Kare-**wa/ga** Ichiro desu  
 He-TOP/NOM Ichiro COP  
 “He is Ichiro”

In his work, Kuroda (e.g., 1965, 1972, 1992, 2005) has put forth theories of *judgments*. Below I review the latest version of his theory based on Kuroda (2005), but interested readers should also refer to his original works. Kuroda argues that sentences/clauses may express *judgments* in addition to representing propositions. Propositions are abstract objects which may be conceptualized as functions from worlds to truth values. In contrast, according to Kuroda, judgments are cognitive or mental acts that take place in the mind/brain, which are in the sense real objects. The following quote summarizes Kuroda's view on propositions and judgments:

(153) A judgment is a mental act by means of which the mind makes itself aware that a proposition is true. We assume that when a sentence expresses a judgment, it also represents the proposition the expressed judgment judges as true. A sentence uttered as a statement [...] expresses a judgment and represents a proposition.

(Kuroda, 2005: 16)

Thus, judgments are the speaker's commitment to the truth of the sentence, which therefore is not expressed by every clause. This point will become relevant in the following discussion.

On the basis of the proposition-judgment distinction, Kuroda further distinguishes two types of judgments. One type of judgment is called a *categorical/predicational* judgment, which corresponds to the cognitive act of *asserting*; another type is a *thetic/descriptive* judgment, which corresponds to the cognitive act of *affirming*. Another quote from Kuroda may help us to clarify the concept of asserting and affirming:

- (154) Asserting is a cognitive act of committing oneself to the truth of a conceived proposition and in its essence independent of other cognitive act or cognitive state; one could simply assert even without grounds for doing so. In contrast, affirming is dependent on another cognitive act or state, the perceptual or conceptual apprehension of a situation.

(Kuroda 2005: 26)

To illustrate the idea, Kuroda presents a very interesting contrast between *wa* and *ga* marked subjects. The following two syllogisms minimally differ with respect to the particle on the subject of the conclusion:

(155) **Syllogism I**

- a. Socrates *wa* kuruma no naka ni iru  
car gen inside at be  
“Socrates is in a car”
- b. Kuruma *wa* ugoite iru  
car move be  
“The car is moving”  
Dakara  
‘therefore’
- c. Socrates ***wa*** ugoite iru  
move be  
“Socrates is moving”

(156) **Syllogism II**

- a. Socrates *wa* kuruma no naka ni iru  
car gen inside at be  
“Socrates is in a car”
- b. Kuruma *wa* ugoite iru  
car move be  
“The car is moving”  
Dakara  
‘therefore’
- c. Socrates ***ga*** ugoite iru  
move be  
“Socrates is moving”

(Kuroda 2005: 27-28)

Kuroda points out that Syllogism I can be felicitously presented in the following scenario:

(157) **Scenario A.**

The speaker perceives a car and perceives Socrates seated in it. Socrates is not visibly moving. The car is indeed moving, but it is moving so slowly that the speaker can barely recognize that it is moving. The speaker does realize, though, that it is moving, because s/he sees that the wheels are slowly rotating. At this point, the speaker presents Syllogism I as an argument.

(ibid.:28)

Notice that under Scenario A, the speaker does not perceive Socrates's movement. The speaker only perceives that Socrates is in the car and the car is moving, which leads the speaker to believe that the proposition that Socrates is moving is true. The conclusion expresses that the speaker believes that the proposition, which is by definition an abstract object that is not based upon other cognitive acts, is true. The speaker simply associates an attribute with an entity through the syllogism, and asserts the truth of the proposition represented by the conclusion sentence.

In contrast, Syllogism II fits better to the following scenario:

(158) **Scenario B.**

We are watching a scene on a TV screen. A convertible is in the foreground; the image of the car on the screen is immobile; no background scenery is visible that could indicate that the car is moving. There is Socrates, with the lower half of his body hidden behind the visible side of the car. It is not obvious if he is in the car or behind the car. But his hair is horizontally drawn in the direction of the back of the car, as though blown by wind.

(ibid.)

In this case, Kuroda argues, that the speaker tries to claim that the car is moving and Socrates is in the car on the basis of his/her "perception" that Socrates is moving. The judgment expressed by the conclusion is dependent upon the perceptual apprehension



of the situation, and it affirms the perceptual apprehension. Therefore, under Scenario B, the last sentence of (156) is not really the conclusion of the syllogism: it is rather the premise based on which the speaker infers that the car is moving and Socrates is in the car.

To make the point clearer, let us imagine a slightly modified situation. First, imagine that the scene on the TV starts with a close-up shot of Socrates' face. His other body parts and background scenery are not visible. But his hair is horizontally drawn, and his head is occasionally bobbing up and down as if he is in some kind of moving vehicle. The observer's perception of the scene is that Socrates is moving, and that makes him wonder why Socrates is moving, because his facial expressions does not look like he is using his body muscles. Then the camera gradually zooms out, and a convertible appears on the screen, with the lower half of Socrates' body hidden behind the visible side of the car. At this point, the observer may utter (156). The last sentence in (156) describes the observer's perceptual apprehension of the scene, from which the observer made an inference about why Socrates is moving. Thus, in English, (156), would naturally be expressed as: "Socrates is in a car and the car is moving. That's why Socrates is moving."

Kuroda claims that Japanese grammaticalizes the distinction between categorical/predicational judgment (asserting) andthetic/descriptive judgment (affirming) by means of the *wa-ga* contrast: a *wa* sentence expresses a categorical/predicational judgment; a *ga* sentence expresses a descriptive judgment. In other words, a statement with a *wa*-marked subject is understood as expressing a categorical/predicational judgment; a statement with a *ga*-marked subject is

understood as expressing athetic/descriptive judgment. Accordingly, a *wa*-sentence presents a proposition and expresses that the speaker believes that the proposition is true for whatever reason. The speaker may not have direct perceptual ground for believing the truth of the proposition, as in the scenario A in (157). In contrast, a *ga*-sentence presents a proposition and expresses that the proposition describes a perceptual/conceptual apprehension of some event in the external world by the speaker.

Kuroda maintains that “a kind of maximality constraint” is imposed on the cognitive process of making thetic/descriptive judgments which functions as a description of a situation. When making a thetic/descriptive judgment, a speaker chooses a situation that is embedded in cognitive environments, conceptual frames, or perceptual scenes, along with other situations. The maximality constraint forces the speaker to choose a description that makes the grasped situation a maximal fit. Conversely, when a thetic/descriptive judgment is expressed by a *ga*-marked subject, it is expected that the speaker has picked up a maximal situation in the cognitive environment that fits the form. Intuitively, the idea can be stated as follows: if the speaker is cooperative, then he is expected to give a full, maximally specific description of a given situation, rather than providing partial information about the situation. This expectation yields the exhaustive listing implicature, and thus the implicature can be regarded as a version of familiar conversational implicature. For example, the use of the form in (159) evokes an expectation that the speaker has picked up a maximal situation that fits the form. From this expectation the exhaustive listing implicature results: “*kare* and only *kare* is Japanese”, which is anomalous

unless it is clear that *kare* is in fact a maximal fit in the context (i.e., *kare* is indeed the only Japanese person in the context).

(159) Kare-**ga** nihonjin desu  
he-NOM Japanese COP  
“He is Japanese”

Therefore, the exhaustive listing implicature is associated with the particular speech act thatthetic/descriptive judgments express. When someone is simply expressing his belief that the proposition “Taroo is Japanese” is true (i.e., making a categorical/predicational judgment), the speaker is not expected to present other numerous propositions that he also believes to be true. For example, the speaker may also believe that the proposition “Hanako is Japanese” is true in this world, but that is simply not relevant to the purpose of his present speech act. In contrast, when someone is describing a situation that involves Taroo and Hanako, then assuming that the speaker is cooperative, it is expected that his description provides a maximal grasp of the situation. In this case, presenting the proposition that “Taroo is Japanese” as a description of the situation invites an inference that that this proposition fully describes the situation, and therefore yields an implicature that Taroo and only Taroo is Japanese.

Kuroda further maintains that the effect of the maximality constraint should be recognized with stage-level predicates, which are often claimed to assign a “neutral-description” (i.e., no exhaustive listing implicature) interpretation to a *ga*-marked subject (e.g., Kuno 1973). In such cases, Kuroda argues, the perceived situation on which the speaker’s judgment is based makes the relevant context narrower. So for example, upon hearing the sentence in (160), “the hearer can understand that the

speaker's visual perception is so narrowed as to make this situation a maximal fit"  
(Kuroda 2005: 39)

(160) Asokode Mori-san ga hasitte iru  
There run be  
"Mori-san is running there"

So far I have reviewed Kuroda's theory of judgment and its interaction with the *ga/wa* distinction in Japanese. Based on Kuroda's theory, I will try to provide a more detailed description of the meanings of Japanese sentences, focusing on those that involve a *ga*-marked subject. First, consider the following situation. A person who does not speak Japanese fluently traveled to Japan, and got lost in Narita Airport. The person wanted to ask someone the way to the train station in the airport, and since he was not confident in his ability to comprehend Japanese, he looked for someone who speaks English. He found an airport staff member, and asked the guy if he speaks English. In this situation, the use of a *ga*-subject creates a strong awkwardness, while the corresponding *wa*-version is fine:

- (161) a. #Anata-**ga** eigo-o hanasi masu ka?  
you-NOM English-ACC speak polite Q  
Lit. "Do you speak English?"  
b. Anata-**wa** eigo-o hanasi masu ka?  
you-NOM English-ACC speak polite Q  
Lit. "Do you speak English?"

Let us analyze the meaning of (161)a using Kuroda's ideas. First, the use of the *ga*-marked subject indicates that the form is (the yes-no question of) a description of a situation that is picked up from the speaker's cognitive environment. The content of the description in turn suggests that the situation chosen by the speaker involves a

property of being able to speak English, because the situation is described by using the predicate “ $\lambda x. x$  speaks English”. This gives rise to an *existential presupposition*: the description is possible only if the discourse context provides the speaker enough cognitive basis (e.g., perceptual scenes, conceptual frames, etc.) for believing that there exists someone who speaks English in this particular place/moment of time. In other words, one cannot describe something as involving a property without knowing if there is anything with the property. Thus, the use of the form that has a function as a description invokes the presupposition “ $\exists x (x \text{ speaks English})$ ”. This presupposition, however, contradicts the actual situation where the sentence (161)a is uttered: the speaker only perceived that there was a person, without having any clue about whether or not the person spoke English. In other words, the speaker did not have a basis within his cognitive environment for presupposing that there was someone (other than himself) who spoke English. This contradiction contributes to the awkwardness associated with (161)a. By contrast, (161)b is free from an existential presupposition, and therefore can felicitously be used in the situation.

Second, as Kuroda argues, (161)a is subject to a maximality constraint. Given the maximality constraint, the description is expected to be a maximal fit to the situation. The description involves a singular term *anata*<sup>38</sup> “you” as the argument of the predicate “ $\lambda x. x$  speaks English”. If the speaker obeys the maximality constraint, then it is expected that the set of individuals that satisfy the predicate is maximally specified by the descriptive content of the subject. In other words, the singleton referent of the subject should constitute the maximal set satisfying the predicate.

---

<sup>38</sup> Japanese personal pronouns have the singular-plural distinction. *Anata-gata* and *anata-tachi* are the plural forms of the second person pronoun.

Consequently, an implicature of uniqueness arises: there is only one individual that satisfies the predicate. Thus, the meaning of (161)a is translated into English using a definite description as the predicate of the sentence: “Are you the person who speaks English?” To illustrate this point further, let us imagine the following situation. A person visited the University of Maryland to attend a conference held at the university. After the conference, the person went to a party at one of the faculty members’ house. There were a lot of students at the party, and one of them talked to the person. The person wanted to know if the student is a student of UMD, so he asked the following question:

- (162) a. #Anata-**ga** UMD-no gakusei desu ka?  
 You-NOM UMD-GEN student COP Q  
 “Are you the student of UMD?”
- b. Anata-**wa** UMD-no gakuse desu ka?  
 You-NOM UMD-GEN student COP Q  
 “Are you a student of UMD?”

As the English translation suggests, the *ga* version implies that the speaker assumes that there is only one student of UMD, which creates awkwardness: in the situation there is no obvious reason to assume that there is only one student of UMD attending the party. Note that the awkwardness in this case cannot be due to a failure to satisfy the existential presupposition: since the party was held at the University of Maryland, and the speaker saw that there were many students at the party, it is quite natural for him to believe that there was someone who was a student of UMD at the party. This effect of the maximality constraint is what is usually referred to as the exhaustive listing implicature. I will instead call the semantic effect the implicature of *uniqueness/maximality*, given its similarity to the semantics of definite descriptions in

English. (162)a can be felicitously uttered if the implicature of *uniqueness/maximality* does not contradict the context. For example, if the speaker is an organizer of a conference for which only one student of UMD has registered, the speaker can felicitously ask someone at the conference registration desk if he is the student of UMD, using the form in (162)a.

This analysis has revealed that the meaning that is conveyed by a *ga*-sentence is strikingly similar to the meaning of definiteness in English (and presumably in other languages as well): the crucial components are existence and maximality, which are often regarded as the defining characteristics of definiteness<sup>39</sup> (e.g., Lyons 1999; Abbott 2004). Note, however, that in Japanese *ga*-sentences, the existential presupposition and the uniqueness/maximality implicature are defined in terms of the property denoted by the predicate of the sentence, rather than by the *ga*-marked subject. To illustrate this point, compare the following examples. I do not include an English translation for (163)b in order to avoid making any presumption about the meaning of the sentence:

- (163) a. The student of UMD came in  
b. UMD-no gakusei-ga haittekita  
UMD-GEN student-NOM came-in

I assume, following Roberts (2003), that the English sentence (163)a presupposes that there is someone who is a student of UMD, and that individual is unique among the individuals in the discourse context in bearing the property of being a student of

---

<sup>39</sup> As reviewed in Abbott (2004), there are various different approaches to the meaning components of definiteness, and different proposals has been made with respect to the nature of the meaning components (i.e., whether they are assertions, presuppositions or implicature). I will put this issue aside here.

UMD: there is one and only one student of UMD in the context. In contrast, I argue that what the Japanese sentence (163)b presupposes is that there is someone who came in, and the sentence implies that the referent or the referents of the subject (the form is ambiguous between singular and plural interpretation) is unique among the individuals in the situation that the speaker picked up as the basis of the description in bearing the property of having come in. Thus, the Japanese sentence can be used without presupposing the existence of a student of UMD in the discourse context: the existence of the student can be completely new information. Also, there can be possibly many students of UMD in the situation, as long as all of the students bear the property of having come in.

Summarizing so far, I have argued that a *ga*-sentence that expresses a judgment is associated with an existential presupposition and implicature of uniqueness/maximality. Those pragmatic meaning components are added on top of the propositional meaning/assertion of the sentence that is compositionally computed from the LF representation. Based on the assumption, I now provide a full description of the meaning components of a *ga*-sentence. (165) gives a full description of the meaning components of (164):

(164) Taroo-**ga** nihonjin desu  
 Taroo-NOM Japanese COP  
 “Taroo is Japanese”

- (165) a. *Assertion*: Taroo is Japanese
- b. *Existential presupposition*: within the situation that has been picked up by the speaker, there is some individual *x* and *x* is Japanese.
- c. *Uniqueness/maximality implicature*: Taroo is unique among the individuals in the situation in bearing the property of being Japanese. Therefore,  $x = \text{Taroo}$ .



(165) is simply a description, as I currently do not have an explicit theory of the computation and rules that derive (b) and (c). It remains an interesting puzzle to spell out how those meaning components are compositionally computed from the linguistic form in (164).

I will now extend this analysis to cases that involve a quantificational subject, especially *dareka* “someone”. In (166), the subject is replaced by *dareka*, and it is marked by *ga*. The meaning of the sentence is analyzed as in (167).

(166) Dareka-**ga** nihonjin desu  
Someone-NOM Japanese COP  
“Someone is Japanese”

- (167) a. *Assertion*: There is some individual  $x$  and  $x$  is Japanese
- b. *Existential presupposition*: Within the situation that has been picked up by the speaker, there is some individual  $y$  and  $y$  is Japanese.
- c. *Uniqueness/maximality implicature*: There is only one  $x$  and  $x$  is unique among the individuals in the situation in bearing the property of being Japanese. Therefore,  $x=y$ .

What is particularly important here is the uniqueness implicature that is imposed on the individual that satisfies the predicate “ $\lambda x. x$  is Japanese.” By using the *ga*-sentence in (166), the speaker of the sentence expresses athetic/descriptive judgment, by which the speaker gives a description of a situation that is picked up from his cognitive environment (rather than merely presenting a proposition that the speaker believes to be true). Given the maximality constraint imposed on such descriptions, it is expected that the set of individuals that satisfy the predicate is maximally specified by the descriptive content of the subject. A remaining problem here is how to

determine the set of individuals on which the maximality constraint is imposed. With a proper noun or a definite subject, the set simply corresponds to the set of the referent(s) of the subject. However, with an indefinite subject, the determination process is not straightforward, especially so if we assume that indefinites denote a GQ. Here, I simply assume that the subject *dareka* “someone” picks up a singular individual in the situation, without specifying the actual mechanism that underlies the process. As a result, the description implies that there is only one individual in the situation that satisfies the predicate. This implicature of uniqueness forces the subject indefinite to be interpreted as specific, in the sense that it presupposes that there exists a uniquely identifiable individual that bears the property of being Japanese.

In order to further illustrate the point, let us compare a *ga*-sentence with the corresponding *wa*-sentence. Imagine that in a detective story, a detective who had been investigating a case of murder finally gathered up those involved. The people were anxious about what the detective would tell them. The detective then broke the ice by saying the following:

- (168) Kononaka-no dareka-**ga** hannin desu  
 this group-GEN someone-NOM criminal COP  
 “Someone in this group is the criminal”
- (169) Kononaka-no dareka-**wa** hannin desu  
 this group-GEN someone-NOM criminal COP  
 “Someone in this group is a criminal”

The *ga* sentence in (168) sounds quite natural in the situation. Due to the uniqueness implicature, the sentence implies that the detective has evidence that shows that there is a unique individual that has a property of being a criminal in the group, whose identity will probably be uncovered by the detective. In contrast, the *wa* version in

(169) merely states that there is at least one individual in the group who is a criminal (hence the indefinite in English translation). The sentence thus implies that the detective has not come close to identifying the criminal: all he has is probably some circumstantial evidence that suggests that the criminal cannot be someone outside of the group (e.g., the murder occurred in a ship out at sea).

Based on the analysis, I propose that the uniqueness implicature that is associated with *dareka* “someone” as a *ga*-marked subject invokes the scope rigidity effect in sentences like (170):

(170) Dareka-ga dono kyoujyu mo hihan-sita  
 someone-NOM every professor criticize-did  
 \* $\forall >> \exists$

Under the current approach, the meaning components of the sentence in (170) are analyzed as in (171):

- (171) a. *Assertion by LF1*: There is some individual *x*, such that for every *y*, *x* criticized *y*.  
*Assertion by LF2*: For every *y*, there is some individual *x* such that *x* criticized *y*.
- b. *Existential presupposition*: Within the situation that has been picked up by the speaker, there is some individual *z* and *z* has a property of being an agent in an event of criticizing.<sup>40</sup>
- c. *Uniqueness/maximality implicature*: There is only one *x* and *x* is unique among the individuals in the situation in bearing the property of being an agent in an event of criticizing. Therefore,  $x=z$ .

---

<sup>40</sup> The relevant property in this component does not involve the semantic contribution of the object quantifier. This is because I want the component to be compatible with both LF1 and LF2. If we take the relevant property to be “ $\lambda x. x$  criticized every professor”, then the component amounts to a presupposition that there is some *x* and *x* criticized every professor, which is only compatible with LF1. Such an analysis would predict that any *ga*-sentence that invokes an existential presupposition only allows the surface scope interpretation, but cases that involve an inherently non-specific subject (e.g., (174)) suggest that the prediction is not borne out.

Since the grammar of Japanese generates two possible LF representations for the sentence (one of which corresponds to the surface scope interpretation, and the other corresponds to the inverse scope interpretation), there are two possible assertions of the sentence. However, the second assertion is not compatible with the uniqueness implicature: under the distributive interpretation, there should be multiple individuals that have a property of being an agent in an event of criticizing (i.e., one criticizer for each professor). The second assertion is thus blocked. In other words, the possibility for the subject to distribute over the universal quantifier is blocked due to the uniqueness implicature.

Cases that involve a plural indefinite subject receive the same analysis. Consider the following example, in which the distributive (i.e., inverse scope) interpretation is not possible:

- (172) Sannin-no gakusei-ga dono kyoujyu mo hihan-sita  
three-GEN student-NOM every professor criticize-did  
“Three students criticized every professor”  
\* $\forall >$ THREE

Due to the maximality constraint, it is expected that the descriptive content of the subject maximally specifies the set of individuals that satisfy the relevant property. Here, I assume the subject picks up a set of students with exactly three members. Accordingly, the sentence implies that there are exactly three students who are unique in the situation in bearing the property of being an agent in an event of criticizing. However, under the distributive interpretation of the sentence, there should be more than three students who participated in the event of criticizing (i.e., three students for each professor). The distributive interpretation is therefore not compatible with the

uniqueness/maximality implicature, and hence the sentence only allows the surface scope interpretation.

Under the present account, it is assumed that the uniqueness/maximality implicature falls out from the nature ofthetic/descriptive judgments. This entails that the implicature would not arise within clauses that do not express a judgment, even with a *ga*-marked subject. Since judgments are defined to be the speaker's commitment to the truth of the sentence, it would be reasonable to assume that irrealis clauses do not express a judgment (i.e., Kuroda's *Non-Statement Making Clauses*). A defining property of irrealis contexts is that the truth of the proposition is left unspecified at the time of speech: hence, the speaker does not (or cannot) commit to the truth of irrealis clauses. Given this assumption, it follows that irrealis clauses do not invoke the uniqueness/maximality implicature of *ga*-marked subjects, and therefore, distributive inverse scope interpretations are not blocked, as we have observed in section 3.2.2. The relevant examples are repeated here as (173):

- (173) a. *Imperative/subjunctive*  
 Dareka-ga dono heya mo souji-si nakereba naranai  
 someone-NOM every room clean-do MOOD  
 "It is imperative that someone cleans every room"  
 $OK \forall >> \exists$
- b. *Counterfactual/subjunctive*  
 Dareka-ga dono heya mo souji-suru hazu datta  
 Someone-NOM every room clean-do MOOD COP-past  
 "Someone should have cleaned every room"  
 $OK \forall >> \exists$
- c. *Assumptive*  
 (Sonouchi) dareka-ga dono heya mo souji-suru darou  
 (In the meantime) someone-NOM every room clean-do MOOD  
 "I assume someone will clean every room in the meantime"  
 $OK \forall >> \exists$

- d. *Speculative*  
 (Sonouchi) dareka-ga dono heya mo souji-suru kamo shirenai  
 (in the meantime) someone-NOM every room clean-do MOOD  
 “It is possible that someone will clean every room in the meantime”  
 ${}^{OK}\forall >> \exists$

Next, let us turn to cases that involve an inherently non-specific QP as a *ga*-marked subject. The relevant examples are repeated here as (174):

- (174) a. *Hutari ijyou-no* gakusei-ga dono kyoujyu-mo hihan-sita  
 two greater-than-GEN student-NOM every professor criticize-did  
 “More than two students criticized every professor”  
 $\forall >>$  more than two
- b. *Sannin ika-no* gakusei-ga dono kyoujyu-mo hihan-sita  
 three smaller-than-GEN student-NOM every professor criticize-did  
 “Less than three students criticized every professor”  
 $\forall >>$  less than three
- c. *Sukunakutomo hutari-no* gakusei-ga dono kyoujyu-mo hihan-sita  
 at-least two-GEN student-NOM every professor criticize-did  
 “At least two students criticized every professor”  
 $\forall >>$  at least two

I assume that the modified numeral quantifiers lack the ability to pick up a specific referent in the discourse, possibly due to the lack of choice-function interpretation (e.g., Reinhart 2006). Given this, those quantifiers may not provide a set of specific individuals from which the maximality constraint derives the implicature of uniqueness/maximality. Consequently, the implicature is not computed, and therefore the sentences are compatible with distributive inverse scope interpretations.

One remaining problem is the cases in which surface scope results in an implausible interpretation. In sentences like (175) (=84)), the surface scope interpretation is implausible, given the knowledge of physical properties of the world:

it is implausible that a specific individual is in a state of crossing every different crosswalk at a single moment of time. By contrast, the distributive inverse scope interpretation describes a plausible situation. I argue that in such a case, the listener tries to accommodate, and as a result, he ignores the uniqueness implicature that is associated with the subject in order to access the plausible interpretation.<sup>41</sup>

(175) (Choudo ima) dareka-ga dono oudan hodou mo watat-teiru  
 right now someone-NOM every crosswalk cross-ing  
 “Right now, someone is crossing every crosswalk”  
 OK<sub>∇</sub>>>E

One might now wonder if inverse scope becomes possible by replacing *ga* of the subject with *wa*, as in the following:

(176) Dareka-**wa** dono kyoujyu mo hihan-sita  
 someone-NOM every professor criticize-did  
 “Someone criticized every professor”

In order to test the possibility of inverse scope in this sentence, several different interpretations of the sentence must be properly sorted out. First, the subject in (176) can be assigned the so-called “thematic” interpretation, and the sentence means something like “Speaking of *dareka*, the person criticized every professor”. Under this construal, *dareka* is a referential pronoun rather than a quantifier, referring to a specific person whose identity the speaker happens not to know. Another possible interpretation is the “contrastive” one, which would arise in a context where the

---

<sup>41</sup> Admittedly, this account lacks an independent argument for the assumption that the plausibility of a particular interpretation can make the listener ignore pragmatic implicature (Colin Phillips, Personal Communication). The assumption would be supported by an observation that an interpretation that is normally blocked by pragmatic implicature is made available by manipulating the plausibility of the (grammatically) possible interpretations. Right now, I am not aware of any such fact.

referent of the subject is contrasted with another specific individual in the context. For example, the sentence can continue the following preceding discourse: “In the meeting, someone didn’t speak up at all. Someone else kept bringing up not-so-important issues...”. In both of those interpretations, *dareka* is specific, and does not allow the inverse scope interpretation. However, there is another possible interpretation of the subject. That interpretation resembles the interpretation of the subject in (169), which can be paraphrased as “at least one”. Under this construal of *dareka*, the inverse scope reading is indeed possible: the sentence can mean “for every professor *x*, there is at least one person who criticized *x*”. The contrast between *ga* and *wa* is even clearer in the following pair of examples:

- (177) a. Dareka-**ga** dono heya mo souji-sita no?  
 someone-NOM every room clean-did Q  
 “Did someone clean every room?”  
 \* $\forall > \exists$
- b. Dareka-**wa** dono heya mo souji-sita no?  
 someone-TOP every room clean-did Q  
<sup>OK</sup> $\forall > \exists$

To my knowledge, this *ga/wa* contrast for scope rigidity has not been discussed in the literature. This is possible because of the existence of confounding interpretations, which seem to be preferred interpretations if the relevant *wa*-sentences are presented without any context. However, once irrelevant interpretations are carefully sorted out, it is possible to observe that a *wa*-marked subject can take part in an inverse scope interpretation. According to my informal interviews with Japanese speakers, the relevant judgments seem to be fairly robust.



Let us now summarize the proposal. I argued that Japanese has the grammatical means to derive inverse scope interpretations, and that the mechanism is identical with that of English. I then proposed that the uniqueness/maximality implicature imposed on *ga*-marked subjects is responsible for the rigid scope effect in Japanese. The grammaticalized system for distinguishing kinds of judgments is not included in the grammar of English. Therefore, English sentences are not associated with the relevant pragmatic implicature, allowing inverse scope interpretations more freely than their Japanese counterparts. Thus, even though the mechanism that is responsible for the cross-linguistic contrast is pragmatic in nature, the reason why pragmatics works differently in Japanese and English is attributed to the difference in grammatical options that those languages provide.

### **3.6 Scrambling and reconstruction**

In this section, I turn to the scope reconstruction asymmetry in scrambled sentences that I pointed out in Chapter 1. I will first examine the scope reconstruction asymmetry in detail, and show that scope interpretations in non-canonical word order sentences, and show that QNPs that involve the focus particle *mo* do not scope-reconstruct. I then propose that those quantifiers that do not reconstruct are base-generated in the surface position.

#### *3.6.1 Reconstruction asymmetry*

To recap, let us review the relevant data again. Hoji (1985) provides the following pair of canonical and scrambled order sentences, pointing out that only the scrambled version shows ambiguity:

- (178) a. Dareka-ga daremo-o sementa  
 someone-NOM everyone-ACC criticized  
 “someone criticized everyone” (unambiguous)
- b. Daremo-o<sub>i</sub> dareka-ga *t<sub>i</sub>* semeta  
 everyone-ACC someone-NOM criticized  
 Lit. “Everyone, someone criticized” (ambiguous)

However, since the “surface scope”  $\forall >> \exists$  interpretation of (178)b is entailed by the inverse scope the inverse scope  $\exists >> \forall$  interpretation, the contrast in (178) does not provide conclusive evidence for the availability of the inverse scope interpretation in the scrambled version. The sentence in (178)a should thus be compared with (179), which in fact shows scope ambiguity:

- (179) Dareka-o<sub>i</sub> daremo-ga *t<sub>i</sub>* semeta  
 someone-ACC everyone-NOM criticized  
 Lit. “Someone, everyone criticized”  
 $\exists >> \forall / \forall >> \exists$

The sentence can be truthfully uttered in a situation where everyone criticized a different individual. Since the surface scope  $\exists >> \forall$  interpretation should make the sentence false in the situation, this fact shows that the inverse scope interpretation is indeed available with the scrambled sentence.

Let us tentatively assume that the inverse scope interpretation (i.e.,  $\forall >> \exists$ ) is derived by reconstructing the scrambled object to its base position. Thus, both in canonical order and scrambled order sentences, reconstruction of an overtly moved element is involved in the derivation of the inverse-scope LF. The examples in (180) show that scrambled indefinites in general can scope-reconstruct, giving rise to scope ambiguity:

- (180) a. [Hutari-no kyoujyu-o]<sub>i</sub> dono gakusei mo *t<sub>i</sub>* hihan-sita  
 two-GEN professor-ACC every student criticize-did  
 “Every student criticized two professors”  
 TWO>>∀ / ∀>>TWO
- b. [Sukunakutomo hutari-no kyoujyu-o]<sub>i</sub> dono gakusei mo *t<sub>i</sub>* hihan-sita  
 at least two-GEN professor-ACC every student criticize-did  
 at least two>>∀ / ∀>>at least two  
 “Every student criticized at least two professors”

A question remains, however, as to whether Hoji’s original claim about (178)b still stands: that is, whether a scrambled universal quantifier can scope-reconstruct. In order to test this possibility, it is necessary to find a combination of quantifiers in which the surface scope interpretation entails the inverse scope interpretation, so that we can construct a test scenario in which only the inverse scope interpretation is true. Since the combination of a universal quantifier and a negative quantifier in this order creates such an environment, we want a negative quantifier as the subject. Negative quantifiers, however, are not straightforwardly available in Japanese: Japanese does not have direct counterparts for *nobody*, *noone*, *nothing*, etc.

A solution for the dilemma is provided by the focus particle *dake* “only”. Let us first observe that, just like its English counterpart, a sentence that contains *dake* entails a negative proposition, as illustrated in (181):

- (181) Taroo-**dake**-ga kare-o hihan-sita  
 Taroo-only-NOM he-ACC criticize-did  
 “Only Taroo criticized him”  
 → Everyone other than Taroo didn’t criticize him

The negation within the entailed proposition scope-interacts with other quantificational elements in the sentence. Moreover, the scope of the negation is determined by the syntactic position of *dake*: when *dake* appears in the subject

position, the entailed negation takes wider scope than the object; when *dake* appears in the object position, the entailed negation takes narrower scope than the subject:

- (182) Taroo-**dake**-ga dono kyouju mo hihan-sita  
 Taroo-only-NOM every professor criticize-did  
 “Only Taroo criticized every professor”  
 → Everyone other than Taroo didn’t criticize every professor ( $\neg \rightarrow \forall$ )
- (183) Dono kyouju mo Taroo-**dake**-o hihan-sita  
 every professor Taroo-only-ACC criticize-did  
 “Every professor criticized only Taroo”  
 → Every professor criticized nobody other than Taroo<sup>42</sup> ( $\forall \rightarrow \neg$ )

Now imagine the following situation. Taroo, Hanako and Jiro are student representatives. In a student meeting, they started criticizing the faculty members of the department. Taroo criticized all the professors in the department (Prof. A, B and C). Hanako only criticized Prof. A. Jiro criticized Prof B and C. The situation is schematically represented in (184).

|       |        |         |         |        |
|-------|--------|---------|---------|--------|
| (184) |        | Prof. A | Prof. B | Prof.C |
|       | Taroo  | √       | √       | √      |
|       | Hanako | √       | *       | *      |
|       | Jiro   | *       | √       | √      |

The sentence (182) is true under the situation: Taroo was the only one who criticized every professor, that is, everyone other than Taroo didn’t criticize every professor. Now the question is whether the same interpretation can be obtained with the scrambled version of (182). If scope-reconstruction of a scrambled universal is possible, (185) can mean the same thing as (182) means:

---

<sup>42</sup> More precisely, “ $\forall x \neq \text{Taroo}, \forall y = \text{a professor}, \neg(y \text{ criticized } x)$ ”.

- (185) [Dono kyoujyu mo]<sub>i</sub> Taroo-dake-ga *t<sub>i</sub>* hihan-sita  
 every professor Taroo-only-NOM criticize-did  
 Lit. "Every professor, only Taroo criticized"

Native speakers of Japanese judge the sentence in (185) is false under the situation in (184). This suggests that the reconstructed interpretation is impossible: otherwise, the sentence should be accepted under the situation, just like its canonical order counterpart in (182). Instead, the sentence in (185) can only mean that for every professor *x*, Taroo is the only person who criticized *x*: everyone other than Taroo didn't criticize *x*. The situation in (184) does not make this interpretation true: Hakano and Jiro also criticized some professor.

The scrambled universal QP consists of several subparts: a *wh*-phrase *dono* "which", the head noun *kyoujyu* "professor", and a focus particle *mo* "also". The focus particle *mo* may form a conjunction phrase in the form of NP<sub>1</sub> *mo* NP<sub>2</sub> *mo*. The ...*mo*...*mo* conjunction also resists scope reconstruction when scrambled, as shown in (186):

- (186) [Piza **mo** pasuta **mo**]<sub>i</sub> Taroo-dake-ga *t<sub>i</sub>* tabeta  
 both pizza and pasta Taroo-only-NOM ate  
 Lit. "Both pizza and pasta, only John ate"  
 $\wedge > > \neg / * \neg > > \wedge$

(186) only allows the interpretation in which the conjunction operator takes scope over the entailed negation associated with *dake*. That is, the sentence is false when, for example, Hanako ate pizza (but not pasta).

Furthermore, the focus particle *mo* itself induces the same anti-reconstruction effect. First, observe that sentences that involve a *mo*-marked focus entail an existential proposition (e.g., Kuroda 1970):

- (187) Taroo-wa piza **mo** tabeta  
 Taroo-TOP pizza also ate  
 "Taroo ate pizza as well"  
 $\rightarrow \exists_{x: x \neq \text{apple}} (\text{Taroo ate } x)$

The existential quantifier in the entailed proposition scope-interacts with other QPs in the same sentence, just in the cases that involve *dake* "only". For example, in (188), the entailed existential quantifier takes narrower scope than the subject universal, yielding a distributive interpretation with respect to what everyone ate in addition to pizza. Therefore, the sentence is true under the situation in (189).

- (188) Zen'in-ga piza **mo** tabeta  
 everyone-NOM pizza-also ate  
 "Everyone ate pizza as well"  
 $\rightarrow \forall_{x: x = \text{person}} (\exists_{y: y \neq \text{pizza}} (x \text{ ate } y))$

(189)

|        | cake | pasta | pizza |
|--------|------|-------|-------|
| Taroo  | √    | √     | √     |
| Hanako | √    | *     | √     |
| Jiro   | *    | √     | √     |

In contrast, when the *mo*-marked object is scrambled to the front of the sentence, a distinct set of truth condition surfaces. The entailed existential now takes scope over the universal, yielding a specific interpretation with respect to what everyone ate in addition to pizza. That is, the sentence in (190) means that there is something other than pizza that everyone ate:

- (190) [Piza **mo**]<sub>i</sub> zen'in-ga *t<sub>i</sub>* tabeta  
 pizza also everyone-NOM ate  
 $\exists_{x: x \neq \text{pizza}} (\forall_{y: y = \text{person}} (y \text{ ate } x))$

Crucially, scope-reconstruction of *piza mo* is again impossible, and the sentence in (190) is false in the situation (189): no food other than pizza was eaten by everyone.

The same effect persists even in sentences with a long-distance scrambling, which is somewhat surprising given that it has often been claimed that long-distance scrambling is semantically vacuous (e.g., Saito 1985, 1989; Tada 1993).<sup>43</sup> In order to make the relevant judgments easier to access, the following examples are built along the situations we are familiar with. First, imagine the following situation: several MLB teams are trying to acquire Japanese baseball players (Matsuzaka, Okajima, and Igawa), and people in Japan are interested in which team will get who. One newspaper, Tokyo Sports, presents their prediction that the Yankees are going to get all of them. Others have different opinions: Spo-Nichi calls that the Yankees are only getting Igawa; Too-Chu anticipates that the Yankees are going to acquire Matsuzaka, and only Matsuzaka. Under this situation, the following sentence can be uttered truthfully:

---

<sup>43</sup> Tada (1993) claims that long-distance scrambling cannot change scope relations. The relevant example in Tada (1993) is the followings.

- (i) a. Dareka-ga [John-ga daremo-o aisiteru]-to omotteiru  
 someone-NOM -NOM everyone-ACC loves -comp thinks  
 b. Daremo<sub>i</sub>-o dareka-ga [John-ga *t<sub>i</sub>* aisiteru]-to omotteiru  
 everyone-ACC someone-NOM -nom loves -comp thinks (Tada 1993: 35)

Tada argues that both sentences are unambiguous, allowing only the  $\exists >> \forall$  interpretation. The judgment is not clear to me: I agree that the distributive interpretation in (b) is somewhat degraded, but the interpretation does not seem to me to be completely impossible. But even if I put that concern aside, there are cases in which long-distance scrambling clearly affects scope interpretations:

- (ii) a. Toosupo-dake-ga [Yankees-ga hutari-ijyou-no nihonjin senshu-o kakutoku-suru]-to yosousita  
 Tokyo Sports-only-NOM -NOM more than two Japanese player-ACC acquire-going-COMP predicted  
 "Only Tokyo Sports reported that the Yankees were going to acquire more than two Japanese players"  
 b. [Hutari-ijyou-no nihonjin senshu-o]<sub>i</sub> Toosupo-dake-ga [Yankees-ga *t<sub>i</sub>* kakutoku-suru]-to yosousita  
 more than two Japanese player-ACC Tokyo Sports-only-NOM -NOM acquire-goin-COMP predicted  
 Lit. "More than two Japanese players, only Tokyo sports predicted that the Yankees were going to acquire"

With (ii)b, but not with (ii)a, the interpretation in which "more than two" takes scope over "only" is possible. Therefore, only (ii)b is true in the situation where Tokyo Sports reported Yankees was going to acquire Sinjyo, Saito, and Kuwata, and other papers predicted that Yankees was going to acquire Ichiro, Matuzaka and Okajima. Thus, whatever property is responsible for the (lack of) contrast in (i), the conclusion that long-distance scrambling cannot change scope relations seems to be too sweeping.

- (191) Toosupo-dake-ga [Yankees-ga dono nihonjin sensyu mo kakutoku-suru]-to  
 Tokyo Sports only-NOM -NOM every Japanese player acquire-going-COMP  
 yosou-sita  
 predict-did  
 "Only Tokyo Sports predicted that the Yankees were going to acquire every  
 Japanese player"

In contrast, the long-scrambled version in (192) is false in the same situation, suggesting that the reconstructed interpretation is impossible. The sentence can only mean that for each Japanese player *x*, Tokyo Sports is the only one who predicted that the Yankees were going to acquire *x*, which is false, because others also predicted that the Yankees were going to get some of the players. Similarly, (193) is also false, again showing that the scrambled conjunction cannot reconstruct.

- (192) [Dono nihonjin senshu mo]<sub>*i*</sub> Toosupo-dake-ga [Yankees-ga *t<sub>i</sub>* kakutoku-  
 every Japanese player Tokyo Sports-only-NOM -NOM acquire-  
 suru]-to yosou-sita  
 going- COMP predict-did  
 Lit. "Every Japanese player, only Tokyo Sports predicted that the Yankees  
 were going to get"
- (193) [Matsuzaka mo Igawa mo]<sub>*i*</sub> Toosupo-dake-ga [Yankees-ga *t<sub>i</sub>* kakutoku-suru]-  
 both Matsuzaka and Igawa Tokyo Sports-only-NOM -NOM acquire-going-  
 to yosou-sita  
 COMP predict-did  
 Lit. "Both Matsuzaka and Igawa, only Tokyo Sports predicted that Yankees  
 was going to acquire"

Also, observe the contrast in (194). In (194)a, the existential quantifier associated with *mo* can distribute over the matrix subject: each of the newspapers expected a different player to be acquired by the Yankees in addition to Matsuzaka. In contrast, for (194)b to be true, there must be a specific player in addition to Matsuzaka that all the newspapers predicted that the player is going to Yankees. The reconstructed interpretation with (194)b is impossible.



- (194) a. Subete-no sinbun-ga [Yankees-ga Matsuzaka mo kakutoku-suru]-to  
 all-GEN newspaper-NOM -NOM also acquire-going-COMP  
 yosou-sita  
 predict-did  
 "All newspapers predicted that the Yankees were going to acquire  
 Matsuzaka as well"
- b. [Matsuzaka mo]<sub>i</sub> subete-no sinbun-ga [Yankees-ga *t<sub>i</sub>* kakutoku-suru]-to -  
 also all-GEN newspaper-NOM -NOM acquire-going-COMP  
 yosou-sita  
 predict-did  
 Lit. "Matsuzaka as well, all newspapers predicted that the Yankees were  
 going to acquire"

Finally, a parallel observation can be made with VP-internal scrambling. In contrast to indefinites that can scope-reconstruct<sup>44</sup>, the *mo*-family only allows the interpretations that match surface word order:

- (195) Taroo-wa [nanika-o]<sub>i</sub> dono gakusei-ni mo *t<sub>i</sub>* ageta  
 Taroo-TOP something-ACC every student gave  
 "Taroo gave something to every student"  
 $\exists >> \forall / \forall >> \exists$
- (196) a. Taroo-wa [dono tabemono mo]<sub>i</sub> Hanako-dake-ni *t<sub>i</sub>* ageta  
 Taroo-TOP every food Hanako-only-DAT gave  
 "Taroo gave every food to only Hanako"  
 $\forall >> \neg / * \neg >> \forall$
- b. Taroo-wa [piza mo pasuta mo]<sub>i</sub> Hanako-dake-ni *t<sub>i</sub>* ageta  
 Taroo-TOP both pizza and pasta Hanako-only-DAT gave  
 "Taroo gave both pizza and pasta to only Hanako"  
 $\forall >> \neg / \neg >> \forall$
- c. Taroo-wa [piza mo]<sub>i</sub> dono gakusei-ni mo *t<sub>i</sub>* ageta  
 Taroo-TOP pizza also every student gave  
 "Taroo gave pizza as well to every student"  
 $*\forall_{x: x=\text{student}} (\exists_{y: y=\text{pizza}} (\text{Taroo gave } y \text{ to } x))$

---

<sup>44</sup> We assume, following Hoji (1985) and others, that NOM-DAT-ACC-V is the basic word order of Japanese ditransitive sentences.

The observation that the specific lexical choice of the NP that undergoes overt movement affects the possibility of scope-reconstruction is not a novel one. Lasnik (1997, 2000) argues that in English, only indefinites can scope-reconstruct after moving to an A-position (some relevant examples are discussed in 2.2.2). Lechner (1997) points out that a topicalized/scrambled phrase in German can scope-reconstruct only when the phrase is a QP headed by a weak determiner. The current Japanese paradigm, however, may not be identified with those cases. Crucially, QPs like *zen'in* “everyone” and *subete-no X* “all the Xs” can scope-reconstruct in Japanese, even though they are definitely not indefinites, and are presumably not weak QPs.

(197) [Zen'in-o]<sub>i</sub> Taroo-dake-ga *t<sub>i</sub>* hihan-sita  
 everyone-ACC Taroo-only nom criticize-did  
 Lit. “Everyone, only Taroo criticized”  
 $\forall \gg \neg / \neg \gg \forall$

(198) [Subete-no hon-o]<sub>i</sub> Taroo-dake-ga *t<sub>i</sub>* yonda  
 all-GEN book-ACC Taroo-only-NOM ti read  
 Lit. “All the books, only Taroo read”  
 $\forall \gg \neg / \neg \gg \forall$

Thus, the generalization about possible scope interpretations with different scrambled QPs seems to be Japanese-specific. I propose the following generalization:

(199) A *mo*-based QP (*NP mo*; *dono NP mo*; *NP mo NP mo*) must be interpreted in its surface position.

In the next section, I give an account for why (199) is the case.

### 3.6.2. A base-generation analysis

One way to capture the generalization in (199) is to assume that a “scrambled” *mo*-QP is base-generated in its surface position, and that the thematic position of the QP is occupied by a null pronoun that is bound by the QP. Since such a base-generated phrase is not related to its lower thematic position via movement (i.e., reconstruction), it does not show a scope-reconstruction effect. I will provide some arguments for the base-generation analysis.

First, it has been pointed out (e.g., Saito 1985) that scrambling shows sensitivity to constraints on movement. For example, scrambling from inside a relative clause leads to ungrammaticality, as shown in (200):

- (200) \*[Furansugo-o]<sub>i</sub> Taroo-ga [<sub>t<sub>i</sub></sub> hanasu] hito-o mituketa  
 French-ACC Taroo-NOM speaks person-ACC found  
 Lit. “French, Taroo found a person who speaks”

Curiously, if the fronted NP is replaced by one of the *mo*-family, the acceptability of the sentence improves significantly:

- (201) a. ?[Furansugo mo]<sub>i</sub> Taroo-ga [<sub>t<sub>i</sub></sub> hanasu] hito-o mituketa  
 French also Taroo-NOM speaks person-ACC found  
 Lit. “French as well, Taroo found a person who speaks”  
 b. ?[Furansugo mo Supeingo mo]<sub>i</sub> Taroo-ga [<sub>t<sub>i</sub></sub> hanasu] hito-o mituketa  
 both French and Spanish Taroo-NOM speaks person-ACC found  
 Lit. “Both French and Spanish, Taroo found a person who speaks”  
 c. ?[Dono romansugo mo]<sub>i</sub> Taroo-ga [<sub>t<sub>i</sub></sub> hanasu] hito-o mituketa  
 every Romance language Taroo-NOM speaks person-ACC found  
 Lit. “Every romance language, Taroo found a person who speaks”

The ungrammaticality of (200) suggests that the scrambling of accusative-marked NP involves some form of movement operation, and the movement has violated a constraint (subjacency/ECP) on movement when it crosses the relative clause

boundary. Given this, the improved acceptability of sentences in (201) can be interpreted as suggesting that the scrambled phrases in (201) have not actually been moved. In other words, the “scrambled” phrases are allowed to be linked to their thematic positions (represented as *t* in (201)) by some way other than direct movement between the two positions. If movement is the only way to construct such a link, then the sentences in (201) should sound as bad as (200).

A second piece of evidence comes from data concerning resumption with local scrambling. With a case-marked scrambled element, pronominal resumption in the same clause is strictly prohibited:

- (202) \*[Kono tukue-ni]<sub>i</sub> Taroo-wa sore<sub>i</sub>-ni hon-o noseta  
 This desk-DAT Taroo-TOP it-DAT book-ACC put  
 Lit. “On this desk, Taroo put a book on it”

However, the acceptability of the sentence is again improved by replacing the scrambled object with one of *mo*-family, as in (203):

- (203) a. [Kono tukue-ni mo]<sub>i</sub> Taroo-wa sore<sub>i</sub>-ni hon-o noseta  
 This desk-DAT also Taroo-TOP it-DAT book-ACC put  
 Lit. “On this desk as well, Taroo put a book on it”  
 b. [Kono tukue-ni mo isu-ni mo]<sub>i</sub> Taroo-wa sore<sub>i</sub>-ni hon-o noseta  
 This desk-DAT also chair-DAT also Taroo-TOP it-DAT book-ACC put  
 Lit. “Both on this desk and the chair, Taroo put a book on it”  
 c. [Dono tukue-ni mo]<sub>i</sub> Taroo-wa sore<sub>i</sub>-ni hon-o noseta  
 Every desk-GEN Taroo-TOP it-DAT book-ACC put  
 Lit. “On every desk, Taroo put a book on it”

If a “scrambled” phrase and its base position are related via a movement operation, it is expected that a resumptive pronoun is excluded from the base position (a local movement usually does not allow pronominal resumption: e.g., Shlonsky 1992). The

improved acceptability of the sentences in (203), then, gives further support to the claim that the sentence-initial NPs can be base-generated in the surface position: otherwise, we expect the same degree of acceptability degradation.

So far, I have reviewed two observations that suggest that a *mo*-based QP, in contrast to other case-marked QNPs, can be base-generated at the “scrambled” position and stay there. I now turn to a case that suggests that a scrambled *mo*-QP must stay at the base-generated position. The case concerns the availability of bound-variable interpretations. As pointed out by Hoji (1985) and Ueyama (1998), among others, a scrambled object may allow variable-binding from the subject, suggesting that the object may be c-commanded by the subject at LF. In the following example from Ueyama (1998), the pronoun *so-ko* in the scrambled object may be variable-bound by the subject:

- (204) [So-ko-no ko-gaisha]-o Toyota-sae-ga suisensita  
 that-place-GEN child-company-ACC Toyota-even-NOM recommended  
 “Even Toyota recommended [its subsidiary]”  
 (Ueyama 1998: 149)

I assume that this kind of binding-reconstruction requires the scrambled object to be placed in its thematic position at LF. Given this, if a scrambled *mo*-based QP fails to show the binding-reconstruction effect, such data would suggest that the QP cannot be located in its thematic position at LF. However, simply replacing the scrambled object in (204) with one of the *mo*-family might not provide an ideal test. We have observed that a scrambled *mo*-phrase does not scope-reconstruct. Then, if the position in which an element is interpreted with respect to its scope must coincide with the position in which an element is interpreted with respect to binding (e.g, Lebeaux

1988), binding-reconstruction with a *mo*-based QP should automatically be blocked when the subject is a scope-taking element (as in (204)). In order to get around this potential confounding factor, I use sentences with ATB scrambling, as exemplified in (205):

- (205) [Soko-no shain-o]<sub>i</sub> Toyota-wa *t<sub>i</sub>* uttae Nissan-wa *t<sub>i</sub>* kubinisita  
 that place-GEN employee Toyota-TOP sued Nissan-TOP fired  
 Lit. “Its employee, Toyota sued and Nissan fired”

The sentence allows a “sloppy” reading of the pronoun *soko*, that is, it can mean that Toyota sued Toyota’s employee and Nissan fired Nissan’s employee. Given the observation that sloppy readings of a pronoun require c-command from its antecedent (e.g., Reinhart 1983), I interpret the fact in (205) to mean that binding-reconstruction is allowed in the sentence. Now, let us compare (205) with cases that involve a *mo*-based QP. The relevant examples are in (206). Sloppy interpretations are not available with these sentences, suggesting that the “scrambled” *mo*-phrases cannot be in their thematic positions at LF.<sup>45</sup>

- (206) a. [Soko-no shain mo]<sub>i</sub> Toyota-wa *t<sub>i</sub>* uttae Nissan-wa *t<sub>i</sub>* kubinisita  
 that place-GEN employee also Toyota-TOP sued Nissan-TOP fired  
 Lit. “Also its employee as well, Toyota sued and Nissan fired”
- b. [Soko-no shain mo bengoshi mo]<sub>i</sub> Toyota-wa *t<sub>i</sub>* uttae Nissan-wa *t<sub>i</sub>*  
 both its employee and lawyer Toyota-TOP sued Nissan-TOP  
 kubinisita  
 fired  
 Lit. “Both its employee and lawyer, Toyota sued and Nissan fired”

---

<sup>45</sup> Admittedly, the judgments regarding the contrast between (205) and (206) are not crystal clear. Many native speakers I have consulted with simply did not get the reconstructed interpretation, even with the base-line sentence (205). However, all the informants who did get the reconstructed interpretation with (205) also found the attested contrast with (206).

Thus, a scrambled *mo*-QP cannot undergo binding-reconstruction, even when scope interpretation is not relevant. This observation suggests that the lower thematic position is not accessible for a scrambled *mo*-QP.

The option of base-generating an argument in a non-theta position has been widely discussed in the Japanese syntactic literature. For example, Kuno (1973) and Saito (1985) argue that topicalized (i.e., *wa*-marked sentence initial) phrases in Japanese can be base-generated in the surface position. Ueyama (1998) claims that a certain kind of “scrambled” phrases are base-generated in the surface position. Bošković and Takahashi (2001) take perhaps the most radical approach, arguing that all scrambled phrases are base-generated at the surface position, and are lowered to their thematic positions at LF. Bošković and Takahashi claim that the LF-lowering of a scrambled phrase is a last-resort operation, triggered by the need to check formal features. This analysis accounts for the fact that adverbial adjuncts may not undergo long-distance scrambling, as shown in the following example by Saito (1985):

- (207) a. Mary-ga [John-ga [riyuu-mo naku] sono setsu-o sinjiteiru to]  
 Mary-NOM John-NOM reason-even without that theory-ACC believes that  
 omotteiru  
 thinks  
 “Mary thinks that John believes that theory without any reason”
- b. \*[Riyuu-mo naku]<sub>i</sub> Mary-ga [John-ga *t<sub>i</sub>* sono setsu-o sinjiteiru to]  
 reason-even without Mary-NOM John-NOM that theory-ACC believes that  
 omotteiru  
 thinks  
 “Without any reason Mary thinks John believes that theory”

Both surface forms of (207) are fine, but (207)b may not have the interpretation that the sentence-initial adverbial “riyuu-mo naku” modifies the subordinate clause. Bošković and Takahashi argue that this is because the “scrambled” adjunct is base-





theory of Japanese scrambling.<sup>46</sup> Under the theory, all “scrambled” phrases are base-generated, and active formal features of a scrambled phrase trigger LF-lowering of the phrase. I argue that the *mo*-based QPs lack a formal case feature, and therefore they cannot undergo the last-resort lowering, just like non-*wh* adjuncts. I assume that the thematic position of a scrambled *mo*-based QP is filled by a null pronoun that is bound by the QP, as illustrated in (210). The null-pronoun is a covert counterpart of the overt resumptive pronouns that we observed in (203).

(210)  $[NP\ mo]_i$  Subj-ga  $[vP\ \dots pro_i \dots V]$

It must be pointed out here that there is a *mo*-based QP that does not fall under the generalization we have made so far. *Daremo* “everyone”, which consists of *dare* “who” and *mo*, can be followed by a case-marker:

(211) <sup>OK</sup>daremo-ga / <sup>OK</sup>daremo-o

This fact suggests that *daremo* can have a case-feature. Given this, the present theory predicts that *daremo* can be reconstructed to a *vP*-internal position, hence allowing scope-reconstruction of scrambling. This prediction is indeed borne out: the reconstructed interpretation is possible in (212):

(212)  $[Daremo-o]_i$  Taroo-dake-ga  $t_i$  hihan-sita  
 everyone Taroo-only-NOM criticize-did  
 Lit. “Everyone, only Taroo criticized”  
<sup>OK</sup> $\neg >> \forall$

---

<sup>46</sup> The “dative” *-ni* may appear within a *mo*-based QP, e.g., <sup>OK</sup>*Taroo-ni-mo*. I assume that *-ni* in those cases is a postposition, rather than a structural case-marker, as the form is ambiguous between the two different grammatical morphemes (e.g., Sadakane and Koizumi 1995). However, it remains a problem to explain why *-ni* as a postposition may not follow a *mo*-based QP. I leave this issue open here.

Thus, the contrast between *daremo* and other *mo*-based QPs adds further support to the base-generation theory developed here.

### 3.6.3 *Two types of reconstruction?*

Before closing this section, let us comment on the difference between canonical word order and non-canonical word order sentences. Recall that I argued in 2.5.1 that inverse scope in canonical order sentences is derived by reconstructing the subject into the  $vP$ -internal position. Thus my theory posits the exact same mechanism of covert scope shifting for inverse scope in canonical order and scrambled sentences: it is reconstruction of overt movement. This position might raise a question as to why inverse scope is readily available in scrambled sentences, but requires some special manipulation in canonical order sentences. For example, inverse scope is impossible in (213), but it is easily obtained in its scrambled counterpart in (214):

- (213) Dareka-ga dono kyoujyu-mo hihan-sita  
 someone-NOM every professor criticize-did  
 “Someone criticized every professor”  
 \* $\forall >> \exists$
- (214) [Dareka-o]<sub>i</sub> dono kyoujyu-mo *t<sub>i</sub>* hihan-sita  
 someone-ACC every professor criticize-did  
 Lit, “Someone, every professor criticized”  
<sup>OK</sup> $\forall >> \exists$

In fact, my theory provides a straightforward answer to the apparent asymmetry. Recall that I argued in 2.5.4. that the uniqueness implicature that is imposed on a *ga*-marked subject contributes to the difficulty of obtaining inverse scope in cases like (214). In (214), however, the indefinite *dareka* is not marked by *ga*. Therefore, no

uniqueness implicature is imposed on the indefinite. Without the uniqueness implicature, *dareka* does not resist the distributive interpretation, and therefore inverse scope is readily accessible in (214).

In short, the apparent asymmetry does not necessitate a distinction between mechanisms that derive inverse scope in canonical order sentences and scrambled sentences. An independently motivated theory about the interpretation of *ga*-marked subjects appropriately handles the contrast between (213) and (214).

A problem remains, however. When a universal object QNP is scrambled into the sentence-initial position, a *ga*-marked *dareka* can receive a distributive interpretation, as the following Hoji's (1985) example shows:

- (215) Daremo- $o_i$  dareka-ga  $t_i$  semeta  
 everyone-ACC someone-NOM criticized  
 Lit. "Everyone, someone criticized"  
 $^{OK} \forall > \exists$

The issue is related to a problem that I chose to put aside in section 3.5.4. If the uniqueness/maximality implicature is always computed in terms of the set that is specified by the descriptive content of the *ga*-subject, then the subject in (215) should invoke an implicature that there was only one individual who bears the property of being an agent in an event of criticizing. The distributive interpretation is therefore predicted to be blocked, contrary to the fact. With cases like (215), then, I need to show either that the uniqueness/maximality implicature does not arise at all, or that the set of individuals on which the maximality constraint is imposed is not determined by the descriptive content of the subject. Either way, it would be helpful if I provide some independent evidence that shows *dareka* in cases like (215) may not



something on the basis of observable properties of the language leads children to block their non-adult scope interpretations.

The theoretical account that I have developed so far in this chapter provides such a possibility. First, under my approach to scope rigidity in canonical order sentences, the acquisition of the scope constraint is reduced to the acquisition of the correct semantic/pragmatic properties of *ga*-marked subjects: acquiring the uniqueness/maximality implicature imposed on *ga*-subjects has the effect of blocking children's non-adult inverse scope interpretations. In fact, it is possible that Japanese children at age 5 have already acquired the knowledge about *ga*-subjects, but they simply did not compute pragmatic implicature in the experimental trials. It has been widely observed that young children do not reliably compute pragmatic implicature (i.e., reject test sentences on the basis of pragmatic implicature) in a TVJT (e.g., Noveck 2001; Papafragou and Musolino 2003; Guasti et al. 2005). But in any case, the theoretical account provides a way to block children's non-adult inverse scope interpretations by learning something else.

A crucial question, then, is how that "something else" is actually learnable from input data. For learners of the *ga/wa* distinction, the relevant data are certainly abundant in the input: most sentential subjects are marked either by *ga* or *wa*, except for cases that involve colloquial case-marker drops, some focus particles (e.g., *mo*), and dative subjects. The distributional differences between *ga* and *wa* would thus be evident in, for example, the contrast between descriptive statements and generic statements, as illustrated in the following examples:

(217) *Context: the speaker is giving a description of a situation in which a dog barked*

- a. Inu-ga hoeta  
dog-NOM barked
  - b. #Inu-wa hoeta<sup>47</sup>  
dog-TOP barked
- (218) *Context: the speaker is talking about dogs in general*
- a. #Inu-ga hoeru  
dog-NOM barks
  - b. Inu-wa hoeru  
dog-TOP barks

If children are sensitive to the distinction between describing a situation and merely presenting a proposition that the speaker believes to be true (in Kuroda's terms, affirming and asserting), then they would be able to relate the distributional difference between *ga* and *wa* to the distinction. Once children learn that *ga*-sentences expressthetic/descriptive judgments, then they would be able to derive the uniqueness/maximality implicature using general principles of pragmatics (i.e., something along the lines of Grice's conversational maxims).

Admittedly, the story is still not fully articulated, and there are still unexplained details about how children derive the appropriate semantic/pragmatic consequences from learning the speech functions of *ga/wa* (i.e., expressing different kinds of judgments). In some sense, the acquisition of the *ga-wa* distinction resembles the acquisition of the definite-indefinite distinction in languages like English: the relevant data are quite abundant, yet discovering the exact semantic properties of definiteness from observing input data does not seem to be easy at all, and it has been observed that children show some non-adultlike behaviors in this domain (e.g., Maratsos 1976;

---

<sup>47</sup> The form is not truth-conditionally false, nor does it invoke some implicature that makes the sentence anomalous. It simply does not fit the speaker's speech act of describing the situation.

Karmiloff-Smith 1979; Wexler 2003; Munn et al. 2006). The problem is, however, different from not having evidence for choosing between narrowly restricted hypotheses. For learners of possible scope interpretations, the logical possibilities that they need to consider is fairly restricted in the first place: given a surface structure, it is mapped onto (i) surface scope interpretation, (ii) inverse scope interpretation, or (iii) both surface and inverse scope interpretation. Innate linguistic knowledge can further restrict possible grammatical hypotheses for each of those possibilities. But even with such a narrowly restricted hypothesis space, learners are not provided with evidence about possible scope interpretations that allows them to choose between the choices. In contrast, for now I do not foresee that learners of the *ga/wa* distinction would face the same kind of challenge. It might be necessary to posit some innate linguistic knowledge to restrict possible hypotheses, but once the hypothesis space is appropriately restricted, the abundance of input data should lead learners to the correct grammar. Given these considerations, I tentatively conclude that Japanese children learn scope rigidity in canonical order sentences from learning the *ga-wa* distinction, leaving issues on the details about the acquisition of the distinction for future research.

With respect to the reconstruction asymmetry between case-marked QNPs and the *mo*-based QNPs in scrambled sentences, I argued that it is due to the fact that the latter lacks a formal case feature that is required to trigger the covert lowering operation. If we assume that children have adultlike knowledge about the derivation of scrambled sentences (under the current approach), then, children's overgeneration of inverse scope interpretations with scrambled *mo*-QNPs is analyzed as involving

overgeneration of case-features with the *mo*-QNP. That is, children assigned a case feature to the *mo*-based QNPs, enabling the application of the LF-lowering operation to them. The assignment of a case feature to the *mo*-based QNPs is probably triggered by the observation that those QNPs mostly share their distribution with other normal NPs. Under this story, the acquisition of the reconstruction asymmetry is reduced to the acquisition of correct feature assignments for each type of QNPs. More specifically, once the learner realizes that the *mo*-based QNPs are devoid of formal case features, the grammar of covert lowering immediately blocks scope-reconstruction of those QNPs, provided that the learner is equipped with the grammar of the case system and its correlation with movement. How, then, does the learner figure out the correct feature assignments? Since Japanese allows case-marker drop (especially in colloquial speech), the absence of a case-marker in a single instance cannot be taken as evidence for the absence of case features. Rather, conclusions must be drawn on the basis of probabilistic observation of the distribution of case markers on a certain kind of NP. This is something that a probabilistic learning mechanism really excels at. Suppose that the learning mechanism considers the following two hypotheses for each type of NP:

- (219) a. X can have a formal case feature.  
b. X may not have a formal case feature.

Let us assume that (219)a predicts that input data involves instances of X followed by a case marker in addition to instances of X without a case marker. Thus, if input data does not involve cases in which X is followed by a case marker, the probabilistic learning mechanism uses the absence of the data as evidence against the superset



hypothesis (219)a. Now, for example, take *X* to be *NP mo*: since this form cannot be followed by a case marker, the crucial evidence supporting (219)a is absent in the input data, and the probabilistic learning mechanism will eventually dismiss the hypothesis. What is crucial here is that any instance of *NP mo* is relevant for discriminating the two hypotheses in (219)b, and objective observations of linguistic signals provide concrete evidence. This is in clear contrast with learning possible scope interpretations from evidence about possible scope interpretations: recall that if the probabilistic learning mechanism were to learn the reconstruction asymmetry from evidence for inverse scope, it must pick up the crucial data from highly restricted cases that involve very specific combinations of quantifiers (e.g., *NP mo* scrambled over a universal QNP). In the current case, the data sparseness problem is significantly reduced, making the probabilistic learning scenario quite plausible.

The acquisition scenario crucially relies on the assumption that the learner knows the causal relations between what is actually learned (i.e., the case-resistant nature of the *mo*-based QNPs) and what is acquired (i.e., the restriction on inverse scope). The causal relations stem from abstract grammatical system with a rich internal structure. How, then, has the abstract grammatical system been formed in the mind of the learner? I am not going to seriously pursue the question here, and tentatively adopt the assumption that innate knowledge plays an important role: the relevant structures of the grammatical system are innately given to children, rather than being formed through experience.

Summarizing, the present theoretical account of scope rigidity in Japanese has an important feature of deriving the effects of the constraint from some independent

grammatical properties of the language. Under this account, scope rigidity is thus not an arbitrary constraint, in the sense that the lack of certain scope interpretations is predictable from other properties of the grammar. I argue that this theory resolves the learnability problem in the acquisition of scope rigidity: acquiring the semantic/pragmatic properties of *ga*-sentences and the lack of case-feature with the *mo*-QNP has the consequence of constraining possible scope interpretations in some specific contexts. Crucially, learners of those properties do not suffer from the same data-sparseness problem that learners of possible scope interpretations face. It remains to be seen whether this account for the acquisition of scope rigidity receives any empirical support. This is an important issue for future research.

### **3.8 Summary**

In this chapter, I examined the properties of CSS in Japanese. I first showed that inverse scope interpretations can be made available in Japanese by manipulating contexts or replacing the subject with a certain type of quantifier. Given this, I argued that “scope rigidity” is not a property of the language, contrary to what has often been claimed in the literature. Second, I pointed out that CSS in Japanese obeys the same constraints as CSS in English. This led me to conclude that Japanese and English use the same mechanism to shift scope of a quantificational element covertly. I then proposed a theory of CSS in Japanese and English, which assumes that covert syntactic movement is involved in deriving inverse scope interpretations. With respect to the original scope rigidity effect in Japanese, I argued that the semantic/pragmatic property of *ga*-marked subjects in Japanese is crucially responsible for the lack of inverse scope interpretations. I then discussed the

reconstruction asymmetry between scrambled *mo*-based QNPs and other case-marked QNPs. I proposed a base-generation account for the lack of the reconstructed reading with a scrambled *mo*-QNP. In the last part of the chapter, I discussed how the theoretical account resolves the learnability problem in the acquisition of scope rigidity.

## Chapter 4: The Acquisition of Japanese Logical Connectives

### 4.1 Introduction

So far, I have restricted my attention to the scope interaction between two quantified arguments. In this chapter, I turn to the scope interaction between a quantificational argument and sentential negation. The main focus of this chapter is on the scope behavior of Japanese logical connectives: disjunction *ka* and conjunction *...mo...mo*. In simple negative sentences, the Japanese connectives receive interpretations that are different from those of their English counterparts. I will argue that the cross-linguistic contrast is due to another language-specific constraint on scope interpretations in Japanese, and present the results of experimental studies that investigated the acquisition of the constraint.

This chapter is organized as follows. In section 4.2, I begin the discussion by illustrating the interpretive contrast between English and Japanese logical connectives in simple negative sentences. Empirical observations reveal that Japanese connectives have Boolean semantics but are subject to a scope constraint that prevents them from yielding the Boolean interpretations within simple negative sentences. Section 4.3 reviews previous experimental studies on the acquisition of the semantics of disjunction and its interaction with negation. Section 4.4 discusses pragmatic felicity conditions that are associated with the use of disjunction and negation. Based on the discussion, a TVJT that aims to satisfy the felicity conditions for disjunction and negation is designed in section 4.5, and the results of the experiment show that Japanese children assign a non-adult scope interpretation to the Japanese disjunction

*ka* in simple negative sentences. Section 4.6 reviews the experiments that investigated children's interpretation of logical connectives within sentences containing *dake* "only". Overall, the results from our experimental studies show that Japanese children do not consider non-adult hypotheses that are compatible with the majority of the input data. At the same time, children's non-adult behavior with *ka* shows that the acquisition of the scope constraint on the connective involves some nontrivial learning. Section 4.7 considers how the learning is possible, and the examination of possible input data leads to the conclusion that the acquisition of the scope of *ka* presents the same kind of learnability problem that I discussed in the previous chapters.

## 4.2 The scope of Japanese connectives

### 4.2.1 *The interpretive contrast*

In English, when the disjunction operator *or* is interpreted within the scope of negation, it allows an inference that closely resembles one of De Morgan's laws of classical logic. In (220), to illustrate, the truth conditions of the sentence that contains a negated disjunction can be recast with the conjunction *and* presiding over both of the disjuncts.

- (220) John doesn't speak Spanish *or* French  
→ John doesn't speak Spanish AND doesn't speak French

We call this interpretation the "conjunctive" interpretation of disjunction because it is logically equivalent to the conjunction of two negated expressions:

|       |   |   |     |        |    |    |       |
|-------|---|---|-----|--------|----|----|-------|
| (221) | A | B | A∨B | ¬(A∨B) | ¬A | ¬B | ¬A∧¬B |
|       | 0 | 0 | 0   | 1      | 1  | 1  | 1     |
|       | 0 | 1 | 1   | 0      | 1  | 0  | 0     |
|       | 1 | 0 | 1   | 0      | 0  | 1  | 0     |
|       | 1 | 1 | 1   | 0      | 0  | 0  | 0     |

Therefore in normal contexts, the sentence in (220) is judged to be false if John speaks either Spanish or French. In contrast, the Japanese counterpart of (220) appears to lack the conjunctive interpretation. As illustrated in (222), a Japanese simple negative sentence that involves the disjunction *ka* is most naturally paraphrased by the disjunction of two negated expressions:

- (222) John-wa supeingo *ka* furansugo-o hanasa-nai  
 John-TOP Spanish or French-ACC speak-NEG  
 Lit. “John doesn’t speak Spanish or French”  
 → John doesn’t speak Spanish OR he doesn’t speak French

Thus, the sentence in (222) can be truthfully uttered in a situation where, for example, John speaks Spanish but not French<sup>48</sup>. In order to convey the intended “neither” meaning of (220), Japanese speakers use the form ...*mo*...*mo*:

- (223) John-wa supeingo *mo* furansugo *mo* hanasa-nai  
 John-TOP Spanish also French also speak-NEG  
 → John doesn’t speak Spanish AND doesn’t speak French

---

<sup>48</sup> Some speakers that I consulted reported that they found sentences like (222) to sound awkward, if the sentence is presented without any context. I assume this is due to rather intricate pragmatic requirements that the sentences like (222) have. As I will discuss in detail in 4.4, negation and disjunction have somewhat contradictory felicity conditions for their uses, and it is rather hard to imagine a context that satisfies both of the conditions simultaneously. I found that the same speakers judge the same sentence to be quite natural when it is given in appropriate contexts. I choose to postpone our discussion on the contexts until we start talking about experimental designs in 4.4.

The particle *mo*, as the gloss shows, corresponds to the English focus particle *also*. When it is used with a single NP, it invokes an existential presupposition. Thus (224) presupposes that there is someone other than John who came:

- (224) John *mo* kita  
 John also came  
 → ∃x [x≠John & x came]

When two *mo*-marked NPs are conjoined, however, it expresses a conjunction, which would be translated to *both...and...* in English<sup>49</sup>. The conjunction *...mo...mo* no longer invokes an existential presupposition. Thus while the sentence in (225) sounds odd in a situation where there are no contextually relevant individuals other than those mentioned in the sentence, the one in (226) is free from such awkwardness:

- (225) #Taroo-wa ko-nakatta ga, John *mo* kita  
 Taroo-TOP come-NEG but John also came  
 “Although Taroo didn’t come, John also came”
- (226) Taroo-wa ko-nakatta ga, John *mo* Mary *mo* kita  
 Taroo-TOP come-NEG but John also Mary also came  
 “Although Taroo didn’t come, both John and Mary came”

The interpretation of *...mo...mo* in simple negative sentences shows another contrast with its English counterpart. When the conjunction *both...and...* appears in the object position of a simple negative sentence, it is interpreted in the scope of negation and

---

<sup>49</sup> In addition to *...mo...mo*, Japanese has several conjunction-like expressions. *To*, *toka*, and *ya* yield more or less similar interpretations to *...mo...mo* in the following sentence:

- (i) John-wa supeingo *to* / *toka* / *ya* furansugo-o hanasu  
 “John speaks Spanish and French”

I will put these items aside in this thesis.

allows an inference that closely resembles another De Morgan's law: the truth conditions can be recast with the disjunction *or* presiding over both of the conjuncts:

(227) John doesn't speak *both* Spanish *and* French  
→ John doesn't speak Spanish OR doesn't speak French

This interpretation is not available in the Japanese counterpart in (223). Therefore, for example, while the English sentence (227) can truthfully be uttered if John speaks Spanish but not French, the Japanese sentence (223) is judged to be false in the same situation.

In sum, the Japanese disjunction *ka* and conjunction *...mo...mo* lack the "De Morgan" interpretations in simple negative sentences. Accordingly, the distributions of those connectives in simple negative sentences are the opposite of the distributions of their English counterparts: the truth conditions of English sentences that involve the disjunction *or* correspond to those of Japanese sentences with the conjunction *...mo...mo*, and the truth conditions of English sentences that involve the conjunction *both...and...* correspond to those of Japanese sentences that involve the disjunction *ka*. The interpretive contrasts between Japanese and English raise an immediate question: why is it that the Japanese connectives *ka* and *...mo...mo* do not yield the logical "De Morgan" interpretations in simple negative sentences? I will pursue this question in the following sections. Closer examinations on those items will reveal that the cross-linguistic contrast does not extend to other contexts.

#### 4.2.2 *Semantics of Japanese connectives*



One possible account for the contrasts between Japanese and English assumes that the semantics of the relevant connectives in Japanese is fundamentally different from that of their English counterparts, and therefore Japanese connectives do not interact with negation in the same way as their English counterparts. The semantic interaction between English negation and *or / both...and...* suggests that those connectives correspond to Boolean disjunction and conjunction respectively. Given the lack of the same semantic interaction with negation in simple clauses, it is possible to assume that the Japanese connectives are not logical Boolean operators, but that they happen to yield identical truth conditions with the corresponding Boolean connectives in positive contexts. Under this hypothesis, the interpretive contrast in the negative contexts is interpreted as disclosing a fundamental semantic difference between the connectives in Japanese and English. Let us call the account *the semantic account*.

The semantic account attributes the source of the interpretive contrasts that arise in simple negative sentences to the lexical semantics of the relevant connectives in Japanese and English. Therefore under the semantic account, it is predicted that the interpretive contrasts between Japanese and English persist in other linguistic environments in general. This prediction, however, turns out to be false. First, when *ka* appears in a subordinate clause that is embedded under matrix negation, it yields the same conjunctive interpretation as English *or*. That is, the interpretive contrast between Japanese *ka* and English *or* evaporates in such embedded contexts. The following examples illustrate the identical conjunctive interpretations of *ka* and *or* when they appear in a sentential complement (228), and in a relative clause (229).

- (228) a. *English complement clause*  
John didn't say that Mary speaks Spanish or French

→ John didn't say that Mary speak Spanish AND didn't say that Mary spoke French

b. *Japanese complement clause*

John-wa [Mary-ga supeingo *ka* furansugo-o hanasu-to] iwa-nakat-ta  
John-TOP Mary-NOM Spanish or French-ACC speak-Comp say-NEG-PAST

→ John didn't say that Mary speaks Spanish AND didn't say that Mary spoke French

(229) a. *English relative clause*

John didn't see a student who speaks Spanish or French

→ John didn't see a student who speaks Spanish AND didn't see a student who speaks French

b. *Japanese relative clause*

John-wa [supeingo *ka* furansugo-o hanasu] gakusei-o mi-nakat-ta  
John-TOP Spanish or French-ACC speak student-ACC see-neg-PAST

→ John didn't see a student who speaks Spanish AND didn't see a student who speaks French

Exactly the same observation can be made with ...*mo...mo* and *both...and...*. Within embedded contexts, the conjunction ...*mo...mo* is interpreted under the scope of extracausal negation, yielding the “not both” interpretation<sup>50</sup>:

(230) a. *English complement clause*

John didn't say that Mary speaks both Spanish and French

→  $\neg$  >> *both*

b. *Japanese complement clause*

John-wa [Mary-ga supeingo *mo* furansugo *mo* hanasu-to] iwa-nakat-ta  
John-TOP Mary-NOM Spanish also French also speak-Comp say-NEG-PAST

→  $\neg$  >> ...*mo...mo*

(231) a. *English relative clause*

John didn't see a student who speaks both Spanish and French

→  $\neg$  >> *both*

b. *Japanese relative clause*

---

<sup>50</sup> As observed in Zwarts 1996, an extracausal negation is merely an antiadditive operator, and does not allow the “De Morgan” paraphrase of conjunctions. Thus for example, the sentence in (228)b cannot be paraphrased as “John didn't say that Mary could speak Spanish OR didn't say that Mary could speak French”, but this is independent of the issue of scope interpretation.

John-wa [supeingo *mo* huransugo *mo* hanasu] gakusei-o mi-nakat-ta  
 John-TOP Spanish also French also speak student-ACC see-neg-PAST  
 → ¬ >> ...*mo*...*mo*

Both the English and Japanese sentences in (230) effectively mean that John didn't say that Mary is a French-Spanish bilingual; the sentences in (231) means that John didn't see any French-Spanish bilingual student. Therefore, we now have exactly the same paradigm as in the case of *ka*: ...*mo*...*mo* is not interpreted under the scope of local negation, but it is interpreted under the scope of extraclassical negation.

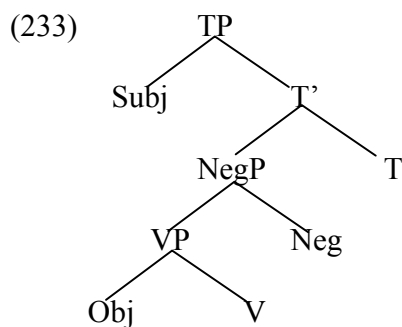
These data are problematic for the semantic account. Contrary to the prediction of the semantic account, the interpretive contrasts do not survive under embedding. In fact, the identical conjunctive interpretation of English *or* and Japanese *ka*, and the identical "not both" interpretation of English *both...and...* and Japanese *mo...mo...* in embedded contexts strongly suggests that these lexical items have identical semantics. We therefore reject the semantic account.

#### 4.2.3 *Scope of Japanese negation*

Another possible account for the interpretive contrasts supposes that negation in Japanese takes narrower scope than its counterpart in English. In Japanese, negation appears on a clause-final predicate as a bound morpheme, and it must appear between the verb root and the tense morpheme as in (232). Japanese does not have negative quantifiers like English *no*, or negative adverbs like *never*. Also, there are no ways to express constituent negation directly, as in *not every girl left* in English.

- (232) Taroo-ga Hanako-o tataka-nakat-ta  
 Taroo-NOM Hanako-ACC hit-NEG-PAST  
 "Taroo didn't hit Hanako"

The head-final structure of Japanese makes it difficult to determine the surface c-command relations between negation and other elements in the sentence. Assuming that the negation morpheme *-na-* is the head of the functional projection NegP (cf. Pollock 1989), its relative position within the verbal inflections suggests that NegP is located between VP<sup>51</sup> and TP, as in (233):



However, this analysis does not preclude the possibility that c-command relations at surface structure have been altered by some movement operations. Given the word order in Japanese, it should in principle be possible to move arguments around so that they escape from the c-command domain of the Neg-head. Therefore, it is possible to assume that the object is not c-commanded by negation in surface structure, and is not interpreted under the scope of negation (e.g., Kuno 1980). The lack of the "De Morgan" interpretations of *ka* and *...mo...mo* in simple negative sentences follow from this analysis: those connectives are not in the scope domain of negation in Japanese.

An immediate problem for the hypothesis that Japanese negation does not take scope over the transitive object is the scope ambiguity of sentences like (234). In

---

<sup>51</sup> In this chapter I abstract away from the functional projection *vP*, as it is not relevant to our discussion.

(234), the narrow scope interpretation of *zen'in* "everyone" under negation is available along with the wide scope interpretation.

- (234) Taroo-wa zen'in-o tataka-nakatta  
 Taroo-TOP everyone-ACC hit-NEG  
 Lit. "Taroo didn't hit everyone"  
 $\forall \gg \neg / \neg \gg \forall$ <sup>52</sup>

However, it is still in principle possible to argue that in Japanese negation does not c-command the object position, and that the narrow scope interpretation of *zen'in* in (234) is derived via some special mechanism that is available to a restricted set of lexical items. Under this assumption, the wide scope interpretation of *ka* and *...mo...mo* in simple negative sentence is the "default" option in Japanese since they are not c-commanded by negation, and no assumption that is specific to the lexical items is required to explain the scope interpretation.

However, a closer examination of the data in (229) and (231) reveals that this hypothesis cannot be sustained. The relevant Japanese sentences are repeated here as (235):

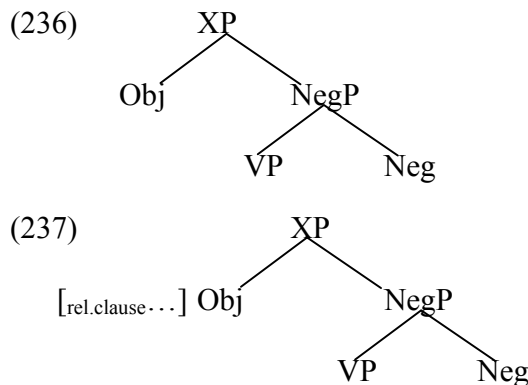
- (235) a. John-wa [supeingo *ka* huransugo-o hanasu] gakusei-o mi-nakat-ta  
 John-TOP Spanish or French-ACC speak student-ACC see-neg-PAST  
 $\rightarrow \neg \gg ka$
- b. John-wa [supeingo *mo* huransugo *mo* hanasu] gakusei-o mi-nakat-ta

---

<sup>52</sup> Although the availability of the narrow scope interpretation of the quantified object seems to be clear to me in this particular example, there are considerable disagreements in the literature as to whether quantified objects in general can be inside the scope of local negation (e.g., Kuno 1980; Kato 1985). In experimental studies using a TVJT, Japanese adults show inconsistent behavior with the narrow scope interpretation of the object (Han et al. 2004, also Chapter 6 of this thesis). In general, Japanese speakers strongly prefer the wide scope interpretation of the object in simple negative sentences, and the availability of the narrow scope interpretation seems to be greatly affected by factors like the choice of quantifier, word order (whether the quantifier is in a prenominal position or is "floated", following its host noun), intonation and context. See the discussion in 6.5.1. In any case, there is evidence that show the narrow scope interpretation of the object under negation is not entirely impossible (i.e., Japanese speakers sometimes, if not always, do accept the narrow scope interpretation), and in this sense *ka/...mo...mo* contrast with other quantifiers.

John-TOP Spanish also French also speak student-ACC see-neg-PAST  
 → ¬ >> ...*mo*...*mo*

In those sentences, *ka* and ...*mo*...*mo* are embedded within the relative clause that is attached to the object, and are interpreted within the scope of negation. Note that this should not be possible under the assumption that the lack of narrow-scope interpretations of those connectives in simple negative sentences is due to the lack of c-command by negation. If negation in Japanese does not c-command the object position as in (236), then it does not c-command anything within the object relative clause, as in (237). Therefore, if the lack of the narrow scope interpretation of *ka*/...*mo*...*mo* in simple negative sentences is due to the lack of c-command from negation, then the narrow scope interpretation of *ka*/...*mo*...*mo* should equally be impossible with a relative clause structure, contrary to the fact:



This observation demonstrates that Japanese negation can take scope over the object position of transitive sentences, and therefore suffices to reject the hypothesis that the interpretive contrasts between Japanese and English are due to the general restricted scope possibilities of Japanese negation.

#### 4.2.4 Strength of negation

Another possibility is to assume that some property of *ka* and *...mo...mo* forces them to take scope over local negation. Under this view, the cross-linguistic contrasts between Japanese and English are reduced a matter of scope interpretations, and the differences in scope interpretations are derived by some lexical property of *ka* and *...mo...mo*. This property must distinguish between negation in the same clause and negation in the higher clause: while *ka* and *...mo...mo* resist taking scope under local negation, they can happily be interpreted under the scope of negation in a higher clause. The relevant data are repeated here as (238) and (239):

- (238) a. *Simple clause*  
John-wa supeingo *ka* furansugo-o hanasa-nai  
John-TOP Spanish or French-ACC speak-NEG  
\*¬ >> *ka*
- b. *Complement clause*  
John-wa [Mary-ga supeingo *ka* furansugo-o hanasu-to] iwa-nakatta  
John-TOP Mary-NOM Spanish or French-ACC speak-COMP say-NEG  
OK¬ >> *ka*
- c. *Relative clause*  
John-wa [supeingo *ka* furansugo-o hanasu] gakusei-o mi-nakatta  
John-TOP Spanish or French-ACC speak student-ACC see-NEG  
OK¬ >> *ka*
- (239) a. *Simple clause*  
John-wa supeingo *mo* furansugo *mo* hanasa-nai  
John-TOP Spanish also French also speak-NEG  
\*¬ >> *...mo...mo*
- b. *Complement clause*  
John-wa [Mary-ga supeingo *mo* furansugo *mo* hanasu-to] iwa-nakatta  
John-TOP Mary-NOM Spanish also French also speak-COMP say-NEG  
OK¬ >> *...mo...mo*
- c. *Relative clause*  
John-wa [supeingo *ka* furansugo-o hanasu] gakusei-o mi-nakatta

John-TOP Spanish or French-ACC speak student-ACC see-NEG  
<sup>OK</sup>¬ >> ...*mo...mo*

One semantic difference between clause-internal sentential negation and sentential negation in a superordinate clause is their ability to license particular logical inferences. Zwarts (1996) proposes a hierarchy of negative expressions in natural language in which negative expressions are classified into three classes according to their “strength”. The hierarchy is summarized in (240):

- (240) a. A functor  $f$  is *decreasing* iff  $f(X \vee Y) \rightarrow f(X) \wedge f(Y)$   
 b. A functor  $f$  is anti-additive iff  $f(X \vee Y) = f(X) \wedge f(Y)$   
 c. A functor  $f$  is antimorphic iff  $f$  is anti-additive and  $f(X \wedge Y) = f(X) \vee f(Y)$

Under the definitions in (240), clause-internal sentential negation and sentential negation in a superordinate clause belong to different classes. The former is antimorphic, but the latter is merely anti-additive, as shown by the non-equivalence of sentences in (241):

- (241) John didn't claim that Mary ate (both) pizza and pasta  
 ≠ John didn't claim that Mary ate pizza or didn't claim that Mary ate pasta

Thus, the following constraint on the scope interpretation of *ka* and ...*mo...mo* captures the scope behavior of those connectives in sentences like (238) and (239):

- (242) *Ka* and ...*mo...mo* cannot be interpreted under the scope of antimorphic negation.

Zwarts (1998) and van der Wouden (1997) point out that the semantic distinction in (240) affects NPI licensing. According to these authors, NPIs in natural languages are



also classified into three types according to what kind of licenser they need. For example, while “superstrong” (in van der Wouden’s terminology) NPIs require an antimorphic licenser, “strong” NPIs can be licensed by a merely anti-additive functor, and so on (thus, while superstrong NPIs require a clausemate negation, strong NPIs may be licensed by a negation in the superordinate clause). If the distinction in (240) plays a crucial role in some domain of natural language grammar, the existence of a constraint like (242) would not be totally implausible.

However, the constraint (242) faces some empirical problems. Let us start our discussion with the focus operator *only*, and its Japanese counterpart *dake*. As is illustrated in (243), a sentence containing *only* entails a negative proposition (cf. Horn 1969), and (244) shows that in this respect Japanese *dake* works exactly the same.

- (243) Only John speaks Spanish  
 →<sup>53</sup> Everyone other than John doesn’t speak Spanish
- (244) John-dake-ga supeingo-o hanasu  
 John-only-NOM Spanish-ACC speak  
 → Everyone other than John doesn’t speak Spanish

When the conjunction *both...and...* appears in the scope of the covert negation that appears within the proposition entailed by sentences containing *only*<sup>54</sup>, it yields a “disjunctive” interpretation that can be paraphrased using *or*. Observe that the first sentence in (245) entails the second one, which in turn is logically equivalent to the third one.

---

<sup>53</sup> The arrow means that “the above sentence entails that” and is used to introduce entailed propositions.

<sup>54</sup> Notice that the direct scope relation between *only* and *and* is not at issue here. Sentences containing *only* are also associated with positive propositions, and for that reason *only* does not create a typical DE domain (cf. von Stechow 1999, Herburger 2000). For the current discussion, however, we will ignore this issue and concentrate on the decomposed semantic representations.

- (245) Only John speaks *both* French *and* Spanish  
 → Everyone other than John doesn't speak both French and Spanish  
 = Everyone other than John doesn't speak French OR<sup>55</sup> doesn't speak Spanish

Given that an entailment relation holds between the first sentence and the third in (245), we conclude that the covert negation associated with *only* is an antimorphic operator. Notice also that this shows that the covert entailment component of sentences with *only* has a universal quantifier that takes scope over the entailed negation. Observe that a negation that takes scope over an existential quantifier is not antimorphic, as illustrated in the examples in (246):

- (246) a. Nobody speaks Spanish and French  
 ≠ Nobody speaks Spanish OR nobody speaks French  
 b. It is not the case that someone speaks Spanish and French  
 ≠ It is not the case that someone speaks Spanish OR it is not the case that someone speaks French

An interesting fact here is that the Japanese conjunction ...*mo...mo* interacts with the covert negation associated with *dake* in exactly the same way as English *both...and...*:

- (247) John-dake-ga supeingo *mo* furansugo *mo* hanasu  
 John-only-NOM Spanish also French also speak  
 “Only John speaks both Spanish and French”  
 → Everyone other than John doesn't speak French *and* Spanish  
 = Everyone other than John doesn't speak French OR doesn't speak Spanish

The constraint (242) predicts that ...*mo...mo* in the sentence (247) must take scope over the antimorphic negation, yielding the interpretation that Everyone other than John doesn't speak French AND doesn't speak Spanish. However, this prediction is

---

<sup>55</sup> The disjunction is, as is specified in the relevant De Morgan's law, the inclusive disjunction. The use of capital “OR” is intended to signify that this disjunction should not carry the implicature of exclusivity.

not borne out: the conjunction *...mo...mo* can be interpreted within the scope of antimorphic negation, which is not expressed overtly. Not surprisingly, once we try to express the entailment of (247) in a Japanese single clause sentence, the relevant narrow-scope interpretation of *...mo...mo* is completely excluded:

- (248) John igai-no zen'in-ga supeingo *mo* furansugo *mo* hanasa-nai  
 John except-GEN everyone-NOM Spanish also French also speak-NEG  
 = Everyone other than John doesn't speak French AND doesn't speak Spanish

Thus, the relevant distinction is not whether negation is antimorphic or not. In both (247) and (248), the negation is antimorphic, but the narrow scope of *...mo...mo* is allowed only with the covert version in (247).

The disjunction *ka* can also be interpreted under the scope of the covert negation associated with *dake*. Within the covert negative entailment, *ka* yields the conjunctive interpretation, as shown in (249).

- (249) John-dake-ga supeingo *ka* furansugo-o hanasu<sup>56</sup>  
 John-only-NOM Spanish or French-ACC speak  
 "Only John speaks Spanish or French"  
 → Everyone other than John doesn't speak Spanish AND doesn't speak French

The facts so far show that *ka* and *...mo...mo* can be interpreted within the scope of a covert antimorphic operator. I now add another observation, that *ka* and *...mo...mo* can take scope under overt antimorphic negation. First, let us observe the following

---

<sup>56</sup> Here and in what follows, we are abstracting away from the issue of the pragmatic requirements associated with the use of disjunction. Normally disjunction is used to express a speaker's uncertainty, and the sentence sounds much more natural when it is used as, for example, a prediction about the future. While this issue is not crucially important in this theoretical discussion, it will become quite relevant when we design psycholinguistic experiments. We will come back to the issue in section 4.5.

conditional sentence, in which ...*mo...mo* and negation appear inside the antecedent clause:

- (250) Mosi John-ga supeingo *mo* furansugo *mo* hanasa-nai-to, kare-wa komaru  
If John-NOM Spanish also French also speak-NEG-COMP he-TOP in-trouble  
Lit. "If John doesn't speak both Spanish and French, he will be in trouble"

Imagine a situation in which a person is going to have a job interview with a professor named John. The person wants to present his previous work to John, but in order to fully appreciate the value of his research, one must be proficient both in Spanish and French. Thus, the person hopes that John speaks both Spanish and French: if John doesn't speak Spanish or doesn't speak French, then he may miss the importance of the person's work. The sentence can be truthfully uttered in the situation. That is, the sentence has an interpretation that can be paraphrased as follows: if John doesn't speak Spanish OR doesn't speak French, he will be in trouble. This fact shows two things: first, the negation within the antecedent clause is an antimorphic negation with respect to ...*mo...mo*; second, ...*mo...mo* is interpreted in the scope of the antimorphic negation.

Exactly the same observation can be made with *ka*. Imagine a situation in which a person, who can only speak Spanish and French, is going to have a guest from a foreign country, whose name is John. The person is anxious about the language that John speaks: if John doesn't speak Spanish and doesn't speak French, there will be no productive way for the person to communicate with his guest. The sentence in (251) can truthfully be uttered as a description of the situation:

- (251) Mosi John-ga supeingo *ka* furansugo-o hanasa-nai-to, kare-wa komaru  
If John-NOM Spanish or French-ACC speak-NEG-COMP he-TOP in-trouble

Lit. "If John doesn't speak Spanish or French, he will be in trouble"

This indicates that the sentence can have an interpretation that can be paraphrased as follows: if John doesn't speak Spanish AND doesn't speak French, he will be in trouble. That is, *ka* can be interpreted under the scope of antimorphic negation. A question arises, however, as to why antecedents of conditionals behave differently from simple clause sentences with respect to the scope of *ka/...mo...mo*. I will return to this question in section 5.2.

The facts conclusively show that Japanese connectives are not entirely excluded from taking scope under an antimorphic operator, thereby rejecting the constraint in (242). More generally, these facts reveal the problem of stating the scope constraint on *ka* and *...mo...mo* in semantic terms: those connectives may or may not take scope under negation that seems to have exactly the same semantic property.

#### 4.2.5 *Summary and issues for language acquisition*

So far, I have examined interpretations of Japanese connectives and their semantic interaction with negation. Based on empirical data, I have rejected the following hypotheses:

- (252) a. *The semantic hypothesis*  
Japanese *ka* and *...mo...mo* are not logical Boolean connectives, and therefore they do not interact with negation in the same way as their English counterparts.
- b. *The negation scope hypothesis*  
Japanese sentential negation does not c-command the object position of transitive predicates, and therefore *ka* and *...mo...mo* in object position are interpreted outside the scope of negation.
- c. *The semantic scope constraint hypothesis*

Some lexical property of *ka* and *...mo...mo* forces them to take scope over antimorphic negation.

Thus, *ka/...mo...mo* are Boolean connectives, which are subject to some independent scope constraint that forces them to take scope over local negation. I will provide an alternative analysis for the scope constraint on *ka/...mo...mo* in the next chapter. For now, let us turn to the acquisition of those connectives. The main question that I would like to address here is whether or not Japanese children consider any of the non-adult hypotheses in (252). Since all those hypotheses yield the “correct” interpretations (i.e., truth-conditionally equivalent) of *ka/...mo...mo* in simple negative sentences, the majority of input data would presumably be compatible with them. Thus it would appear that children could be misled by input data to assume a non-adult hypothesis, such as those in (252). Thus, an empirical issue for acquisition research is how “adultlike” children’s knowledge of Japanese connectives is: more specifically, (i) whether or not Japanese children have the correct lexical semantics of *ka/...mo...mo*, and (ii) whether or not they have adultlike knowledge of the scope constraint on the connectives. To address the issue, an experimental study should determine (i) whether or not Japanese children can compute the Boolean, “De Morgan” interpretations of those connectives, and (ii) whether or not Japanese children can assign the correct scope interpretations to those connectives in accordance with the contexts. In what follows, I will explore ways to assess children’s knowledge of logical connectives and their interactions with negation.

### **4.3 Disjunction in first language acquisition**

The semantic interaction between disjunction and negation has attracted a growing interest in acquisition research. There are experimental studies with English-speaking children that examined children's interpretation of the disjunction operator within and outside of the scope of negation. I will review some of the results that are informative with respect to what young children know about the semantic interaction between disjunction and negation.

#### 4.3.1 *Structure dependence of children's semantic interpretations*

Crain et al. (2002) investigated children's interpretation of sentences that involve disjunction and negation in different structural relations. The question pursued in the study was whether or not children rely on linear precedence in determining the semantic relation between disjunction and negation. A sample pair of test sentences used in Crain et al.'s study is given in (253):

- (253) a. The girl who stayed up late will *not* get a dime *or* a jewel  
b. The girl who *didn't* go to sleep will get a dime *or* a jewel

Both of the sentences involve the disjunction operator *or* and negation. In addition, in both of the sentences negation precedes disjunction. However, the structural relations between negation and disjunction are different in the two sentences. In (253)a, the negation *not* appears in the matrix clause, and is structurally higher than the disjunction *or*, i.e., the former c-commands the latter. In contrast, the negation *n't* in (253)b is embedded within a relative clause, and hence it does not c-command the disjunction *or*. This difference in the structural relations affects the interpretations of the sentences. In (253)a, *or* is interpreted under the scope of negation, yielding

conjunctive truth conditions: the girl will not get a dime AND will not get a jewel. In (253)b, *or* is interpreted outside the scope of negation, and therefore the sentence is not associated with conjunctive truth conditions.

Crain et al. describe the experimental story that was used for the test sentences in (253) as follows:

(254) On this trial, children were told a story about two girls who had both lost a tooth. The girls knew that the Tooth Fairy would come during the night and would give them a reward in exchange for their lost tooth. One girl decided to go to bed right away, while the other girl decided to stay up late to see what the Tooth Fairy looked like. Then, the Tooth Fairy arrived, with two jewels and two dimes.

(Crain et al. 2002: 18)

At this point, the puppet interrupted the story, and presented his prediction about what would happen in the remainder of the story. One group of children were presented with (253)a, while the other group heard (253)b. The story then resumed, as in (255):

(255) As events ensued, the Tooth Fairy gave a dime and a jewel to the girl who was sleeping. The Tooth Fairy was disappointed to see that the other girl was still awake, however. The little girl explained that she had decided to stay up to see what the Tooth Fairy looked like. At the end, the Tooth Fairy decided to give a jewel, but no dime, to the girl who had stayed up late.

(Crain et al. 2002: 19)

Following the completion of the story, the puppet repeated the test sentence, reminding the child participant what his prediction was. The child participant was then asked to judge whether the puppet was right or wrong.

Under the adult interpretations of the test sentences, (253)a is false in the situation, because of the conjunctive truth conditions associated with the sentence (i.e., the girl will not get a dime AND will not get a jewel). In contrast, (253)b is true in the



situation, due to the lack of c-command between negation and disjunction. Crain et al. found that English-speaking children at age 4-5 rejected sentences like (253)a 92% of the time, while they accepted sentences like (253)b 87% of the time. The results exclude the possibility that children compute the semantic interaction between negation and disjunction on the basis of linear precedence: the linear orderings of the negation and the disjunction do not distinguish the test sentences.

Gualmini and Crain (2005) extended Crain et al.'s (2002) study by investigating the role of linear distance in children's interpretation of the semantic interaction between disjunction and negation. The study controlled the linear distance between negation and disjunction operators as in the following examples:

(256) Winnie the Pooh will *not* let Eeyore eat the cookie *or* the cake

(257) The Karate Man will give the Pooh Bear he *cannot* lift the honey *or* the doughnut.

In (256), the negation c-commands the disjunction, but the two operators are further from each other than in the corresponding condition in Crain et al.'s study (i.e., (253)a). In (257), the negation does not c-command the disjunction, but they are closer to each other than in (253)b. If linear proximity plays crucial role in children's interpretation of the semantic interaction between the two operators, then their interpretation of sentences like (256) should resemble their interpretation of sentences like (253)b; at the same time, their interpretation of (257) should resemble their interpretation of (253)a. In other words, if children rely crucially on linear proximity and ignore structure, it is predicted that they assign a conjunctive interpretation only to sentences like (257). By contrast, if children compute the semantic interaction

between the two operators on the basis of structural notion of c-command, then linear proximity should not matter, and children should assign conjunctive truth conditions only to sentences like (257).

Gualmini and Crain's experimental finding supported the latter possibility. English-speaking children at age 3-6 rejected test sentences like (256) 85% of the time when, for example, Winnie the Pooh let Eeyore eat the cookie, but not the cake. In contrast, children accepted test sentences like (257) 80% of the time when, for example, the Karate Man gave the Pooh Bear he couldn't lift the honey, but not the doughnut. Taken together, Crain et al's and Gualmini and Crain's results strongly suggest that children base their interpretation of sentences on abstract syntactic notion of c-command, rather than on structure-independent notions such as linear precedence or linear proximity.<sup>57</sup>

Another point that is worth pointing out about their findings is that children not only assigned a conjunctive interpretation to *or* when it is c-commanded by negation in surface structure, but they also rejected the wide scope interpretation of *or*. Suppose, for example, that in sentence (253)a, repeated here as (258), the disjunction phrase can undergo an operation of covert scope shift. Then the sentence should be ambiguous between the narrow scope (i.e., conjunctive) and the wide scope interpretation of disjunction. Under the wide scope interpretation, the sentence is true in the experimental condition associated with it: the wide scope interpretation can be

---

<sup>57</sup> The c-command requirement for conjunctive interpretations of *or* may not be a grammatical primitive, but may rather be a consequence of compositional computation of semantic interpretations. The notion of structure-dependence still holds in the latter possibility: such compositional computation is based on structural hierarchy.

paraphrased as: the girl who stayed up late will not get a dime OR will not get a jewel, and it is indeed the case that the girl did not get both a dime and a jewel.

(258) The girl who stayed up late will *not* get a dime *or* a jewel

Nevertheless, the observation was that children consistently rejected the sentence in the experimental condition. This behavior of children is somewhat reminiscent of the “Isomorphism” effect that we discussed in section 3.4: children did not access the inverse scope interpretation. However, there is one important difference between the standard isomorphism cases and the cases that involve disjunction. In standard isomorphism cases that involve negation and quantifiers such as *every*, *some*, or *two* (e.g., Musolino et al. 2000; Lidz and Musolino 2002), adult control groups showed no problem in accepting inverse scope interpretations. In the cases that involve negation and disjunction, by contrast, even adults stuck to surface scope interpretations, showing identical behaviors with children. I take these observations as showing that the relative scope interpretation between sentential negation and the disjunction *or* in English strictly corresponds to their surface hierarchical relation (at least with a standard intonation). In other words, *or* cannot undergo a process of CSS to take scope over negation that c-commands the disjunction. I will come back to the point in section 5.7.

#### 4.3.2 “Two-faced” disjunction

Within the discussion so far, we have restricted our attention to the semantic interaction between disjunction and negation. However, the actual contexts in which the disjunction operator yields the conjunctive truth condition are much broader. In

fact, as defined in Zwarts' hierarchy of negative expressions (see section 4.2.4), the licensing of the conjunctive interpretation of disjunction is the defining characteristic of various "negative expressions". That is, the disjunction *or* yields conjunctive truth conditions in the scope of decreasing operators, which also license inferences from a set to its subset (downward-entailing, or DE). Here are several examples of the licensing contexts, taken from Crain et al. (2002):

- (259) a. *First argument of "every"*  
Every student who speaks French *or* Spanish likes to travel  
→ Every student who speaks French likes to travel AND every student who speaks Spanish likes to travel
- b. *Nuclear scope of "none of the NPs"*  
None of the students in this class speaks French *or* Spanish  
→ None of the students in this class speaks French AND none of the students in this class speaks Spanish
- c. *Complement of "before"*  
John went to Europe before learning French *or* Spanish  
→ John went to Europe before learning French AND before learning Spanish
- d. *Complement of "without"*  
John went to Europe without learning French *or* Spanish  
→ John went to Europe without learning French AND without learning Spanish

(Crain et al. 2002: pp6-7)

There are contexts that are apparently related to the ones in (259), but that nonetheless do not allow the disjunction *or* to have the conjunctive interpretation. The tests in (261) reveal the correlation between the conjunctive interpretation of *or* and downward-monotonicity: the contexts in (259), but not those in (260), license inferences from a set to its subset.

- (260) a. *Second argument of “every”*  
 Every student who likes to travel speaks French *or* Spanish  
 \*→ Every student who likes to travel speaks French AND speaks Spanish
- b. *Nuclear scope of “some of the NPs”*  
 Some of the students in this class speak French or Spanish  
 \*→ Some of the students in this class speak French AND some of the students in this class speak Spanish
- c. *Complement of “after”*  
 John went to Europe after learning French or Spanish  
 \*→ John went to Europe after learning French AND after learning Spanish
- d. *Complement of “with”*  
 John went to Europe with French or Spanish interpreter  
 \*→ John went to Europe with French interpreter AND Spanish interpreter
- (261) a. *First vs. second argument of “every”*  
 Every student who speaks a *Romance language* likes to travel  
 → Every student who speaks *French* likes to travel  
 Every student who likes to travel speaks a *Romance language*  
 \*→ Every student who likes to travel speaks *French*
- b. *“None of the NPs” vs. “some of the NPs”*  
 None of the students in this class speaks a *Romance language*  
 → None of the students in this class speaks *French*  
 Some of the students in the class speak a *Romance language*  
 \*→ Some of the students in the class speak *French*
- c. *“Before” vs. “after”*  
 John went to Europe before learning a *Romance language*  
 → John went to Europe before learning *French*  
 John went to Europe after learning a *Romance language*  
 \*→ John went to Europe after learning *French*
- d. *“Without” vs. “with”*  
 John went to Europe without a *Romance language interpreter*  
 → John went to Europe without a *French interpreter*  
 John went to Europe with a *Romance language interpreter*  
 \*→ John went to Europe with a *French interpreter*

These observations lead to the following generalized schema of the semantic interpretation of disjunction, where  $OP_{DE}$  stands for a downward-entailing (=decreasing) operator:

$$(262) \quad OP_{DE}(A \vee B) \rightarrow OP_{DE}(A) \wedge OP_{DE}(B)$$

(cf. Gualmini and Crain 2002, Crain et al. 2002)

The focus operator *only* provides an interesting problem for the descriptive generalization in (262). As pointed out in previous research (cf. von Stechow 1999), *only* does not exhibit the typical DE pattern. For example, the first sentence in (263) does not entail the second, since it might be the case that John speaks French but not Spanish. In that situation, English native speakers judge the first sentence to be true, but the second sentence to be false:

$$(263) \quad \text{Only John speaks a Romance language} \\ * \rightarrow \text{Only John speaks Spanish}$$

Von Stechow argues that the reason that the sentence in (263) does not pass the standard DE test is that the meaning of the sentence contains a proposition that does not involve a DE operator. As we have discussed several times so far, sentences containing *only* entail a negative proposition. However, a full semantic description of sentences with *only* involves another meaning component in addition to the entailed negative proposition. Specifically, as proposed by Horn (1969), the meaning of sentences with *only* is decomposed into two conjoined propositions, with (264) representing the fully decomposed meaning of (263):

$$(264) \quad \text{i. John speaks a Romance language, AND}$$

- ii. Everyone other than John doesn't speak a Romance language

There is considerable debate regarding the nature of these propositions. While everyone seems to agree that the second part is directly asserted/entailed by the original sentence, people disagree about the status of (i): Horn (1969; 1996) and von Stechow (1999) argue that it is a presupposition; Atlas (1993; 1996) and Herburger (2000) claim that it is also the assertion of the sentence. In this thesis, I choose to put this issue aside. For the sake of exposition only, I will adopt Horn's terminology and I will call (i), which is the proposition about the focused individual, the "presupposition"; and I will call (ii), which is the proposition about background individuals, the "assertion". I intend no theoretical commitments by using this terminology.

Turning back to the entailment properties of the two propositions in (264), the second "assertion" part introduces a standard DE operator: negation (or a semantic equivalent of negation). As we have discussed several times, the introduction of the negative operator in the covert meaning component is a characteristic semantic property of *only*. Thus the scope domain of the covert negation is downward-entailing and, therefore, (263) entails the following proposition:

(265) Everyone other than John doesn't speak Spanish

By contrast, the first meaning component, the "presupposition" of (264), does not introduce a DE operator and therefore does not create a DE context. Consequently, no entailment relation holds between (263) and the following proposition:

(266) John speaks Spanish

Given this analysis, we are now able to see why the standard DE test in (263) fails. Consider (263) again. The “presupposition” part of the first sentence in (263) does not entail the “presupposition” part of the second sentence, as illustrated in (267).

- (267) John speaks a Romance language (“presupposition” of the first sentence)  
\*→ John speaks Spanish (“presupposition” of the second sentence)

In sum, we have observed that sentences containing *only* are associated with two conjoined propositions, which contrast with each other in their entailment properties. In other words, the focus domain of *only* is not simply DE or non-DE: the context has both of the properties. The interpretation of disjunction in this context is affected by this duality in an interesting way. By applying the decomposition analysis, we can observe that disjunction *or* within the scope of *only* is effectively interpreted twice, receiving two distinct interpretations. Let us illustrate the point, using the following sentence as an example:

- (268) *Only* John speaks French *or* Spanish  
i. John speaks French or Spanish, AND  
ii. Everyone other than John doesn’t speak French or Spanish

Within the first “presupposition” part of the decomposed propositions, *or* appears within a non-DE context, and thus is interpreted disjunctively with respect to what John speaks. Thus, for the sentence to be true, it must be the case that John speaks French or speaks Spanish (but not necessarily both French and Spanish). In contrast, within the second “assertion” part, *or* appears within a DE environment, and it therefore receives the conjunctive interpretation with respect to what everyone other



than John doesn't speak. Hence, for the sentence to be true, it must be the case that everyone other than John doesn't speak French and everyone other than John doesn't speak Spanish. These two interpretations of *or* suggest that the generalization in (262) is indeed correct: *or* is interpreted conjunctively only within a DE environment.

Goro, Minai and Crain (2005a) investigated children's interpretation of disjunction *or* within the scope of *only*. As described above, *or* in this context is "two-faced": it is simultaneously associated with two distinct truth conditions (i.e., a conjunctive and a disjunctive one). In order to correctly interpret the "two-faced" disjunction operator *or* within the scope of *only*, it is necessary to go through the process of semantic decomposition, and then compositionally compute the truth conditions for each meaning component. For example, in order to judge the truth value of the sentence (268), one must first determine whether or not John has a property of being able to speak French or Spanish: given the disjunctive interpretation of *or*, this condition is satisfied if John speaks French, or if John speaks Spanish. Next, one must determine whether or not everyone other than John has a property of not being able to speak Spanish or French. Within this condition *or* is conjunctive, and therefore, the condition is satisfied only if everyone other than John speaks neither of the languages.<sup>58</sup> Thus, the semantic property of *or* within the scope of *only* provides an excellent ground for testing the nature of children's semantic computation. The

---

<sup>58</sup> One may alternatively describe the process of the truth value judgment as follows: speakers determine if John has the property of being able to speak French or Spanish, and that nobody else has the same property (Colin Phillips, Personal Communication). However, determining that nobody else has the property crucially includes knowing what it is about not having a property of being able to French or Spanish, which requires a computation of the conjunctive truth condition of *or*. Thus, the "alternative" does not remove the necessity of interpreting *or* twice.

correct interpretation of *or* in the context cannot be obtained by resorting to, for example, a “template” of form-meaning correspondence like (269):

$$(269) \quad \begin{array}{ll} \text{Form} & \text{Meaning} \\ \text{not ... } X \text{ or } Y & \Leftrightarrow \neg X \wedge \neg Y \end{array}$$

Such templates may work in interpreting negative sentences that involve *or*, but not in the case of *only*. Crucially, in sentences containing *or* within the scope of *only*, *or* is not simply disjunctive or conjunctive, but has both interpretations at the same time.

One of the crucial test sentences used in Goro, Minai and Crain’s experiment is given in (270), and the test conditions had the setups illustrated in (271) and (272).

(270) Only Bunny Rabbit will eat a carrot *or* a pepper

(271) *Condition I*

|                 | Carrot | Pepper |
|-----------------|--------|--------|
| Winnie the Pooh | *      | *      |
| Bunny Rabbit    | √      | *      |
| Cookie Monster  | *      | *      |

(272) *Condition II*

|                 | Carrot | Pepper |
|-----------------|--------|--------|
| Winnie the Pooh | *      | *      |
| Bunny Rabbit    | √      | *      |
| Cookie Monster  | *      | √      |

The experiment employed a Truth Value Judgment Task in ‘Prediction Mode’ (cf. Crain et al. 2000): after part of each story was acted out, it was interrupted so that the puppet could make a prediction about what would happen next in the story: for example, “*I think only Bunny Rabbit will eat a carrot or a pepper*”. In Condition I, Bunny Rabbit proceeded to eat a carrot, but neither of the other characters ate anything. In Condition II, in addition to Bunny Rabbit, Cookie Monster also ate a

pepper. The test sentence was repeated at the end of each story, and the child was asked if the puppet's prediction was right or wrong. In Condition I, 21 English-speaking children (age 3;6 – 5;8) accepted the test sentence in (270) in 93% of trials (Adult control group: 100% acceptance). In contrast, the same children rejected the test sentence in Condition II in 90% of trials (Adult control group: 100% rejection).

The interpretation of the results is as follows. First, the meaning of the test sentence in (270) is decomposed as in (273).

- (273) i. Bunny Rabbit will eat a carrot *or* a pepper, AND  
ii. Everyone other than Bunny Rabbit will not eat a carrot *or* a pepper

Within the non-DE presupposition part, *or* yields the disjunctive truth condition under adult interpretation (BR will eat a carrot OR will eat a pepper). The high acceptance rate of children in Condition I suggests that they actually interpreted *or* disjunctively with respect to what Bunny Rabbit ate: Bunny Rabbit only ate a carrot. By contrast, within the DE assertion part, *or* yields the conjunctive truth conditions under the adult interpretation (everyone else will not eat a carrot AND will not eat a pepper). Again, the high rejection rate of children in Condition II suggests that children interpreted *or* conjunctively with respect to what everyone else failed to eat. In short, children showed adultlike performance in interpreting a “two-faced” disjunction *or* within sentences containing *only*.

The results suggest that adultlike semantic composition of the meaning of sentences containing *or* and *only* is fully operative at around age 4. This implies that the relevant semantic computation is not subject to a performance problem that is caused by some limitation on the processing capacity of children, although the

computation appears to be quite complex. In interpreting the crucial test sentences, children must have created representations for two separate propositions (“presupposition” and “assertion”), and computed the truth conditions for each of the propositions individually, in order to derive the distinct truth conditions with the “two-faced” *or*. Children’s adultlike behavior with the “two-faced” *or* suggests that the processing capacity of children at around age 4 is capable of carrying out the computation.

#### 4.3.3 *Interim summary*

The results of previous experimental studies show that English-speaking children at around age 4-5 have adultlike knowledge of the semantic interaction between negation and disjunction. Children are able to compositionally compute the meanings of sentences that involve negation and disjunction following the interpretive schema in (262), taking into account the abstract structural relation of c-command between the two operators. The successful acquisition of the semantics of disjunction is a remarkable achievement by English-speaking children, given the nature of input data available to children. Crain et al. (forthcoming), among others, pointed out that in the vast majority of the input utterances available to children, the English disjunction *or* is used to indicate exclusive disjunction – that is, it is used in non-DE contexts with the disjunctive interpretation, carrying along an implicature of exclusivity. Moreover, as Gualmini and Crain (2005) argue, abstract structural notions such as c-command are not overtly marked in input data, and multiple incorrect hypotheses (e.g., linear precedence) seem to be compatible with the primary linguistic data. Given these considerations, the successful acquisition of the semantics of disjunction has often

taken to be providing a nativist's argument for the poverty of the stimulus (e.g., Crain et al. 2002; Crain et al. forthcoming; Gualmini and Crain 2005).

Compared to children acquiring English, children acquiring Japanese face an additional challenge. Even if the basic semantics of disjunction (i.e., the interpretive schema in (262)) is innately specified, Japanese children still need to figure out that the disjunction operator *ka* in the language is subject to an independent scope constraint. The acquisition of *...mo...mo* also involves the same challenge: the polarity sensitivity of *...mo...mo* is not a universal property of conjunction in natural language, and therefore some form of learning is required to determine the scope behavior of *...mo...mo*. The problem with this learning is that it apparently requires the learner to be sensitive to the absence of particular scope interpretations: that is, the narrow-scope, De Morgan interpretations of those connectives in simple negative sentences. Given the indirectness of evidence concerning scope interpretations that we discussed in Chapter 1 and 2, we would expect it to be particularly hard for children to learn the unavailability of the narrow scope interpretations in the relevant constructions. These considerations invite a research question as to how Japanese children solve the learning problem. To address this question, I begin with an empirical investigation of Japanese children's interpretation of *ka/...mo...mo* in simple negative sentences.

#### **4.4 Experimental design: pragmatic felicity**

One general design requirement for a TVJT experiment is that test sentences must be used in a pragmatically felicitous way. This design requirement bears particular importance in experiments that involve test sentences with negation and another quantificational element. This is because previous research in this domain has found

that children's performance is greatly affected by the pragmatic felicity of test sentences: specifically, children's non-adult bias towards "isomorphic" interpretations has been shown to be greatly reduced by pragmatic conditioning. We discussed the issue of the Observation of Isomorphism in 2.6: let us recap the issue here.

The relevant empirical observation is that young children experience problems in accessing interpretations in which the scope relation between negation and a quantifier does not match their surface order (i.e., inverse scope relations). For example, in an experiment by Musolino (1998), a group of children (mean 4;7) accepted the wide-scope interpretation of *some* only 35% of the time in sentences like (274).

(274) The detective didn't find someone/some guys.

The sentence was uttered in a situation where the detective was playing hide-and-seek with two friends, and he was able to find one of his friends but not the other. Under the wide scope interpretation of *some* (i.e., *there is someone that the detective didn't find*), sentence (274) is true. Adults in a control group accepted the test sentence 100% of the time, whereas children had rejected it almost two-thirds of the time. Children's adherence to surface scope interpretations is replicated with quantifiers like *every* (in the subject position), and *two* (Lidz and Musolino 2002). Furthermore, Lidz and Musolino (2002) extended the study to Kannada, a language with SOV word order. They found that Kannada-speaking children also have the same problem as English-speaking children in accessing wide-scope interpretations of object quantifiers, despite the difference in word order – negation follows the object in Kannada, as in Japanese.

In some recent experimental work, however, it has been discovered that children's performance with negation-quantifier scope interpretations is greatly improved by implementing certain changes in experimental design. For example, Musolino and Lidz (2002) found that children showed adult-like performance when the test sentences like (275) are preceded by a positive lead-in sentence, as illustrated in (276).

(275) Every horse didn't jump over the fence.

(276) Every horse jumped over the log and/but every horse didn't jump over the fence.

In the original study by Musolino (1998), children who heard sentences like (275) showed difficulty in accessing the interpretation in which negation takes wider scope than the subject universal quantifier (i.e., *not every horse jumped over the fence*). However Musolino and Lidz showed that adding a positive lead-in, as in (276), greatly improved children's performance. With a positive lead-in, children accepted the inverse-scope interpretation of the target sentence much more often than in previous research.

Gualmini (2003) also showed that pragmatically felicitous uses of target negative sentences lead children to access the inverse-scope interpretation of sentences with multiple quantifiers. Gualmini based his experiment on De Villiers and Tager-Flusberg's (1975) observation that negative statements are typically used to point out that contextually determined expectations have not panned out. For example, the sentence in (274) sounds most natural and, hence, is easier to process when it is uttered in a context in which the detective was expected to find all of his friends, but failed to satisfy this expectation (i.e., he could not find one of them). In contrast, the

sentence in (277) sounds odd in the same context, even though it is true, because the context did not establish the expectation that the detective would miss all of his friends.

(277) The detective didn't miss someone.

Gualmini argues that the use of pragmatically unmotivated negative sentences in Musolino's (1998) experiment was the cause of children's degraded performance, and his experiments revealed that the pragmatic felicity of the use of negation in test sentences greatly affects children's performance in accessing inverse scope interpretations. In an experiment that provided appropriate contextual expectations that the detective would find all of his friends – as the pragmatic basis for using negation – Gualmini found that children experienced no problems in accessing the inverse scope interpretation of sentences like (274), but within the very same context their performance was at chance with sentences like (277).<sup>59</sup>

A general lesson that we can draw from Gualmini's study is that test sentences in experiments must satisfy the felicity conditions associated with the use of negation. Otherwise, children's performance may be degraded for some reason that is not related to children's grammatical knowledge. To that end, for our purposes we must make sure that inverse scope interpretations in negative sentences are accessible to children. First, the experimental design must satisfy the pragmatic felicity conditions on the use of sentences with negation: the test sentences should point out

---

<sup>59</sup> These finding has led to the proposal of the Question-Answer Requirement by Hulsey et al. (2004). According to the QAR view, children adhere to the scope interpretation that addresses the question under discussion, but adults can accommodate. See the discussion in section 3.4.



discrepancies between contextual expectations and the actual outcomes. Adding a positive lead-in should also help. In addition, a control condition can be included to ensure that the child participants can in principle access inverse scope interpretations. This can be established by replacing the disjunctive phrase in the target sentences with another quantificational expression.

One additional concern is about the pragmatics of the use of disjunction. Due to its polarity sensitivity, in simple negative sentences *ka* yields disjunctive truth conditions in adult interpretations. Generally, disjunctive interpretations indicate the speaker's uncertainty about what actually happened. If the speaker knows exactly what happened, she would avoid using a weak statement involving disjunction, in favor of a more descriptively accurate statement. As we have seen, however, negation is generally used to express mismatches between what was expected and what actually happened. Thus, a pragmatically felicitous use of negation generally implies that the speaker *knows* what actually happened. As a consequence, negation and disjunction with the disjunctive interpretation have somewhat contradictory pragmatic conditions on their use: while a disjunctive disjunction expresses that the speaker is not certain about what actually happened, negation is most naturally used when the speaker knows what happened. In fact, some adult speakers of Japanese that I have interviewed report a slight awkwardness with descriptive sentences with *ka* and negation such as (278) when they are presented without any context.

- (278) Taroo-wa piza *ka* pasuta-o tabe-nakatta  
Taroo-TOP pizza or pasta-ACC eat-NEG  
Lit. "Taroo didn't eat pizza or pasta"

We do not want to introduce the potential awkwardness into our test sentences, because it could interfere with children's scope interpretations, and may trigger non-adult performance for some reason independent of their grammar. Therefore, our task here is to find a context that satisfies the felicity conditions on the use of negation and disjunction simultaneously.

One way to achieve this goal is to control the amount of information that the speaker has access to. To illustrate, imagine the following situation. There is a course on linguistics that requires three research papers to get credit: a paper on syntax, semantics, and phonology. Suppose that one knows that John, a student taking the course, is a phonology major and has turned in his phonology paper. Then the semester ends, and the person hears that John has gotten an "incomplete" for the course. At this point, on the basis of the grade that John got, the person can conclude that John failed to turn in all the required papers to get a grade for the course. Put differently, it is clear to the person that there was a discrepancy between what had been expected (to turn in three research papers) and what actually happened (John didn't turn in all of the required papers). But at the same time, the person is not sure about which paper John actually failed to turn in: it may be the syntax paper, maybe the semantics paper, or even both. In this situation, the person can felicitously utter the following sentence with negation and disjunction:

- (279) John-wa sintakusu-no ronbun *ka* semantikusu-no ronbun-wo dasa-nakatta  
John-TOP syntax-GEN paper OR semantics-GEN paper-ACC turn-in-NEG  
Lit. "John didn't turn in a syntax paper or a semantics paper"

Since the disjunction *ka* must take scope over negation in the sentence, it means "John didn't turn in his syntax paper OR he didn't turn in his semantics paper". The

use of negation is pragmatically motivated by the fact that the person knows that John failed to satisfy the expectation to turn in all the required papers. At the same time, the use of disjunction is motivated by the fact that the person's uncertainty about which paper John failed to turn in. The crucial feature of the context is that it dissociates information about the achievement of the objective (to get a grade for the course) from information about the individual requirements to achieve the objective. While the speaker of the sentence (279) has information about whether or not the objective was achieved (i.e., John did not get a grade), s/he does not have complete information about the satisfaction of each of the requirements (i.e., which of the required papers John turned in). This structure of the speaker's knowledge about what happened therefore creates a context that satisfies the felicity conditions for using negation and disjunction simultaneously.

Summarizing, the use of disjunction and negation in a descriptive sentence can be appropriately motivated by controlling the information that the speaker has access to. To that end, experimental contexts should follow the following general guidelines:

- (280) a. Explicit information should be provided with regard to the objective that is expected to be achieved, and the requirements for achieving the objective.
- b. It must be made clear that the objective is not achieved at the end.
- c. Information about which requirement was not satisfied should not be transparent at the time when a test sentence is presented.

(280)b is necessary to motivate a use of negation, and (280)c provides appropriate pragmatics for using disjunction with a disjunctive interpretation. In the next section, I develop experimental stories for children following these guidelines.

## 4.5 Experiments: simple negative sentences

### 4.5.1 Design and participants

The first set of experiments was carried out in collaboration with Sachie Akiba, and the study has been published as Goro and Akiba (2004a; 2004b). The experiments aimed to investigate Japanese-speaking children's interpretations of *ka* and *...mo...mo* in simple negative sentences. The sample test sentences are given in (281):

- (281) a. Butasan-wa ninjin *ka* piiman-wo tabe-nakat-ta  
Pig-TOP carrot or pepper-ACC eat-NEG-PAST  
Lit. "The pig didn't eat the carrot or the pepper"
- b. Butasan-wa ninjin *mo* piiman *mo* tabe-nakat-ta  
Pig-TOP carrot also pepper also eat-NEG-PAST  
Lit. "The pig didn't eat both the carrot and the pepper"

Under adult interpretations, both *ka* and *...mo...mo* take wider scope than negation in these sentences. Thus (281)a means "The pig didn't eat the carrot OR didn't eat the pepper" and (281)b means "The pig didn't eat the carrot AND didn't eat the pepper". Therefore, sentence (281)a is true in a situation where the pig ate the carrot but not the pepper. By contrast, sentence (281)b is false in the same situation.

The experiment used the Truth Value Judgment Task (Crain and McKee 1985; Crain and Thornton 1998). In order to satisfy the pragmatic felicity conditions for using the test sentences, we created an experimental design that consists of two phases. The first phase was a partial "story". One experimenter acted out this part of the story using paper-crafted props. The second phase was the Truth Value Judgment

part. Here, a puppet, Kermit the Frog, was manipulated by a second experimenter. The puppet uttered the target sentences. These sentences were interspersed with filler trials. The task of the child was to judge the truth of the test sentences by giving Kermit different fruit toys (a strawberry for “right”; a lemon for “wrong”).

The central theme of the stories was an eating-contest. There were twelve different animals, who were each invited to eat the following foods: a piece of cake, a carrot, and a green pepper. The participant was told, first, that all of the animals like cake, but not all of them like carrots or green peppers (just like many children). Then we introduced the rules of the contest. First, if an animal eats not only cake, but also the vegetables, then it receives a shining gold medal. Second, if an animal eats cake but only one of the vegetables, then it receives a blue medal. Finally, if an animal only eats cake and does not eat any vegetables, then it gets a black cross. These rewards serve as “reminders” in the second phase of the experiment (see Crain and Thornton 1998). This procedure for the contest dissociates the objective and the requirements in the game: the objective is to obtain the best reward (a gold medal), and the requirements for achieving the objective are to eat both of the vegetables. Explicit information regarding the objective and the requirements is provided as the rules of the game.

After explaining the rules, the story commences. One of the experimenters acts out the eating trials for each animal. Among the twelve animals, four eat both vegetables and get a gold medal; four eat only one of the vegetables and get a blue medal, and four eat none of the vegetables and get a black cross. All of the animals eat the cake. We ask the child to present a reward to each animal, and correct the

child when s/he makes mistakes. Most of the children did not have any problems understanding the rules of the game, and those who made more than three mistakes in choosing a correct reward were excluded from the data analysis. The story phase continued until all twelve animals finished their trials and were presented with their rewards.

After the story phase was finished, we returned to the first animal, and the puppet started to guess how well each animal did in the game. First, the puppet said that he didn't remember exactly what each animal ate, then he started to make guesses about this, based the color of the prizes the animals had been presented as awards. For example, the puppet uttered the test sentence (283), preceded by the lead-in in (282) for the pig, who had eaten the carrot but not the green pepper:

(282) Butasan-wa aoi medaru-wo motteru-yo. To-iu koto-wa...  
“The pig has a blue medal, which means...”

(283) Butwasan-wa keki-wo tabeta kedo, ninjin *ka* piman-wo tabe-nakat-ta  
pig-TOP cake-ACC eat-PAST but carrot or pepper-ACC eat-NEG-PAST  
Lit. “the pig ate the cake, but didn't eat the carrot or the pepper”

In this way, the design motivated the use of negation and disjunction simultaneously. First, the “contest” set up a context in which negative sentences could be used felicitously. The objective of the contest was to eat all of the foods and obtain the best prize: a gold medal. Given the rules for awarding prizes, the color of the prizes provides the puppet with enough information to judge whether the objective has been achieved. Receiving a lesser prize indicated that the requirements for getting the best prize had not been fulfilled and, therefore, this was associated with a clear sense of failure. The appearance of negation in the target sentences therefore felicitously

indicated that what had actually happened did not match the expectation of what should have happened. Also, a positive lead-in to the target sentence was included, as in (283), to reduce any difficulty for children in accessing inverse-scope readings (Musolino and Lidz 2002).

Second, the two-phased structure of the design was incorporated to motivate the use of disjunction. Recall that the puppet started to make its guesses after the “contest” phase had been completed. Therefore, the puppet could not remember exactly what each animal had eaten, so its guess was based on the color of the prizes that each animal had been awarded. It is crucial here that a blue medal was awarded only to those animals who had eaten just one of the vegetables - it did not indicate which vegetable the animals had actually eaten. Therefore, the color of prizes provides only incomplete information with respect to which requirement was actually satisfied, and which was not. Given this incompleteness of information, all that the puppet could reasonably guess was something like “he didn’t eat the pepper or he didn’t eat the carrot”, which corresponds to the adult-Japanese interpretation of the target sentence. In this way, this design minimizes the possibility that children might reject the adult interpretation because of pragmatic infelicity associated with that interpretation. If children had an adult-like interpretation of negated disjunctions in Japanese, they should have accepted sentence like (283). However, if children assigned the conjunctive interpretation to *ka*, then they should have rejected the puppet’s statements, since the color of the medal revealed that the animal had eaten one of the vegetables.

The same logic applies to target sentences with ...*mo...mo*. For example, the target sentence in (284) is presented in exactly the same situation, as the puppet's guess for an animal with a blue medal:

- (284) Butwasan-wa keki-wo tabeta kedo, ninjin *mo* piman *mo* tabe-nakat-ta  
pig-TOP cake-ACC eat-PAST but carrot also pepper also eat-NEG-PAST  
Lit. "the pig ate the cake, but didn't eat both the carrot and the pepper"

Here we are concerned whether Japanese children can successfully exclude the narrow-scope, "not both" interpretation of ...*mo...mo*. Notice that the "not both" interpretation, if that is possible at all, can work as a perfectly reasonable guess for the animals with a blue medal: the medal shows that the animals ate at least one of the vegetables, but not both, without specifying exactly which vegetable was not eaten. Thus again, the design minimizes the possibility that children might reject the non-adult interpretation because of pragmatic infelicity associated with the relevant interpretation.

The puppet made guesses for all twelve animals. The test sentences consisted of four fillers (for animals with a gold medal), four target sentences with *ka* (two for animals with a blue medal; two for those with a black cross), and four target sentences with ...*mo...mo* as in (284) (two for animals with a blue medal; two for those with a black cross).

In addition to the main experiment (which will be referred to as Experiment 1A), we carried out a control experiment (Experiment 1B) using test sentences containing another quantificational element. The control experiment aimed to see whether or not Japanese children can access inverse-scope readings of an object QP in this particular experimental design. In the control experiment, disjunctive phrases (*A ka B*) in the



target sentences were replaced with *nanika* “something”; similarly *A mo B mo* phrases were replaced with *nanimo* (anything). *Nanika* is an indefinite existential corresponding to English *something*, and *nanimo* is a NPI-version of *nanika*:

(285) Butasan-wa *nanika* tabe-nakat-ta  
Pig-TOP something eat-NEG-PAST  
"The pig didn't eat something"

(286) Butasan-wa *nanimo* tabe-nakat-ta  
Pig-TOP anything eat-NEG-PAST  
"The pig didn't eat anything"

Like its English counterpart *something*, *nanika* must take scope over local negation. Therefore the adult interpretation of (285) means "there is something that the pig didn't eat" rather than "The pig didn't eat anything". In short, the inverse-scope relation is required for adults. For present purposes, it suffices to show that the inverse-scope reading is available to children with *nanika*.

In the control experiment, we used three different vegetables, rather than a piece of cake and two vegetables, in order to create a situation in which sentences like (286) were true. All other details were the same as those of the main experiment. If children accepted the inverse-scope reading of *nanika* in the control experiment, that would suggest that the experiments were properly designed and did not create any extra-linguistic difficulties that caused problems for children in accessing inverse-scope interpretations.

Thirty monolingual Japanese-speaking children (Age: 3;7 - 6;3, Mean: 5;3) participated in the main experiment, and another thirty monolingual Japanese-speaking children (Age: 3;7 - 6;3, Mean: 5;4) participated in the control experiment. There was no individual overlap between the two groups. The children were recruited

at Totsuka Sumire Kindergarten, Yokohama, and were tested individually. The experiments were carried out by two Japanese native speakers. In addition, an adult control group (N=10, age 29 - 32, Japanese monolingual non-linguists) participated in the main experiment, and another adult control group (N=20, age 23 – 32, Japanese monolingual) participated in the control experiment.

#### 4.5.2 Results and discussion

The results from the crucial test conditions are summarized in the tables in (287) and (288). (287) shows the results from the main experiment, and (288) shows the results from the control experiment:

(287) Experiment 1A: *Ka* vs. ...*mo...mo*

| <i>Outcome / Medal</i>                                    | <i>Target sentence</i>  | <i>% accept (children)</i> | <i>% accept (adults)</i> |
|---|-------------------------|----------------------------|--------------------------|
| Didn't eat carrot <b>OR</b><br>Didn't eat pepper / Blue   | <i>ka...NEG</i>         | 25% (15/60)                | 100% (20/20)             |
|   | <i>...mo...mo...NEG</i> | 5% (3/60)                  | 0% (0/20)                |
| Didn't eat carrot <b>AND</b><br>Didn't eat pepper / Black | <i>ka...NEG</i>         | 78.3% (47/60)              | 20% (4/20)               |
|   | <i>...mo...mo...NEG</i> | 95% (57/60)                | 95% (19/20)              |

(288) Experiment 1B: *Nanika* vs. *nanimo*

| <i>Outcome / Medal</i>                                    | <i>Target sentence</i> | <i>% accept (children)</i> | <i>% accept (adults)</i> |
|---|------------------------|----------------------------|--------------------------|
| Didn't eat carrot <b>OR</b><br>Didn't eat pepper / Blue   | <i>nanika...NEG</i>    | 88.3% (53/60)              | 100% (40/40)             |
|   | <i>nanimo...NEG</i>    | 15% (9/60)                 | 0% (0/40)                |
| Didn't eat carrot <b>AND</b><br>Didn't eat pepper / Black | <i>nanika...NEG</i>    | 58.3% (35/60)              | 27.5% (11/40)            |
|   | <i>nanimo...NEG</i>    | 100% (60/60)               | 100% (40/40)             |

Let us review the crucial results in turn. First, in Experiment 1A, adults and children showed contrasting behaviors in the crucial test cases on *ka*. The crucial test cases are the puppet's guess about those animals with a blue medal, that is, those who ate only one of the vegetables. In this situation the adult control group accepted the test sentences with disjunction, as in (283), 100% of the time. This result clearly

shows that the experiment was properly designed so that the crucial test sentences were in fact judged to be true by those who have the disjunctive interpretation of negated *ka*. In contrast to the pattern of results for adults, children only accepted the crucial test sentences under the same situation 25% of the time. The difference in the acceptance rates was statistically significant (Wilcoxon Signed Ranks,  $z = 4.417$ ,  $p < 0.01$ ) Among the thirty children, only four (ages: 4;11, 5;5, 5;10, and 6;2) were adultlike in consistently accepting the test sentences. The remainder of the children consistently rejected the test sentences 87% of the time. When these children were asked to explain the reason for their negative judgments, most children said e.g., either “because the pig did eat one of the vegetables” or “because it is only one of the vegetables that the pig didn’t eat”.

The negative judgments of the vast majority of children, combined with these children’s explanation for their negative judgments, suggest that Japanese children are assigning the conjunctive interpretation to *ka* in simple negative sentences. Furthermore, when sentences like (283) were uttered as a guess about the animals who had received a black cross, i.e., those who had eaten none of the vegetables, children accepted the sentences 78% of the time. Assuming that the 75% rejection in the blue-medal condition corresponds to the rate that children assigned the conjunctive interpretations to negated *ka*, the 78% acceptance rate in the black-cross condition makes sense: in this situation, the sentences with *ka* were true under the conjunctive interpretation of negated *ka*.

Within the black-cross condition, the test sentences with *ka* under the adult interpretation are truth-conditionally true assuming that *ka* is an inclusive disjunction

but invokes the familiar scalar implicature and implies “it is not the case that the pig ate neither the carrot nor the pepper”. While 8 out of 10 adult participants consistently rejected the test sentences in the situation on the basis of the scalar implicature, the other 2 participants consistently accepted the test sentences. When asked to motivate their judgment, those participants stated that the sentences sounded strange but were nonetheless logically true. We assume that the variation in adult responses in this condition is due to the variation among strategies adult participants employed in the experiment: some followed truth-conditional meanings, the others computed scalar implicatures. The same thing applies to the black-cross condition in the control experiment: the sentences with *nanika* are truth-conditionally true, but are inappropriate given scalar implicatures. Both children and adults responded rather inconsistently in this condition, and we assume that this reflects the variation among strategies that the participants employed. In addition, some children might have failed to compute scalar implicatures at all, as suggested by previous research (cf. Noveck 2001; Papafragou and Musolino 2003; Guasti et al. 2005).

Another finding was that children performed almost without error in the *...mo...mo* conditions. For those animals who had received a blue medal, children correctly rejected the sentences containing *...mo...mo* 95% of the time, showing that they excluded the narrow-scope “not both” interpretation of *...mo...mo*; for those animals who had received a black cross, they correctly accepted the sentences 100% of the time. Adults in the control group rejected these sentences 100% of the time in the blue-medal condition, and they accepted the sentences 95% of the time in the black-cross condition. In short, Japanese children assigned an adult-like interpretation

to ...*mo*...*mo* in simple negative sentences. Finally, the high level of accuracy in these conditions suggests that the children in our experiment understood the task well, including the rules for awarding rewards.

A third set of findings comes from the control sentences with *nanika* in Experiment 1B. Here, children did not show the same non-adult performance as the children in the *ka* conditions in the main experiment. For those animals who had gotten a blue medal, children in the control group correctly accepted test sentences like (285) 88% of the time. This result shows that Japanese children in our experiments did not experience general problems in accessing inverse-scope interpretations of object QPs<sup>60</sup>. Given this, Japanese children's non-adult performance in interpreting sentences with *ka* cannot be attributed to a general inability to access inverse-scope interpretations. The non-adult performance by children must have to do specifically with the lexical item *ka*.

Let us now discuss the implications of the experimental results. First, Japanese children's conjunctive interpretation of *ka* can be interpreted as showing that they interpreted the disjunction within the scope of local overt negation. Under this interpretation of the results, the non-adult behavior by children suggests that Japanese children at around age 5 do not endorse any of the hypotheses in (252) with respect to *ka*. Children know that *ka* is a Boolean disjunction that yields a conjunctive truth condition under the scope of negation; children know that Japanese sentential negation may take scope over a QP in the object position; and finally, children do not

---

<sup>60</sup> This might be either because Japanese children at this age do not have any problems in assigning inverse-scope interpretations, or because our experimental design correctly eliminated the causes of children's adherence to isomorphic interpretations. This is an independent issue that our experimental design did not address.

assume that *ka* resists taking scope under antimorphic negation. Furthermore, the fact that a majority of Japanese children rejected the wide-scope interpretation of disjunction *ka* suggests that the narrow-scope interpretation of disjunction is the only interpretation that is available to children. In this respect, Japanese children are similar to English children/adults, in that they all adhere to the conjunctive interpretation of disjunction when disjunction is in the c-command domain of negation in surface structure. The results from the various controls undermining the possibility that non-adult performance with *ka* is simply an experimental artifact. It is especially important to point out that children accepted the wide scope reading of *nanika* in the control experiment. The contrast between *nanika* and *ka* further strengthens the conclusion that children do not have the option to shift the scope of *ka* covertly.

However, there is another possible way to interpret the data. If children assume that *ka* is a logical conjunction rather than disjunction, then assigning the wide scope interpretation to *ka* should yield the identical truth condition with the conjunctive interpretation of disjunction. In order to eliminate this possibility, it is necessary to show that Japanese children accept a disjunctive interpretation of *ka* when it appears within a non-DE context. This issue will be addressed in our second experiment.

Let us now turn to *...mo...mo*. In the experiment, Japanese children showed adultlike performance in interpreting *...mo...mo* in simple negative sentences. However, the result alone does not let us conclude that children's knowledge about *...mo...mo* is completely adultlike. For example, children might be assigning non-Boolean semantics to *...mo...mo*. In that case, *...mo...mo* would not interact with

negation, and the Boolean “not both” interpretation is excluded independently of scope assignment. Another possibility is that children assume that ...*mo...mo* may not take scope under antimorphic negation, or even worse, negation in general. In that case, children’s interpretation of ...*mo...mo* happens to match the adult interpretation, but that is not because they know the correct constraint on the scope interpretation of ...*mo...mo*. In other words, the data so far are still compatible with some of the non-adult hypotheses in (252). A follow-up experiment is called for to test those possibilities.

Summarizing, the results of the experiments reveal an interesting asymmetry between the acquisition of *ka* and ...*mo...mo*: Japanese children are like Japanese adults in interpreting ...*mo...mo*, but they are more like English children/adults in interpreting *ka* in simple negative sentences. The remaining issue is the existence of the potential non-adult hypotheses that can explain the data so far. To address the issue, a second set of experiments investigates Japanese children’s interpretation of *ka/...mo...mo* in sentences containing *dake* “only”.

## **4.6 Experiments: sentences containing *dake* “only”**

### *4.6.1 Design and participants*

The second set of experiments was carried out in collaboration with Utako Minai and Stephen Crain, and the results have been reported in Goro, Minai and Crain (2004) and Minai, Goro and Crain (2006). The experiments aimed to examine Japanese children’s interpretation of *ka* and ...*mo...mo* within the DE and non-DE meaning component of sentences that contain *dake* “only”. I partially reviewed some

results of the experiments in section 2.5.3. Here I will present a full description of the experiments within the current context.

In analyzing the meanings of sentences containing *dake*, we used the decomposition analysis discussed in section 4.3.2. Under this analysis, the meaning of sentences containing *dake* is decomposed into two conjoined propositions, as illustrated in (289):

- (289) Taroo-dake-ga furansugo-o hanasu  
Taroo-only-NOM French-ACC speak  
“Only Taroo speaks French”  
i. Taroo speaks French, AND  
ii. Everyone other than Taroo doesn’t speak French.

The first, the “presupposition” meaning component, does not involve a DE operator. In contrast, the second, the “assertion” component, creates a DE context due to the presence of an operator whose semantic property is equivalent to antimorphic negation (see section 4.2.4). As I pointed out in 4.2.4, both *ka* and *...mo...mo* can be interpreted within the scope of the covert negative operator: the scope constraint does not apply to this case. Therefore, those connectives assume the “two-faced” character within the scope of *dake*, yielding distinct truth conditions in each of the two meaning components. In this context, the interpretations of the Japanese connectives are identical to those of their English counterparts.

We first carried out two experiments with English-speaking children, one with *or* and *only*, the other with *and* and *only*. The findings were that English-speaking children were fully adultlike in interpreting the disjunction *or* and the conjunction *and* within the scope of *only* (for details, see Goro, Minai and Crain 2005a; 2005b). The results indicate that children’s processing capacity is capable of computing the



semantic interaction between *only* and a logical connective. Given the successful results, we decided to directly translate the experiments into Japanese. This choice should reduce the possibility that Japanese children might show non-adult behavior due to poor design of the experiments.

The experiment with *ka* (Experiment 2A) employed the Truth Value Judgment Task in Prediction Mode, in order to accommodate the felicity conditions for using disjunction. The experiment involved 8 stories, 4 for the test conditions and 4 for fillers. Each story involved 3 characters and 2 objects. One experimenter acted out the stories, and another experimenter manipulated the puppet (Kermit the Frog) and presented the test sentences. In one story Winnie the Pooh, Bunny Rabbit, and Doraemon (a famous Japanese cartoon character) went hiking. On their way, they found a farm with carrots and green peppers. At this point the story was interrupted by Kermit the Frog to make a prediction about what would happen next. His prediction served as the test sentence:

(290) Usagisan-dake-ga ninjin *ka* piiman-wo taberu to omou  
Rabbit-only<sub>NOM</sub> carrot or pepper-ACC eat COMP think  
“I think only Bunny Rabbit will eat a carrot or a pepper”

After Kermit’s prediction, the story resumed. Winnie the Pooh considered eating a carrot or a pepper, but he decided not to eat anything. Bunny Rabbit, in contrast, picked up a carrot and ate it. Doraemon said that he didn’t like vegetables, so he didn’t eat anything. The final outcome of the story in the condition is summarized in

(291):

(291) *Condition I*

|                 | Carrot | Pepper |
|-----------------|--------|--------|
| Winnie the Pooh | *      | *      |
| Bunny Rabbit    | √      | *      |
| Doraemon        | *      | *      |

The other condition differs from Condition I in that another character ate one of the vegetables, as in (292)<sup>61</sup>:

(292) *Condition II*

|                 | Carrot | Pepper |
|-----------------|--------|--------|
| Winnie the Pooh | *      | *      |
| Bunny Rabbit    | √      | *      |
| Doraemon        | *      | √      |

At the end of each story, Kermit the Frog repeated the prediction that he had made in the middle of the story, and the participant was asked whether Kermit was right or wrong.

Under the analysis we are endorsing here, the meaning of the test sentence in (290) is decomposed into two propositions:

- (293) i. Bunny Rabbit will eat a carrot *or* a pepper, AND  
ii. Everyone other than Bunny Rabbit will not eat a carrot *or* a pepper

The disjunction in the “presupposition” part is interpreted disjunctively, thus Bunny Rabbit does not need to eat both a carrot and a pepper to make the proposition true. In contrast, the disjunction in the “assertion” part is interpreted conjunctively without invoking the positive polarity effect of *ka*, giving rise to the interpretation that everyone else will not eat a carrot AND will not eat a pepper. Thus, the test sentence

---

<sup>61</sup> To present the logic of the experiment clearly, in these examples we simplified the actual variations among conditions. In the actual experiment, each condition involves different characters and different objects, with different actions (eating vegetables, finding treasure, catching bugs, and getting fruits)

in (290) is true in Condition I but is false in Condition II. For our current concerns it is important to determine whether or not Japanese children accept the test sentence in Condition I. In the last section, I pointed out that the results of the first experiments could be explained by assuming that Japanese children assumed *ka* is a conjunction rather than disjunction. If that is the case, then they should reject the test sentence in Condition I, because it is not the case that Bunny Rabbit ate a carrot and a cake.

The experiment with ...*mo...mo* (Experiment 2B) used a Truth Value Judgment Task in Description Mode. The theme of the experimental story-line was a PSI-power training session, in which three Pokemon characters (Pikachu, Zenigame, and Hitokage) attempted to perform several feats using their PSI power, e.g., open boxes, flip over cars, etc. The feats were presented as computer generated animation on a screen, which was coordinated with actions of toy figures of the three characters. For example, a box on the screen was animated to open as one of the toy figures gestured towards the screen. Each of the characters was rewarded with prizes each time he succeeded in performing one of the feats. These prizes served as reminders for children, whose task was to judge the truth or falsity of the test sentences. The experiment involved 5 test conditions, interspersed with 4 fillers. At the end of each trial, Kermit the Frog uttered a sentence, describing what he thought happened in the trial. The crucial test sentences involved *dake* “only” and ...*mo...mo*, as in (294), and there were 3 test conditions<sup>62</sup>:

(294) *Pikachu-dake-ga aoi hako mo kuroi hako mo aketa*

---

<sup>62</sup> Again, the conditions are simplified for ease of exposition. In the actual experiment, different conditions involved different objects for applying PSI power to, and each condition differed from others with respect to who was the most successful in the trial.

Pikachu-only-NOM blue box also black box also opened  
 “Only Pikachu opened the blue box and the black box”

(295) *Condition I*

|          | Blue box | Black box |
|----------|----------|-----------|
| Pikachu  | √        | √         |
| Zenigame | *        | *         |
| Hitokage | √        | *         |

(296) *Condition II*

|          | Blue box | Black box |
|----------|----------|-----------|
| Pikachu  | *        | √         |
| Zenigame | *        | *         |
| Hitokage | √        | *         |

(297) *Condition III*

|          | Blue box | Black box |
|----------|----------|-----------|
| Pikachu  | √        | √         |
| Zenigame | *        | *         |
| Hitokage | √        | √         |

(298) represents the fully decomposed meaning of the test sentence in (294):

- (298) i. Pikachu opened both the blue box and the black box, AND
- ii. Everyone other than Pikachu did not open both the blue box and the black box

Here, the crucial part is the interpretation of the second, “assertion” meaning component. Under the adult interpretation, the conjunction ...*mo...mo* is interpreted under the scope of the DE meaning component, yielding the “not both” interpretation.

Thus the sentence in (294) entails (299):

- (299) Everyone other than Pikachu didn’t open the blue box OR didn’t open the black box

Hence, the sentence is true in Condition I because nobody other than Pikachu succeeded in opening both boxes. By contrast, the sentence is false in Condition III,

because in this case Hitokage also opened both of the boxes. Condition II also makes the sentence false, because the “presupposition” that Pikachu opened the blue box and the black box is not satisfied<sup>63</sup>. In order to correctly accept the test sentence in Condition I, children must know that i) ...*mo...mo* corresponds to Boolean conjunction, and ii) the scope constraint does not apply to the interpretation of the sentence. If children assign a non-Boolean semantics to ...*mo...mo*, then it would not yield the “not both” interpretation, and they should reject the test sentence in Condition I on the basis of the fact that Hitokage also opened a box. Similarly, if Japanese children adhere to a wide-scope interpretation of ...*mo...mo* over the covert negation within the “assertion” component, the test sentence should mean (300):

(300) Everyone other than Pikachu didn’t open the blue box AND didn’t open the black box

Under this interpretation, the sentence is false in Condition I, because Hitokage did open one of the boxes. In sum, children’s non-adult hypotheses about the semantics and scope property of ...*mo...mo* should lead them to reject the test sentence in Condition I, as well as in Conditions II and III.

Twenty monolingual Japanese-speaking children (Age: 4;5 - 6;2, Mean: 5;3) participated in the experiment with ...*mo...mo*, and another twenty monolingual Japanese-speaking children (Age: 4;1 - 6;2, Mean: 5;4) participated in the experiment with *ka*. There was no individual overlap between the two groups. The children were recruited at Totsuka Sumire Kindergarten, Yokohama, and were tested individually.

---

<sup>63</sup> I am aware of the possibility that this might just be a case of presupposition failure, and the sentence is not “false” in the proper sense (i.e., the sentence may not have a truth value). This is related to the issue about the nature of propositions associated with sentences containing *only*, which I briefly mentioned in 4.3.2. As I did in 4.3.2, I choose to put the issue aside, and use the term “false” loosely, without making any theoretical commitment.

The experiments were carried out by two Japanese native speakers. In addition to those groups of children, adult Japanese speakers (N=15 for the ...*mo*...*mo* experiment, N=18 for the *ka* experiment) participated in video-taped versions of the experiments. Those adults were undergraduate students of Ritsumeikan University who were recruited at American University, Washington DC.

#### 4.6.2 Results and discussion

The results from the crucial test conditions are summarized in (301) and (302). The conditions correspond to those we used as examples in the previous section. “True” and “false” represent whether the test sentence is true under adult interpretation.

(301) Experiment 2A: *Dake...ka*

|                             | % acceptance by children<br>(n=20) | % acceptance by adults<br>(n=18) |
|-----------------------------|------------------------------------|----------------------------------|
| <b>Condition I (True)</b>   | 97.5% (39/40)                      | 100% (36/36)                     |
| <b>Condition II (False)</b> | 2.5% (1/40)                        | 0% (0/36)                        |

(302) Experiment 2B: *Dake...mo...mo*

|                              | % acceptance by children<br>(n=20) | % acceptance by adults<br>(n=15) |
|------------------------------|------------------------------------|----------------------------------|
| <b>Condition I (True)</b>    | 95% (38/40)                        | 100% (30/30)                     |
| <b>Condition II (False)</b>  | 5% (1/20)                          | 0% (0/15)                        |
| <b>Condition III (False)</b> | 10% (4/40)                         | 3% (1/30)                        |

Let us review the results in turn. First, in Experiment 2A, children performed at ceiling. They correctly accepted the test sentences 97.5% of the time in Condition I, suggesting that they assigned the disjunctive interpretation to *ka* within the “presupposition” part of the test sentence. This eliminates the possibility that Japanese children at this age misanalyze *ka* as a logical conjunction. Remember that in Condition I of the experiment the focused character acts on only one of the two

objects, and the other two characters do nothing. If children assign the conjunctive interpretation to *ka* within the presupposition part, they should have rejected the test sentence. In addition, they correctly rejected the test sentences 97.5% of the time in Condition II, suggesting that they assigned the conjunctive interpretation to *ka* within the negative “assertion” part of the test sentence. When they were asked to motivate their negative judgment, children always pointed to the third character who did something to one of the objects (e.g., Doraemon in (292)). We interpret this result as showing that Japanese children have adultlike semantics of *ka* as a Boolean disjunction.

In Experiment 2B, children again performed at ceiling. First, the most important finding is that children accepted the test sentences 95% of the time in Condition I. This suggests that Japanese children assigned the narrow-scope, Boolean “not both” interpretation to the conjunction within the negative “assertion” part of the decomposed semantics of the test sentences. This result demonstrates that neither children’s lexical semantics nor the scope property of *...mo...mo* deviate from adult knowledge. For children, *...mo...mo* is a Boolean conjunction that can be interpreted under the scope of antimorphic negation. Furthermore, the high rejection rates in the false conditions (Condition II and Condition III) suggests that children were actually computing the truth conditions for each decomposed proposition of the test sentences. Remember that the test sentences are false in Condition II due to the fact that the “presupposition” part was not satisfied, and are false in Condition III because the “assertion” part contradicts the situation. The fact that children consistently rejected the test sentences in those conditions, while accepting the test sentences in Condition

I is taken to show that children are able to associate distinct truth conditions for each decomposed meaning component of the test sentences.

Overall, the results from the second set of experiments conclusively show that Japanese children's lexical semantics of the logical connectives are adultlike. Given this conclusion, I reject the hypothesis that children's non-adult behavior with *ka* in simple negative sentences (i.e., in the first set of experiments) was due to their non-adult semantics of *ka*. Consequently, children's conjunctive interpretation of *ka* in simple negative sentences must be attributed to their non-adult scope assignment: for children, *ka* takes scope under overt local negation. Similarly, children's adultlike knowledge of the lexical semantics of *...mo...mo* entails that they assigned an adultlike scope interpretation to *...mo...mo* in simple negative sentences.

#### **4.7 Children's knowledge of Japanese connectives**

The experimental results we have obtained reveal that Japanese children exhibit both adultlike and non-adult behaviors in interpreting *ka* and *...mo...mo* and their scope interaction with negation. Let us now discuss what we can infer about children's knowledge about the connectives from the empirical data. First, the experimental results show that children know that both *ka* and *...mo...mo* yield the "De Morgan" interpretations when they are interpreted under the scope of negation. Japanese children assigned the conjunctive interpretation to *ka* in simple negative sentences and in the covert negative propositions that are associated with sentences containing *dake*. Similarly, they assigned the "not both" interpretation to *...mo...mo* within the covert negative meaning component of sentences with *dake*. These observations indicate that Japanese children have the correct Boolean semantics for



both *ka* and *...mo...mo*, without being misled by input. Second, children's interpretation of *ka* in simple negative sentences suggests that they do not know that *ka* must take scope over overt local negation. Rather, they interpreted the disjunction in situ, and resisted assigning the wide-scope interpretation to the item. In this respect Japanese children are similar to English-speaking children/adults. By contrast, children's scope assignments to *...mo...mo* were fully adultlike. Not only did they assign the correct wide-scope interpretation to *...mo...mo* in simple negative sentences, they also correctly avoided overgeneralizing that scope pattern to cases that involve covert negation.

The fact that Japanese children allowed the narrow scope interpretation of *ka* in simple negative sentences has two consequences. First, it shows that children do not learn possible scope interpretations conservatively, but can productively generate scope interpretations that are not exemplified by input data. In this sense Japanese children's non-adult behavior with *ka* in simple negative sentences is similar to the Freedom of Scope observed in the experiments in Chapter 2. Second, it indicates that the scope constraint must in fact be learned by learners of Japanese. In other words, the scope constraint cannot be a mere reflection of some default hypothesis or a product of conservative learning, and learners need to modify their grammar on the basis of some kind of linguistic experience. The crucial question is how children can purge their non-adult hypothesis on the basis of the input data available to them. Let us first consider if some form of domain-general learning algorithm can solve the problem by observing input data about possible scope interpretations.

Imagine a learner who considers the following three hypotheses about possible scope interpretations of simple negative sentences with *ka* in the object position:

- (303) i. Hypothesis 1:  $\neg \gg \vee$   
 ii. Hypothesis 2:  $\vee \gg \neg$   
 iii. Hypothesis 3:  $\neg \gg \vee$  or  $\neg \gg \vee$

The first hypothesis predicts that only the surface scope interpretation is possible. This seems to be the hypothesis that a majority of Japanese children endorse at around age 5. The second hypothesis corresponds to adult Japanese grammar. The third hypothesis predicts that the sentence is scopally ambiguous. This is also a perfectly reasonable hypothesis to consider, given that in Japanese many quantificational expressions in the object position show scope ambiguity with sentential negation. For example, in the following sentence the object “two books” can either take scope over or under negation<sup>64</sup>:

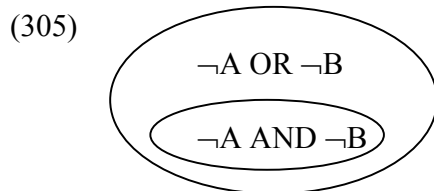
- (304) Taroo-wa nisatu-no hon-o yoma-nakatta  
 Taroo-TOP two-GEN book-ACC read-NEG  
 “Taroo didn’t read two books”  
 $\neg \gg \text{TWO} / \text{TWO} \gg \neg$

Under Hypothesis 1, *ka* is interpreted under the scope of negation, yielding conjunctive truth conditions ( $\neg A$  AND  $\neg B$ ). The situations in which such conjunctive truth conditions are satisfied are a subset of the situations in which the relevant forms would actually be used with the wide scope interpretation of disjunction ( $\neg A$  OR  $\neg B$ ).

---

<sup>64</sup> In this particular sentence, the wide scope interpretation of negation is less preferred, probably because pronominal numeral quantifiers strongly favor a specific interpretation. See the discussion in 6.5.1.

The semantic subset relation holding between the two scope interpretations is illustrated in (305):



Thus, the learner can obtain explicit “error signals” for Hypothesis 1 by encountering cases in which the relevant form is used in a situation where the conjunctive interpretation is false. One such case would involve a context in which it is clear that  $\neg A \text{ AND } \neg B$  is false: for example, the context we used in our experiment 1A. Another possible case is when the speaker expresses his uncertainty by continuing the crucial sentence by something like “but I don’t know which”. In this case, even if the context does not provide an explicit clue that suggests  $\neg A \text{ AND } \neg B$  is false, assigning the conjunctive interpretation with disjunction creates a contradiction with the continuation. Such an experience would tell the learner that the wide scope interpretation of *ka* is possible, and consequently lead the learner to reject Hypothesis 1.

Deciding between Hypothesis 2 and 3 is a more complex matter. In this case, no explicit error signal against the wrong hypothesis (i.e., Hypothesis 3) is available because Hypothesis 3 simply generates all logically possible scope interpretations. Given that the wrong hypothesis can never be directly falsified by input data (assuming that direct negative evidence is not available), a remaining possibility is to resort to indirect negative evidence. The possible scope interpretations that Hypothesis 3 generates (wide or narrow scope of *ka*) form a superset of the

interpretations that Hypothesis 2 generates (wide scope of *ka*). In this case, a probabilistic learner (with, for example, a Bayesian learning algorithm: e.g., Regier and Gahl 2004; Tenenbaum and Griffiths 2001) might be able to learn to dismiss the superset hypothesis. The idea is as follows: if the learner observes that the superset hypothesis generates not only the interpretation that can be seen in the input (i.e., the wide scope of *ka*) but also an interpretation that is never encountered (i.e., the narrow scope of *ka*), then the absence of the predicted interpretation can serve as evidence against the hypothesis.

We note that in order to detect the absence of a particular scope interpretation, the learner must be able to reliably identify the intended scope interpretation of an utterance. However, as we discussed in Chapter 2, this is not a straightforward assumption to make. Linguistic signals do not explicitly mark intended scope interpretations, and thus it is in principle possible that the scope interpretation that the learner assigns for an utterance does not match the scope interpretation that the speaker intends. For example, even if Japanese adults only use *ka* with an intended wide scope interpretation over local negation, it is possible that the learner may sometimes interpret the form with a different scope interpretation (in fact, this seems to be what happened in our experiment – Japanese children assigned narrow scope interpretations to *ka* in simple negative sentences). If the learner counts such an experience as evidence for an “occurrence” of the narrow scope of *ka*, a learning mechanism that exploits indirect negative evidence would face a serious problem in rejecting the superset hypothesis. Therefore, some kind of auxiliary mechanism is

necessary to pick up appropriate “intake” evidence from general input experience (on a related issue, see Pearl and Lidz 2006).

But even if we put the technical issues aside, a probabilistic learning account faces a serious challenge when actual uses of negated disjunction are considered. In the CHILDES database, I could not find any adult utterance in which sentential negation cooccurs with *ka* in the local object position. Furthermore, among 100,000 sentences that were randomly collected from internet forums, there are only two such forms, but both of them are antecedents of conditionals.<sup>65</sup> The relevant data are given in (306):

- (306) a. Uwattura-dake-demo, interior *ka* graphic-o kajittei-nai-to muzukasii-  
 superficially-only-even interior or graphic-ACC learn-NEG-COMP difficult-  
 deshou  
 DEC  
 “If you haven’t learned interior or graphic design even only superficially,  
 it would be difficult”
- b. Nihongo *ka* Eigo-o kichinto-si-nai-to kodomo-ga  
 Japanese or English-ACC right-do-NEG-COMP child-NOM  
 otona-ni natta toki-ga taihen nan desuyone  
 adult-DAT become time-NOM trouble COP DEC+MOOD  
 “If he does not study Japanese or English in the right way, the child will  
 face problems when he becomes an adult”

As was pointed out in section 4.2.4, in the antecedent of conditional clauses *ka* may take scope under negation in the same clause, and in fact, the narrow scope interpretation of *ka* seems to be the intended scope interpretation of those sentences.

Thus, not only are the forms that are crucially relevant for the constraint vanishingly

---

<sup>65</sup> This corpus search, by and large, is preliminary. In Japanese texts, no spaces are put between words, and the disjunction *ka* is always written in *Hiragana*, which are phonogramic letters. Those properties of Japanese texts make it particularly hard to isolate disjunction *ka* from other syllables that have the same pronunciation. I first searched for frequent words with a syllable *ka* and deleted them, then extracted sentences that involve the letter *ka* and negation. It is thus possible that a few cases of disjunction *ka* were deleted in the first step. A more rigorous corpus study using a corpus with morphological parses is clearly needed, which will be a topic for future research.

rare,<sup>66</sup> but also the actual data can be misleading. Even if the learner ignores subordinate clauses like antecedents of conditionals, the data sparseness problem remains: within the crucial context, the wide scope interpretation of *ka* is almost as rare as the narrow scope interpretation of *ka*. The sparseness of positive evidence for the wide scope interpretation of *ka* can seriously impair a probabilistic learner that depends on input evidence for rejecting the non-adult scope interpretation. As I pointed out in section 2.7, probabilistic comparisons of different data sets would not yield a reliable conclusion when the overall data size is so small. Given this problem, I consider it extremely unlikely that the input data provide a basis for a probabilistic learning model to distinguish Hypothesis 3 and Hypothesis 2. In other words, the non-adult narrow scope interpretation of *ka* cannot be expunged on the basis of input data.

Thus, the acquisition of the scope constraint on *ka* represents the same kind of learnability problem that I discussed in the previous chapters on the acquisition of scope rigidity. First, children productively generate scope interpretations that are not possible in the adult grammar. Second, the input data do not provide negative evidence (direct or indirect) against children's non-adult scope interpretation. Given this, a theoretical analysis of the scope constraint on *ka* (and on *...mo...mo*) becomes quite relevant. Because children cannot learn which of the relevant scope interpretations is impossible from the input, there must be some mechanism in children's grammar that makes them abandon their non-adult interpretation when

---

<sup>66</sup> The low frequency might be due to the felicity conditions associated with the use of disjunction and negation. As we discussed in 5.3, sentences that involve *ka* and negation are subject to partially contradicting felicity conditions, and consequently there are only limited contexts that satisfy those felicity conditions simultaneously. One such context is the one I used in the experimental story, but one could easily imagine that such a situation would not occur frequently.

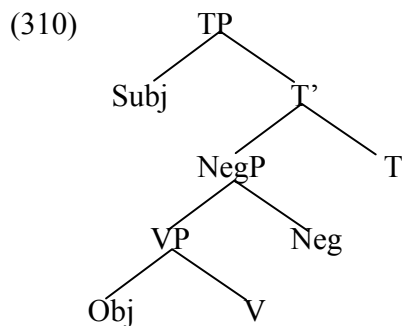
something else is learned. A relevant question is whether or not an empirically well-motivated theoretical analysis of the scope constraint could offer such a mechanism that resolves the learnability problem. The next chapter presents a theory of the scope constraint, and discusses how it can be related to the problem of language acquisition.





- (309) John-wa supeingo *mo* furansugo *mo* hanasa-nai  
 John-TOP Spanish also French also speak-NEG  
 Lit. “John doesn’t speak both Spanish and French”  
 $\wedge \gg \neg / * \neg \gg \wedge$

Given the obligatory wide scope of *ka/...mo...mo*, we are forced to assume that those connectives occupy a position that is higher than negation in LF. However, in section 4.2.3, I argued that the base structure for Japanese negative transitive sentences is the following, in which the object is c-commanded by negation:



Therefore, it is necessary to assume that some movement operation alters the structural configuration in (310) when the object involves *ka* or *...mo...mo*. I will argue that *ka* and *...mo...mo* are subject to obligatory syntactic movement that raises them to a position higher than local negation. The movement approach yields various consequences that receive empirical support. Furthermore, I argue that Japanese connectives are Positive Polarity Items (PPI), and discuss a cross-linguistic variation among PPIs, which is called “rescuing” by Szabolcsi (2004). The movement analysis yields two major consequences that receive empirical support: (i) locality, and (ii) insensitivity to non-overt negation. In the last part of the chapter, I discuss the learnability problem concerning the acquisition of Japanese connectives in terms of the theoretical analysis.

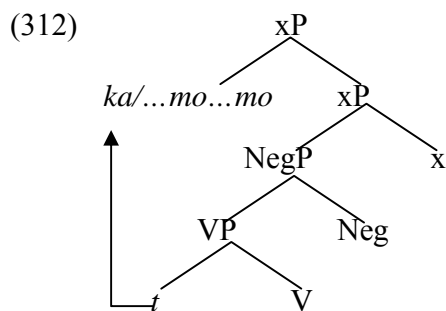
## 5.2 A syntactic account

Let us first recall the three hypotheses that I have rejected. Those hypotheses about the interpretive contrasts between Japanese and English are summarized in (311):

- (311) a. *The semantic account*  
Japanese *ka* and *...mo...mo* are not logical Boolean connectives, and therefore they do not interact with negation in the same way as their English counterparts.
- b. *The negation scope account*  
Japanese sentential negation does not c-command the object position of transitive predicates, and therefore *ka* and *...mo...mo* in object position are interpreted outside the scope of negation.
- c. *The semantic scope constraint account*  
Some lexical property of *ka* and *...mo...mo* forces them to take scope over antimorphic negation.

The semantic account was rejected on the basis of the observation that *ka* and *...mo...mo* yield identical interpretations to their English counterparts in embedded contexts. We then pursued the possibility of reducing the interpretive contrast to a matter of scope interpretation: *ka* and *...mo...mo* must take wider scope than local negation. However, it turned out that the scope behavior of *ka* and *...mo...mo* cannot be reduced to a general inability of Japanese negation to take scope over other QNP arguments in the sentence. Similarly, our attempt to define the scope constraint on Japanese connectives in semantic terms also failed. Given this background, I now explore the possibility of defining the scope behavior of *ka* and *...mo...mo* in syntactic terms.

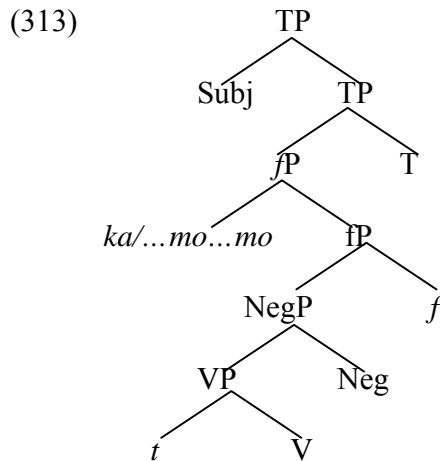
Given the assumption that configurations in LF determine relative scope between quantificational elements, it is in any case necessary to assume that *ka* and *...mo...mo* are always in a higher position than local negation at LF. The question is how we derive the configuration, especially when *ka* and *...mo...mo* are the object of the sentence. Let us assume that *ka* and *...mo...mo* must undergo obligatory movement that targets a functional projection that is located right above NegP. The movement is illustrated in (312):



In this configuration, *ka/...mo...mo* is outside of the c-command domain of Neg, thus it takes scope over negation. Let us assume that the obligatory movement occurs in the covert component (i.e., LF) and cannot be reconstructed. Given these assumptions, it follows that *ka/...mo...mo* must take scope over local negation: the obligatory movement places those connectives in a higher position than negation in LF representations.

Crucially, I assume that the movement is driven by a purely syntactic reason. Specifically, I assume that *ka* and *...mo...mo* have a weak uninterpretable feature in the sense of Chomsky (1995) that must be checked in the specifier position of a specific functional projection. Let us call the functional projection *fP* (due to the lack of a better name), and assume that it is located between TP and NegP. Under this

assumption, the LF representation of simple negative sentences that involve *ka/...mo...mo* should look like (313)<sup>67</sup>:



The raised object has its uninterpretable feature checked at the specifier position of *fP*, and therefore it is not forced to move anymore (although some optional LF movement may still apply to the object). In other words, the feature-driven movement only affects the c-command relation between the object and local negation, and it does not force *ka/...mo...mo* to move above negation in the superordinate clause because the feature-checking completes within the local clause domain. The locality effect that we have observed in the previous chapter is thus explained: the movement forces *ka/...mo...mo* to take scope over local negation, but does not necessarily affect their relative scope with extracausal negation, as illustrated in the examples in (314) and (315).

---

<sup>67</sup> There remains a question about the size of the constituent that must be “pied-piped” by *ka/...mo...mo*. One possibility is that the entire NP/DP that involves *ka/...mo...mo* is raised to the specifier position of *fP*, possibly exploiting the mechanism of percolation and subsequent large-scale pied-piping as proposed by Nishigauchi (1990). Another possibility is that only *ka/...mo...mo* moves, leaving the conjoined NPs in the base position. I leave the issue open.

- (314) a. *Simple clause*  
 John-wa supeingo *ka* furansugo-o hanasa-nai  
 John-TOP Spanish or French-ACC speak-NEG  
 \*¬ >> *ka*
- b. *Complement clause*  
 John-wa [Mary-ga supeingo *ka* furansugo-o hanasu-to] iwa-nakatta  
 John-TOP Mary-NOM Spanish or French-ACC speak-COMP say-NEG  
 OK ¬ >> *ka*
- c. *Relative clause*  
 John-wa [supeingo *ka* furansugo-o hanasu] gakusei-o mi-nakatta  
 John-TOP Spanish or French-ACC speak student-ACC see-NEG  
 OK ¬ >> *ka*
- (315) a. *Simple clause*  
 John-wa supeingo *mo* furansugo *mo* hanasa-nai  
 John-TOP Spanish also French also speak-NEG  
 \*¬ >> ...*mo...mo*
- b. *Complement clause*  
 John-wa [Mary-ga supeingo *mo* furansugo *mo* hanasu-to] iwa-nakatta  
 John-TOP Mary-NOM Spanish also French also speak-COMP say-NEG  
 OK ¬ >> ...*mo...mo*
- c. *Relative clause*  
 John-wa [supeingo *ka* furansugo-o hanasu] gakusei-o mi-nakatta  
 John-TOP Spanish or French-ACC speak student-ACC see-NEG  
 OK ¬ >> ...*mo...mo*

A further consequence of this movement approach is that *ka* and ...*mo...mo* are not forced to take scope over the subject. This explains why *ka*/...*mo...mo* can be interpreted under the scope of *dake* in the subject position, and consequently, under the scope of covert negation associated with *dake*. The relevant data are repeated here as (316) and (317):<sup>68</sup>

---

<sup>68</sup> A problem arises, however, with the derivation of sentences with ...*mo...mo* in the sentence-initial, “scrambled” position. In chapter 2, I made the assumption that scrambled phrases are base-generated in their surface position. Under this assumption, it is not clear how a scrambled ...*mo...mo* can check its uninterpretable feature. If it is lowered to the specifier of *fP*, then it is predicted to take scope under the subject, contrary to the fact. I do not have any good solution to this problem.

- (316) John-dake-ga supeingo *ka* furansugo-o hanasu  
 John-only-NOM Spanish or French-ACC speak  
 “Only John speaks Spanish or French”  
 → Everyone other than John doesn’t speak Spanish AND doesn’t speak French
- (317) John-dake-ga supeingo *mo* furansugo *mo* hanasu  
 John-only-NOM Spanish also French also speak  
 “Only John speaks both Spanish and French”  
 → Everyone other than John doesn’t speak French OR doesn’t speak Spanish

The cases of conditional clauses at first glance appear to be problematic for this approach. As we observed above, in the antecedent of conditional sentences *ka* and *...mo...mo* can be interpreted under the scope of local negation. The relevant data are repeated here as (318) and (319):

- (318) Mosi John-ga supeingo *ka* furansugo-o hanasa-nai-to, kare-wa komaru  
 If John-NOM Spanish or French-ACC speak-NEG-COMP he-TOP in-trouble  
 Lit. "If John doesn’t speak Spanish or French, he will be in trouble"  
<sup>OK</sup>  $\neg$  >> *ka*
- (319) Mosi John-ga supeingo *mo* furansugo *mo* hanasa-nai-to, kare-wa komaru  
 If John-NOM Spanish also French also speak-NEG-COMP he-TOP in-trouble  
 Lit. "If John doesn’t speak both Spanish and French, he will be in trouble"  
<sup>OK</sup>  $\neg$  >> *...mo...mo*

However, a closer examination of the relevant facts reveals that negation in the antecedent of conditionals may take wider scope than in declarative main clauses. First, let us examine the scope interaction between *zen'in* "everyone" and negation in declarative main clauses. As shown in (320), negation may take scope over *zen'in* in the object position. However, the wide scope interpretation of negation is excluded if *zen'in* appears in the subject position:

- (320) a. Taroo-ga *zen'in*-o hihansi-nakatta  
 Taroo-NOM everyone-ACC criticize-NEG  
 "Taroo didn’t criticize everyone"

OK  $\neg >> \forall$

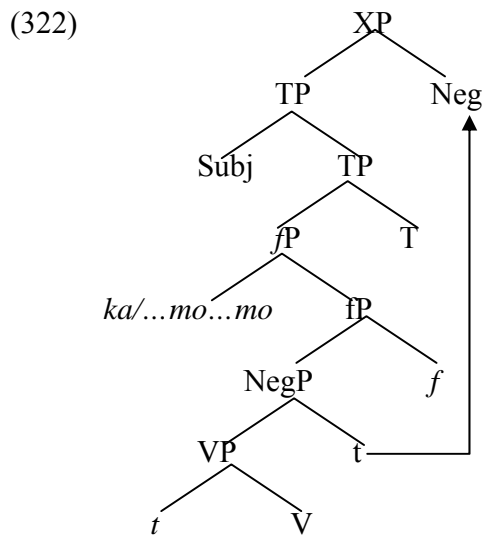
- b. *Zen'in-ga* Taroo-o hihansi-nakatta  
everyone-NOM Taroo-ACC criticize-NEG  
"Everyone didn't criticize Taroo"  
\*  $\neg >> \forall$

The lack of the wide scope reading of negation in (320)b suggests that negation does not c-command the subject position. As in (313), we assume that the subject is in the spec-TP position, which is higher than NegP, and that therefore it is interpreted outside the scope of negation.

Interestingly, when sentence (320)b is embedded within the antecedent of a conditional sentence, the relative scope relation between *zen'in* and negation becomes ambiguous: that is, in contrast with (320)b, the wide scope interpretation of negation is possible in (321):

- (321) Mosi *zen'in-ga* Taroo-o hihansi-nai-to kare-ha komaru  
if everyone-NOM Taroo-ACC criticize-NEG-COMP he-TOP be-in-trouble  
"If everyone does not criticize Taroo, he will be in trouble"  
OK  $\neg >> \forall / \forall >> \neg$

Based on this observation, Kato (1997) argues that negation in the antecedent of conditional clauses can undergo optional raising to a position from which it can c-command the subject. If we adopt the optional neg-raising, then the facts in (318) and (319) follow: the raised negation is now higher than *ka/...mo...mo*, even after the connectives underwent the obligatory raising, as shown in (322):



In this configuration, *ka/...mo...mo* is interpreted under the scope of negation. If the optional raising of negation does not occur, then *ka/...mo...mo* takes scope over negation, as in declarative main clauses. The sentences in (318) and (319) in fact allow the narrow scope interpretation of negation: (318) can mean that "if John doesn't speak Spanish OR doesn't speak French, he will be in trouble", and (319) can mean that "if John doesn't speak Spanish AND doesn't speak French, he will be in trouble".

Under the neg-raising analysis in (322), the narrow scope interpretation of *ka/...mo...mo* becomes possible only when negation is raised to the position from which negation takes sentential scope. Consequently, it is predicted that negation that takes scope over *ka/...mo...mo* in the object position must take scope over the subject. That is, within a configuration *mosi* [ $QP_{subj}$  ...*ka/...mo...mo*... NEG], possible scope interpretations are either  $\neg \gg QP_{subj} \gg ka/...mo...mo$ , or  $QP_{subj} \gg ka/...mo...mo \gg \neg$ , but crucially,  $QP_{subj} \gg \neg \gg ka/...mo...mo$  is impossible. This prediction is borne



out. In the following examples, the intermediate scope interpretation of negation is excluded:

- (323) Mosi zen'in-ga supeingo *ka* furansugo-o hanasa-nai-to, kare-wa komaru  
 If everyone-NOM Spanish or French-ACC speak-NEG-COMP he-TOP in-trouble  
 Lit. "If everyone doesn't speak Spanish or French, he will be in trouble"

<sup>OK</sup>  $\neg \gg \forall \gg ka : \neg \forall x [x \text{ speaks S OR } x \text{ speaks F}]$   
<sup>OK</sup>  $\forall \gg ka \gg \neg : \forall x [x \text{ doesn't speak S OR } x \text{ doesn't speak F}]$   
 $*\forall \gg \neg \gg ka : \forall x [x \text{ doesn't speak S AND } x \text{ doesn't speak F}]$

- (324) Mosi zen'in-ga supeingo *mo* furansugo *mo* hanasa-nai-to, kare-wa komaru  
 If everyone-NOM Spanish also French also speak-NEG-COMP he-TOP in-trouble  
 Lit. "If everyone doesn't speak both Spanish and French, he will be in trouble"

<sup>OK</sup>  $\neg \gg \forall \gg \dots mo \dots mo : \neg \forall x [x \text{ speaks S AND } x \text{ speaks F}]$   
<sup>OK</sup>  $\forall \gg \dots mo \dots mo \gg \neg : \forall x [x \text{ doesn't speak S AND } x \text{ doesn't speak F}]$   
 $*\forall \gg \neg \gg \dots mo \dots mo : \forall x [x \text{ doesn't speak S OR } x \text{ doesn't speak F}]$

Thus, (323) cannot mean “If nobody speaks Spanish or French...”; (324) cannot mean “If nobody speaks both Spanish or French...”. In contrast, if the quantified object is one which can take scope under negation in simple clauses (e.g., *zen'in* in (320)a), then the intermediate scope interpretation of negation is possible, as shown in (325). In fact, the intermediate scope interpretation of negation is possible in corresponding single clauses as in (326), which is not surprising given that the object QP can be in the scope of negation without neg-raising.<sup>69</sup>

- (325) Mosi zen'in-ga zen'in-o hihansi-nakatta-ra, kare-wa komaru

---

<sup>69</sup> The relevant examples may sound a bit odd, due to the repetition of the same quantifier *zen'in*. Adding some modifier to the quantifier reduces the oddness. Such a modification does not affect possible scope interpretations:

(i) Koko-ni iru zenin-ga achira-ni iru zen'in-o hihansi-nakatta  
 this place being everyone-NOM that place being everyone-ACC criticize-NEG  
 “Everyone in this place did not criticize everyone in that place”  
<sup>OK</sup>  $\forall \gg \neg \gg \forall$

If everyone-NOM everyone-ACC also speak-NEG-COMP he-TOP in-trouble  
 Lit. "If everyone doesn't criticize everyone, he will be in trouble"  
 ${}^{OK}\forall >> \neg >> \forall$

- (326) Zen'in-ga zen'in-o hihansi-nakatta  
 everyone-NOM everyone-ACC criticize-NEG  
 Lit. "Everyone did not criticize everyone"  
 ${}^{OK}\forall >> \neg >> \forall$

These observations add further support to the claim that the narrow scope interpretation of *ka/...mo...mo* in conditionals is derived by neg-raising.

In sum, the movement analysis successfully captures all the empirical data we have seen so far. I thereby endorse the movement analysis, whose crucial assumptions are given in (327):

- (327) a. *Ka* denotes the Boolean disjunction operator, and *...mo...mo* denotes the Boolean conjunction operator.  
 b. *Ka* and *...mo...mo* have a weak uninterpretable feature that must be checked in the spec of *fP*.  
 c. *fP* is located in between NegP and TP.

Under this analysis, the scope constraint on Japanese connectives is actually a constraint on LF-syntax: all that the constraint does is to place the relevant items in the appropriate syntactic position, which sometimes yields a semantic consequence. The cross-linguistic contrast between Japanese and English is reduced to the presence of the relevant syntactic feature in Japanese connectives. English *or* and *both...and...* do not have the feature that triggers LF raising to *fP*, and therefore they are not forced to take scope over local negation. The connectives in Japanese and English are semantically identical, but only the Japanese ones are subject to syntactic movement

that has a semantic consequence in certain limited contexts, e.g., simple negative sentences.

### 5.3 Japanese connectives and positive polarity

The scope behavior of *ka* and *...mo...mo* is reminiscent of the defining property of so-called Positive Polarity Items (PPI). Observe that English *some*, which is assumed to be a PPI existential (cf. Progovac 1994; Szabolcsi 2004), shows exactly the same locality effect in scope interpretation:

- (328) a. John didn't call someone  $*_{\neg} \gg \exists$ <sup>70</sup>  
 b. Taroo didn't think John called someone  $OK_{\neg} \gg \exists$   
 c. John didn't meet a boy who called someone  $OK_{\neg} \gg \exists$

Furthermore, Szabolcsi (2002) argues that Hungarian disjunction *vagy* is a PPI. Szabolcsi points out that *vagy* does not take scope under clausemate negation, but it is interpreted under the scope of extracausal negation:

- (329) a. Nem csukt-uk be az ajtó-t vagy az ablak-ot.  
 not closed-1PL in the door-ACC or the window-ACC  
 Lit. "We didn't close the door or the window"  
 $*_{\neg} \gg vagy$   
 b. Nem hisz-em, hogy becsukt-uk volna az ajtó-t vagy az ablak-ot.  
 not think-1SG that in-closed-1PL AUX the door-ACC or the window-ACC  
 "I don't think we closed the door or the window"  
 $OK_{\neg} \gg vagy$

(Szabolcsi 2002: 2)

---

<sup>70</sup> Although the literature often claims that the narrow scope interpretation of *some* is impossible, there seem to be nontrivial numbers of native speakers who find the reading just fine. This may possibly be due to a lexical variation among speakers: for those speakers that allow the narrow scope interpretation of *some* in simple negative sentences, *some* is not a PPI.

Given the parallelism in the scope interpretations, I maintained (Goro 2004; 2006; Goro and Akiba 2004a; 2004b) that Japanese *ka* and *...mo...mo* are also PPIs. Furthermore, I argued (Goro 2004; 2006) that the obligatory covert movement outlined above was the defining property of PPIs in general. Under this view, positive polarity items are analyzed as having a weak uninterpretable feature (which is called *f*-PPI in Goro 2004) that triggers covert raising of those items to the spec of *fP*. I will adopt this position in this thesis.

There is, however, one open issue regarding the thesis that PPIs in natural language uniformly receive the movement analysis. The issue concerns a phenomenon that was called “rescuing” by Szabolcsi (2004). Szabolcsi, expanding upon an observation by Baker (1970), points out that the English PPI *some* can be interpreted within the immediate scope of overt negation, when the [ $\neg$  >> *some*] part is embedded within contexts that license weak NPIs (e.g. *any*). In other words, otherwise impossible scope interpretation of the PPI *some* is “rescued” by another NPI-licenser. The following examples are from Szabolcsi (2004), illustrating the rescuing phenomena:

- |   |   |
|---|---|
| (330) I don't think that John didn't call someone.  | $\sqrt{\text{not}} > \text{not} > \text{some}$      |
| (331) No one thinks that John didn't call someone.  | $\sqrt{\text{no one}} > \text{not} > \text{some}$   |
| (332) I am surprised that John didn't call someone. | $\sqrt{\text{surprise}} > \text{not} > \text{some}$ |
| (333) I regret that John didn't call someone.       | $\sqrt{\text{regret}} > \text{not} > \text{some}$   |
| (334) If we don't call someone, we are doomed.      | $\sqrt{\text{if}} (\text{not} > \text{some})$       |
| (335) Every boy who didn't call someone . . .       | $\sqrt{\text{every}} (\text{not} > \text{some})$    |
| (336) Only John didn't call someone.                | $\sqrt{\text{only}} > \text{not} > \text{some}$     |

(337) Few boys didn't call someone.  $\sqrt{\text{few}} > \text{not} > \text{some}$

(338) Few boys thought that you didn't call someone.  $\sqrt{\text{few}} > \text{not} > \text{some}$

Szabolcsi notes, in footnote 12 of Szabolcsi (2004), that Hungarian indefinite and disjunctive PPIs also exhibit the same behavior. Szabolcsi takes the ability to be rescued by a weak NPI licenser to be a core property of PPIs. However, the rescuing effect does not directly follow from the movement analysis. Specifically, it is not clear under the movement analysis why the existence of a weak NPI licenser should affect the relative scope relation between a PPI and negation.

In fact, the narrow scope interpretation of Japanese *ka* and *...mo...mo* fails to be rescued in many of the contexts that Szabolcsi lists. We begin with sentences with double negation. When a simple negative sentence that involves *some* is embedded under matrix negation, the narrowest scope interpretation of *some* is “rescued”, as shown in (330). Japanese *ka* and *...mo...mo*, in contrast, still resist taking scope under the local negation in the same context.

(339) John-wa [Taroo-ga piza *ka* pasuta-o tabe-nakat-ta to] omowa-nakatta  
 John-TOP Taroo-NOM pizza or pasta-ACC eat-NEG-PAST COMP think-NEG  
 Lit. “John didn't think that Taroo didn't eat pizza or pasta”  
 $*\neg >> \neg >> ka / \overset{OK}{\neg} >> ka >> \neg$

(340) John-wa [Taroo-ga piza *mo* pasuta *mo* tabe-nakat-ta to] omowa-nakatta  
 John-TOP Taroo-NOM pizza also pasta also eat-NEG-PAST COMP think-NEG  
 Lit. “John didn't think that Taroo didn't eat both pizza and pasta”  
 $*\neg >> \neg >> \dots mo \dots mo / \overset{OK}{\neg} >> \dots mo \dots mo >> \neg$

Second, within the first argument of the universal quantifier (English counterpart:

(335)), *ka* and *...mo...mo* continue to resist scoping under local negation:

(341) Supeingo *ka* furansugo-o hanasa-nai dono gakusei-mo...

Spanish or French-ACC speak-NEG every student  
 Lit. "Every student who doesn't speak Spanish or French..."  
 \*every ( $\neg \gg ka$ ) / <sup>OK</sup>every ( $ka \gg \neg$ )

- (342) Supeingo *mo* furansugo *mo* hanasa-nai dono gakusei-mo...  
 Spanish also French also speak-NEG every student  
 Lit. "Every student who doesn't speak both Spanish and French..."  
 \*every ( $\neg \gg \dots mo \dots mo$ ) / <sup>OK</sup>every ( $\dots mo \dots mo \gg \neg$ )

Next, within sentences containing *dake* "only" (English counterpart: (336)), *ka* and *...mo...mo* resist taking scope under local overt negation:

- (343) Taroo-dake-ga supeingo *ka* furansugo-o hanasa-nai  
 Taroo-only-NOM Spanish or French-ACC speak-NEG  
 Lit. "Only Taroo doesn't speak Spanish or French"

can mean: For all  $x$ ,  $x \neq$  Taroo, it is not the case that  $x$  doesn't speak Spanish OR doesn't speak French ( $\neg \gg ka \gg \neg$ )

cannot mean: For all  $x$ ,  $x \neq$  Taroo, it is not the case that  $x$  doesn't speak Spanish AND doesn't speak French ( $\neg \gg \neg \gg ka$ )

- (344) Taroo-dake-ga supeingo *mo* furansugo *mo* hanasa-nai  
 Taroo-only-NOM Spanish also French also speak-NEG  
 Lit. "Only Taroo doesn't speak both Spanish and French"

can mean: For all  $x$ ,  $x \neq$  Taroo, it is not the case that  $x$  doesn't speak Spanish AND doesn't speak French ( $\neg \gg \dots mo \dots mo \gg \neg$ )

cannot mean: For all  $x$ ,  $x \neq$  Taroo, it is not the case that  $x$  doesn't speak Spanish OR doesn't speak French ( $\neg \gg \neg \gg \dots mo \dots mo$ )

If the narrowest scope of the PPI connectives is rescued in this context, the sentence in (343) should be able to mean "Taroo doesn't speak Spanish or French, and everyone other than Taroo speaks French or Spanish". This interpretation is, however, not available with the sentence. Similarly, the sentence in (344) cannot mean "Taroo doesn't speak both Spanish and French, and everyone else speaks both Spanish and French", suggesting that the narrow scope interpretation of *...mo...mo* under the overt negation is still impossible.

As we have seen above, in the antecedent of conditional clauses *ka* and *...mo...mo* can take scope under local negation. However, I provided independent evidence that in the context negation takes wider scope than it does in matrix declarative clauses. Thus, Japanese has a mechanism (i.e., optional neg-raising) that can derive the narrow scope interpretation of *ka/...mo...mo* in conditionals independently of the rescuing in Szabolcsi's sense. Furthermore, there is indeed evidence that suggests that the neg-raising is the only mechanism that derives the exceptional scope interpretation of Japanese connectives in conditionals. Kato (1997) points out that the optional neg-raising in the antecedent of conditionals is conditioned by the semantics of the matrix predicate. Specifically, only "adversative" predicates that describe some negative event can trigger the neg-raising.<sup>71</sup> Thus in (345), replacing the matrix predicate *komaru* "be in trouble" with *uresii* "be happy" makes the wide scope interpretation of negation over the subject impossible, just as in matrix declarative clauses:

- (345) a. Mosi zen'in-ga shukudai-o dasa-nai-to kare-wa komaru  
 If everyone-NOM homework-ACC submit-NEG-COMP he-TOP be-in-trouble  
 "If everyone doesn't submit the homework, he'll be in trouble"  
 $\text{OK } \neg > \forall$
- b. Mosi zen'in-ga shukudai-o dasa-nai-to kare-wa uresii  
 If everyone-NOM homework-ACC submit-NEG-COMP he-TOP be-happy  
 "If everyone doesn't submit the homework, he'll be happy"  
 $*\neg > \forall$

---

<sup>71</sup> Another way to look at the neg-raising is to assume that neg-raising is always possible, but the sentential scope interpretation of negation is blocked in some contexts by some independent factor. Under this view, the sentential scope interpretation of negation is similar to the inverse scope interpretation that I discussed in Chapter 2: the grammar of Japanese provides a way to derive that interpretation, but it fails to surface in some specific contexts (especially, in matrix declarative clauses). In any case, a theory of Japanese neg-raising must explain why its effect is observable only in certain limited contexts. This is a topic for future research.

If the narrow scope interpretation of *ka/...mo...mo* in the antecedent of conditionals depends strictly on the availability of neg-raising, then it is predicted that within the antecedent clause of (345)b, *ka/...mo...mo* may not take scope under local negation. This prediction is borne out: *ka/...mo...mo* indeed resists taking scope under local negation in (346) and (347):

- (346) Mosi John-ga supeingo *ka* furansugo-o hanasa-nai-to, kare-wa uresii  
 If John-NOM Spanish or French-ACC speak-NEG-COMP he-TOP be-happy  
 Lit. "If John doesn't speak Spanish or French, he will be happy"  
 \*¬ >> *ka*
- (347) Mosi John-ga supeingo *mo* furansugo *mo* hanasa-nai-to, kare-wa uresii  
 If John-NOM Spanish also French also speak-NEG-COMP he-TOP be-happy  
 Lit. "If John doesn't speak both Spanish and French, he will be happy"  
 \*¬ >> ...*mo...mo*

This is unexpected if the narrow scope of *ka/...mo...mo* is rescued by the presence of a weak NPI licenser: the semantics of the matrix predicate should not affect the NPI-licensing ability of the antecedent clause (e.g., <sup>OK</sup>*If anyone can help me, I will be happy*).

Exactly the same observation can be made with complements of adversative predicates. First, the narrow-scope interpretation of *ka/...mo...mo* is possible within the complements of adversative predicates:

- (348) Boku-wa Taroo-ga supeingo *ka* furansugo-o hanasa-nakatta koto-ni odoroitā  
 I-TOP Taroo-NOM Spanish or French-ACC speak-NEG thing-DAT surprised  
 "I was surprised at the fact that Taroo did not speak Spanish or French"  
<sup>OK</sup>¬ >> *ka*
- (349) Boku-wa Taroo-ga supeingo *mo* furansugo *mo* hanasa-akatta koto-ni odoroitā  
 I-TOP Taroo-NOM Spanish also French also speak-NEG thing-DAT surprised  
 "I was surprised at the fact that Taroo did not speak both Spanish and French"  
<sup>OK</sup>¬ >> ...*mo...mo*
- (350) Boku-wa Taroo-ga supeingo *ka* furansugo-o hanasa-nakatta koto-o koukaisita



I-TOP Taroo-NOM Spanish or French-ACC speak-NEG thing-ACC regretted  
 “I regretted the fact that Taroo did not speak Spanish or French”  
 OK<sub>¬</sub> >> ...*mo...mo*

- (351) Boku-wa Taroo-ga supeingo *mo* furansugo *mo* hanasa-nakatta koto-o  
 I-TOP Taroo-NOM Spanish or French-ACC speak-NEG thing-ACC  
 koukaisita  
 regretted  
 “I regretted the fact that Taroo did not speak Spanish or French”  
 OK<sub>¬</sub> >> ...*mo...mo*

Second, the narrow scope interpretation of *zen'in* in the subject position is allowed within these contexts:

- (352) Boku-wa zen'in-ga shukudai-o dasa-nakatta koto-ni odoroi-ta  
 I-TOP everyone-NOM homework-ACC submit-NEG thing-DAT surprise-PAST  
 “I was surprised at the fact that everyone didn't submit the homework”  
 OK<sub>¬</sub> >> ∇
- (353) Boku-wa zen'in-ga shukudai-o dasa-nakatta koto-o koukaisi-ta  
 I-TOP everyone-NOM homework-ACC submit-NEG thing-ACC regret-PAST  
 “I regretted the fact that everyone didn't submit the homework”  
 OK<sub>¬</sub> >> ∇

The narrow-scope interpretation of *zen'in* disappears if the main predicate is replaced by a “positive” predicate, such as *kandousuru* “be impressed”:

- (354) Boku-wa zen'in-ga shukudai-o dasa-nakatta koto-ni kandousita  
 I-TOP everyone-NOM homework-ACC submit-NEG thing-DAT be-impressed  
 “I was impressed at the fact that everyone didn't submit the homework”  
 \*<sub>¬</sub> >> ∇

Based on those observations, I conclude that the narrow scope of *ka* and ...*mo...mo* under local negation is not rescued in the same semantic contexts as English *some*. In other words, the Japanese connectives are not “rescuable” PPIs. The cross-linguistic variation of the rescuing effect, or the existence of the rescuing effect itself, is not

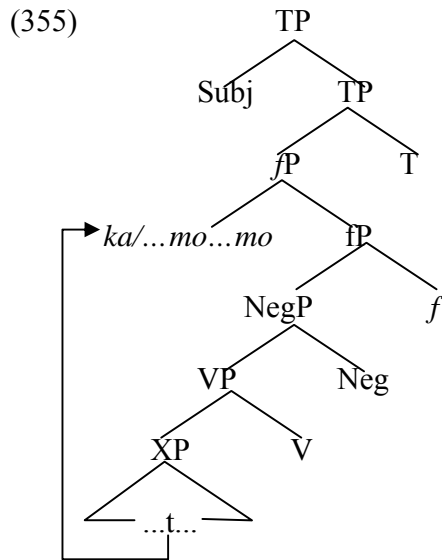
directly accounted for by our present movement analysis. To explain the scope behavior of items like *some* in the rescuing contexts, some mechanism should be added on top of covert movement. This issue, however, is beyond the scope of this thesis. Our main concern is with the interpretive contrasts between Japanese and English logical connectives, and the feature-based movement analysis alone suffices to explain the scope behavior of those connectives. I therefore choose to put the matter aside here, and leave the issue on the theory of positive polarity in natural language for future research.

## 5.4 Further consequences

In what follows, I explore further consequences of the movement account for the scope behavior of Japanese logical connectives.

### 5.4.1 *The size of complement clauses*

In simple clause sentences, the uninterpretable feature of *ka/...mo...mo* is checked at the specifier position of *fP* in the same clause. In complement clauses with full CP structure, the feature checking is carried out within the complement clause, and therefore *ka/...mo...mo* can be interpreted under the scope of negation in the matrix clause. However, we have not considered the cases that involve smaller complement clauses that do not have the *fP* layer. If a complement clause lacks *fP*, then a PPI connective that is embedded inside the complement must be moved to the matrix *fP* to check its uninterpretable feature. Consequently, it is predicted that in such a case the embedded PPI connective is forced to take scope over matrix negation, as illustrated in (355):



In order to examine the prediction empirically, we need to find a diagnosis for the size of complement clauses. First, let us compare finite vs. nonfinite complement clauses. In Japanese, finite complement clauses show three typical properties: (i) a tense marker appears on the complement verb, (ii) the clause is headed by an overt complementizer (comparable to English *that*), and (iii) the complement subject is assigned nominative case.

- (356) John-wa [Taroo-**ga** piza-o tabe-**ta-to**] itta  
 John-TOP Taroo-NOM pizza-ACC eat-PAST-COMP said  
 “John said that Taroo ate pizza”

The properties of the finite complements suggest that those clauses have the fully projected functional layers up to CP. As we have seen above, a PPI connective that is embedded within those finite clauses can be interpreted under the scope of matrix negation.

By contrast, most nonfinite complements show none of these properties. For example, in a periphrastic causative construction that has been analyzed as having bi-

clausal structure (cf. Kuroda 1965), (i) tense markers are excluded from the complement verb, (ii) overt complementizers are disallowed, and (iii) nominative case of the complement subject is not licensed:

- (357) John-wa [Taroo-**ni**/\***ga** piza-o tabe-(\***ta**)-(\***to**)] sase-ta  
 John-TOP Taroo-DAT/NOM pizza-ACC eat-(PAST)-(COMP) cause-PAST  
 “John made Taroo eat pizza”

Furthermore, non-finite complement clauses differ in their ability to take sentential negation. For example, while the complement of *saseru* does not allow sentential negation to appear on the complement predicate, the complement of *tehosii* “want” does.

- (358) a. \*tabe-nai-saseru  
 eat-NEG-cause  
 b. tabe-nai-dehosii<sup>72</sup>  
 eat-NEG-want

This contrast can be interpreted as reflecting different selectional properties of those predicates. Under the assumption that NegP is generated above VP, sentential negation should be excluded from a VP complement clause. Thus, if we assume that *saseru* selects VP as its complement, the ungrammaticality of (358)a follows. As for *tehosii*, let us assume that it selects non-finite TP as its complement. The exact syntactic category of those complements is not crucial here. What is important is that the former complement clause is smaller than NegP. We assume that *fP* is located in between NegP and TP (i.e., (327)): thus if a complement clause is smaller than NegP, then the clause may not involve the *fP* projection. Given these considerations, our

---

<sup>72</sup> The first consonant of the main predicate is voiced via a phonological process.

theory predicts that a *ka/...mo...mo* that is embedded within the complement of *saseru* is forced to take scope over matrix negation. The examples in (359) show that the prediction is indeed borne out. The scope interpretations in those sentences are restricted just as in simple clauses.

- (359) a. John-wa [Taroo-ni piza *ka* pasuta-o tabe] sase-nakatta  
 John-TOP Taroo-DAT pizza or pasta-ACC eat cause-NEG  
 Lit. “John didn’t make Taroo eat pizza or pasta”  
 \*¬ >> *ka*
- b. John-wa [Taroo-ni piza *mo* pasuta *mo* tabe] sase-nakatta  
 John-TOP Taroo-DAT pizza also pasta also eat cause-NEG  
 Lit. “John didn’t make Taroo eat both pizza and pasta”  
 \*¬ >> ...*mo...mo*

In contrast, a PPI connective within the complement clause of *tehosii* can be interpreted under the scope of matrix negation, as shown in (360). This indicates that the scope restriction in (359) is not a general property of non-finite clauses, but reflects the lack of *fP*.

- (360) a. John-wa [Taroo-ni piza *ka* pasuta-o tabe-] tehosiku-nai  
 John-TOP Taroo-DAT pizza or pasta-ACC eat-want-NEG  
 “John doesn’t want Taroo to eat pizza or pasta”  
 OK ¬ >> *ka*
- b. John-wa [Taroo-ni piza *mo* pasuta *mo* tabe-] tehosiku-nai  
 John-TOP Taroo-DAT pizza also pasta also eat-want-NEG  
 “John doesn’t want Taroo to eat both pizza and pasta”  
 OK ¬ >> ...*mo...mo*

Let us further expand the data. First, (361) is a list of non-finite complement clauses that cannot take sentential negation. We assume those complement clauses do not involve *fP* projection.

- (361) a. Complement of *tuzukeru* “continue”  
 tabe-\*(nai-) *tuzukeru*  
 eat-NEG-continue
- b. Complement of *hajimeru* “begin”  
 tabe-\*(nai-) *hajimeru*  
 eat-NEG-begin
- c. Complement of *yameru* “cease”  
 tabe-\*(nai-) *yameru*  
 eat-NEG-cease
- d. Complement of *tai* “want (to do something)”<sup>73</sup>  
 tabe-\*(nai-) *tai*  
 eat-NEG-want
- e. Complement of *tesimau* “finish”<sup>74</sup>  
 tabe-\*(nai-) *desimau*  
 eat-NEG-finish

*Ka/...mo...mo* embedded inside those complement clauses may not take scope under negation in the matrix clause, again conforming to the prediction of our theory:

- (362) Complement of *tuzukeru* “continue”
- a. John-wa [piza *ka* pasuta-o tabe] tuzuke-nakatta  
 John-TOP pizza or pasta-ACC eat continue-NEG  
 Lit. “John didn’t continue to eat pizza or pasta”  
 \*¬ >> *ka*
- b. John-wa [piza *mo* pasuta *mo* tabe] tuzuke-nakatta

<sup>73</sup> In English, *want* may take a complement clause with its subject being controlled by the matrix subject (e.g., I want to go), or a complement clause with a lexical subject (I want John to go). In Japanese, the two kinds of complements require a different matrix predicate: the control complement is selected by *tai*, and the lexical subject complement is selected by *tehosii*:

- (i) a. Boku<sub>i</sub>-wa [PRO<sub>i</sub> ringo-o tabe]-tai  
 I-TOP apple-ACC eat-want  
 b. \*Boku<sub>i</sub>-wa [PRO<sub>i</sub> ringo-o tabe]-tehosii  
 “I want to eat an apple”
- (ii) a. \*Boku-wa [John-ni ringo-o tabe]-tai  
 I-TOP -DAT -ACC eat-want  
 b. Boku-wa [John-ni ringo-o tabe]-tehosii  
 “I want John to eat an apple”

<sup>74</sup> The form is ambiguous between the “finish” interpretation and “end up doing” interpretation. The observation about complement negation specifically applies to the “finish” interpretation.

John-TOP pizza also pasta also eat continue-NEG  
 Lit. “John didn’t continue to eat both pizza and pasta”  
 \*¬ >> ...*mo...mo*

- (363) Complement of *hajimeru* “begin”
- a. John-wa [piza *ka* pasuta-o tabe] hajime-nakatta  
 John-TOP pizza or pasta-ACC eat begin-NEG  
 Lit. “John didn’t begin to eat pizza or pasta”  
 \*¬ >> *ka*
- b. John-wa [piza *mo* pasuta *mo* tabe] hajime-nakatta  
 John-TOP pizza also pasta also eat begin-NEG  
 Lit. “John didn’t begin to eat both pizza and pasta”  
 \*¬ >> ...*mo...mo*
- (364) Complement of *yameru* “cease”
- a. John-wa [piza *ka* pasuta-o tabe] yame-nakatta  
 John-TOP pizza or pasta-ACC eat cease-NEG  
 Lit. “John didn’t cease to eat pizza or pasta”  
 \*¬ >> *ka*
- b. John-wa [piza *mo* pasuta *mo* tabe] yame-nakatta  
 John-TOP pizza also pasta also eat cease-NEG  
 Lit. “John didn’t cease to eat both pizza and pasta”  
 \*¬ >> ...*mo...mo*
- (365) Complement of *tai* “want (to do something)”
- a. John-wa [piza *ka* pasuta-o tabe] taku-nakatta  
 John-TOP pizza or pasta-ACC eat want-NEG  
 Lit. “John didn’t want to eat pizza or pasta”  
 \*¬ >> *ka*
- b. John-wa [piza *mo* pasuta *mo* tabe] taku-nakatta  
 John-TOP pizza also pasta also eat want-NEG  
 Lit. “John didn’t want to eat both pizza and pasta”  
 \*¬ >> ...*mo...mo*
- (366) Complement of *tesimau* “finish”
- a. John-wa [piza *ka* pasuta-o tabe] tesimawa-nakatta  
 John-TOP pizza or pasta-ACC eat finish-NEG  
 Lit. “John didn’t finish eating pizza or pasta”  
 \*¬ >> *ka*
- b. John-wa [piza *mo* pasuta *mo* tabe] tesimawa-nakatta  
 John-TOP pizza also pasta also eat cease-NEG  
 Lit. “John didn’t finish eating both pizza and pasta”  
 \*¬ >> ...*mo...mo*

In contrast, the complement clause of *temiru* “try” can support negation, as in (367). A PPI connective embedded within the complement clause can be interpreted within the scope of matrix negation:

(367) <sup>OK</sup>tabe-nai-demiru  
eat-NEG-try

(368) Complement of *temiru* “try”

a. John-wa [piza *ka* pasuta-o tabe] temi-nakatta  
John-TOP pizza or pasta-ACC eat try-NEG  
Lit. “John didn’t try to eat pizza or pasta”  
<sup>OK</sup>¬ >> *ka*

b. John-wa [piza *mo* pasuta *mo* tabe] temi-nakat-ta  
John-TOP pizza also pasta also eat cease-NEG  
Lit. “John didn’t try to eat both pizza and pasta”  
<sup>OK</sup>¬ >> ...*mo*...*mo*

An aspectual predicate *teiru* provides a further striking case. This morpheme is three ways ambiguous: (i) progressive, (ii) habitual, and (iii) perfective:

(369) tabe-teiru  
(i) is eating  
(ii) has a habit of eating  
(iii) has eaten

The morpheme allows its complement to take negation, as in (370)a. However, when negation is placed within the complement, the progressive interpretation is no longer available. The oddness of (370)b, a sentence with a temporal adverb that is compatible only with a progressive interpretation, illustrates this point:

(370) a. tabe-nai-deiru  
eat-NEG-*teiru*

b. \*John-wa goji choudo-ni(wa) piza-o tabe-na-i deita



John-TOP 5 o'clock at(TOP) pizza-ACC eat-NEG-INF *teiru*-PAST  
 Intended: “John was not eating pizza at 5 o'clock”

The form (370)a is compatible with adverbs that force perfective or habitual readings:

- (371) a. John-wa goji made(wa) piza-o tabe-na-i deita  
 John-TOP 5 until-(TOP) pizza-ACC eat-NEG-INF *teiru*-PAST  
 “John had not eaten pizza until 5 o'clock”
- b. John-wa natu-no aida(wa) piza-o tabe-na-i deita  
 John-TOP summer-GEN during (TOP) pizza-ACC eat-NEG-INF *teiru*-PAST  
 “John has a habit of not eating pizza during the summer”

These observations suggest that the progressive *teiru* selects a “smaller” complement clause than the complement of habitual or perfective *teiru*. Let us assume, consistent with our discussion so far, that the progressive *teiru* selects a VP complement. The crucial observation is that, when *teiru* is interpreted as progressive, a PPI connective within the complement is forced to take scope over matrix negation as shown in (372); otherwise, the narrow-scope reading of the PPI is possible as in (373) and (374):

- (372) a. John-wa goji choudo-ni(wa) [piza *ka* pasuta-o tabe] *tei-nakatta*  
 John-TOP 5 o'clock at(TOP) pizza or pasta-ACC eat *tei-NEG*  
 Lit. “John was not eating pizza or pasta at 5 o'clock”  
 \*¬<sub>1</sub> >> *ka*
- b. John-wa goji choudo-ni(wa) [piza *mo* pasuta *mo* tabe] *tei-nakatta*  
 John-TOP 5 o'clock at(TOP) pizza also pasta also eat *teiru-NEG*  
 Lit. “John was not eating both pizza and pasta at 5 o'clock”  
 \*¬<sub>1</sub> >> ...*mo...mo*
- (373) a. John-wa goji made(wa) [piza *ka* pasuta-o tabe] *tei-nakatta*  
 John-TOP 5 o'clock until(TOP) pizza or pasta-ACC eat *teiru-NEG*  
 “John had not eaten pizza or pasta until 5 o'clock”  
 OK ¬<sub>1</sub> >> *ka*
- b. John-wa goji made(wa) [piza *mo* pasuta *mo* tabe] *tei-nakatta*

John-TOP 5 o'clock until(TOP) pizza also pasta also eat *teiru-NEG*  
 “John had not eaten both pizza and pasta at 5 o'clock”  
 ?<sub>¬</sub> >> ...*mo...mo*

- (374) a. John-wa natu-no aida(wa) [piza *ka* pasuta-o tabe] *tei-nakatta*  
 John-TOP summer-GEN during (TOP) pizza or pasta-ACC eat *teiru-NEG*  
 “John didn’t have a habit of eating pizza or pasta during the summer”  
 OK<sub>¬</sub> >> *ka*
- b. John-wa natu-no aida(wa) [piza *mo* pasuta *mo* tabe] *tei-nakatta*  
 John-TOP summer-GEN during (TOP) pizza also pasta also eat *teiru-NEG*  
 “John didn’t have a habit of eating both pizza and pasta during the  
 summer”  
 ?<sub>¬</sub> >> ...*mo...mo*

The fact that the scope behavior of Japanese PPI connectives in embedded contexts correlates with the size of the complement clause provides a strong argument for the syntactic movement analysis that I am endorsing here. Under our theory, the crucial distinction is whether or not a complement clause is large enough to support an *fP* projection within the clause. The empirical data we have observed suggest that the distinction is indeed real.

#### 5.4.2 *Non-overt negations*

Under the present approach, the scope restriction on *ka/...mo...mo* is a consequence of purely syntactic movement that happens to have a semantic effect in some specific configurations (i.e., simple negative sentences). In other words, there is no semantic reason for the connectives to not be able to take scope under negation, and the effect of the scope restriction is sensitive only to negations that have corresponding expressions within syntactic representations. In this section, I present further empirical data that support this position.

As we saw in section 4.2.4, *ka* and *...mo...mo* can be interpreted under the scope of covert negation that is associated with the focus operator *dake* ('only'). The same observation can be made with another focus-related construction. First, observe that the cleft construction in (375) entails a negative proposition:

- (375) John-ga supeingo-o hanasu-no-wa gonenburi da  
 John-NOM Spanish-ACC speak-COMP-TOP 5-years-since COP  
 "It has been five years since John spoke Spanish"  
 → John had not spoken Spanish for five years

Within the entailed proposition, both *ka* and *...mo...mo* are interpreted under the scope of the covert negation. Therefore, the sentence in (376) is false when John had only used Spanish for the past five years, due to the conjunctive truth condition of *ka*. In contrast, the sentence in (377) can still be true in the same situation, showing that the conjunction yields the "not both" interpretation.

- (376) John-ga supeingo *ka* furansugo-o hanasu-no-wa gonenburi da  
 John-NOM Spanish or French-ACC speak-COMP-TOP 5-years-since COP  
 "It has been five years since John spoke Spanish or French"  
 → John had not spoken Spanish for five years AND had not spoken French for five years
- (377) John-ga supeingo *mo* furansugo *mo* hanasu-no-wa gonenburi da  
 John-NOM Spanish also French also speak- COMP-TOP 5-years-since COP  
 → John had not spoken Spanish for five years OR had not spoken French for five years

Implicative verbs that entail the falsity of their complement proposition (cf. Karttunen 1971) provide another set of relevant data. Let us take the verb, *kanichigai-suru* "mistakenly believe" for example. With this verb as the matrix predicate, the truth of whole sentence entails the falsity of the complement proposition in the actual world. In other words, in order for the proposition "John mistakenly believes that

Taroo speaks Spanish” to be true, it must be the case that the proposition “Taroo speak Spanish” is false. Thus, the negation of the complement proposition is entailed, as illustrated in (378).

- (378) John-wa [Taroo-ga supeingo-o hanasu to] kanchigai-si-teiru  
 John-TOP Taroo-NOM Spanish-ACC speak COMP mis-believe-ing  
 “John mistakenly believes that Taroo speaks Spanish”  
 → Taroo doesn’t speak Spanish

Predicates like *uso-o tsuku* “tell a lie”, *furi-o suru* “pretend” also entail the negation of the complement proposition:

- (379) John-wa [*pro* supeingo-o hanasu to] uso-o tsuita  
 John-TOP *pro* Spanish-ACC speak COMP told-a-lie  
 “John lied that he speaks Spanish”  
 → John doesn’t speak Spanish
- (380) John-wa [*pro* speingo-ga hanas-eru] furi-o sita  
 John-TOP *pro* Spanish-NOM speak-able pretend-did  
 “John pretended that he can speak Spanish”  
 → John cannot speak Spanish

When *ka* or ...*mo...mo* appear within the complement clause of those predicates, they happily take scope under the entailed negation, yielding the “De Morgan” interpretations. Thus again, the effect of the scope restriction fails to manifest itself with those non-overt negations:

- (381) a. John-wa [Taroo-ga supeingo *ka* furansugo-o hanasu to] kanchigaisi-teiru  
 John-TOP Taroo-NOM Spanish or French-ACC speak COMP mis-believe-ing  
 → Taroo doesn’t speak Spanish AND doesn’t speak French
- b. John-wa [Taroo-ga supeingo *mo* furansugo *mo* hanasu to] kanchigaisi-teiru  
 John-TOP Taroo-NOM Spanish also French also speak COMP mis-believe-ing  
 → Taroo doesn’t speak Spanish OR doesn’t speak French

- (382) a. John-wa [*pro* supeingo *ka* furansugo-o hanasu to] uso-o tuita  
 John-TOP *pro* Spanish or French-ACC speak COMP told-a-lie  
 → John doesn't speak Spanish AND doesn't speak French
- b. John-wa [*pro* supeingo *mo* furansugo *mo* hanasu to] uso-o tuita  
 John-TOP *pro* Spanish also French also speak COMP told-a-lie  
 → John doesn't speak Spanish OR doesn't speak French
- (383) a. John-wa [*pro* speingo *ka* furansugo-ga hanas-eru] furi-o sita  
 John-TOP *pro* Spanish or French-NOM speak-able pretend-did  
 → John cannot speak Spanish AND cannot speak French
- b. John-wa [*pro* speingo *mo* furansugo *mo* hanas-eru] furi-o sita  
 John-TOP *pro* Spanish also French also speak-able pretend-did  
 → John cannot speak Spanish OR cannot speak French

The relevant observation further extends to cases that involve adverbs like *ayauku* “nearly/almost”, and *izure* “eventually”. Unlike the constructions we have seen so far, those adverbs require an eventive predicate, but the crucial point remains the same: negative propositions are entailed, and the PPI connectives are interpreted under the scope of entailed negation.

- (384) a. John-wa ayauku piza *ka* pasuta-o taberu tokoro datta  
 John-TOP nearly pizza or pasta-ACC eat the-moment COP  
 “John nearly ate pizza or pasta”  
 → John didn't eat pizza AND didn't eat pasta
- b. John-wa ayauku piza *mo* pasuta *mo* taberu tokoro datta  
 John-TOP nearly pizza also pasta also eat the-moment COP  
 “John nearly ate both pizza and pasta”  
 → John didn't eat pizza OR didn't eat pasta
- (385) a. John-wa izure supeingo *ka* furansugo-o hanasu youni-naru  
 John-TOP eventually Spanish or French-ACC speak become  
 “John will eventually become capable of speaking Spanish or French”  
 → John doesn't speak Spanish AND doesn't speak French
- b. John-wa izure supeingo *mo* furansugo *mo* hanasu youni-naru  
 John-TOP eventually Spanish also French also speak become

“John will eventually become capable of speaking both Spanish and French”

→ John doesn't speak Spanish OR doesn't speak French

The counterfactual constructions in (386) and (387) also add another set of relevant data:

- (386) a. John-ga supeingo *ka* furansugo-ga hanas-e-tara iinoni  
John-NOM Spanish or French-NOM speak-able-COMP be-nice  
“It would be nice if John could speak Spanish or French”  
→ John cannot speak Spanish AND cannot speak French
- b. John-ga supeingo *mo* furansugo *mo* hanas-e-tara iinoni  
John-NOM Spanish also French also speak-able-COMP be-nice  
“It would be nice if John could speak both Spanish and French”  
→ John cannot speak Spanish OR cannot speak French
- (387) a. John-wa supeingo *ka* furansugo-o tukau beki datta  
John-TOP Spanish or French-ACC use should COP  
“John should have used Spanish or French”  
→ John didn't use Spanish AND didn't use French
- b. John-wa supeingo *mo* furansugo *mo* tukau beki datta  
John-TOP Spanish also French also use should COP  
“John should have used both Spanish and French”  
→ John didn't use Spanish OR didn't use French

The last set of data concerns negative answers to a Yes-No question. Let us consider the dialog in (388). The question asks whether or not the proposition “John speaks French” is true. The answer asserts that the proposition is not true, that is, the negation of the proposition is true:

(388) Q: John-wa supeingo-o hanasu-no?  
John-TOP Spanish-ACC speak-Q  
“Does John speak French?”

A: Iie  
no  
“No”

→ John doesn't speak Spanish

In (389) and (390), the negative answer yields the “De Morgan” interpretation of the connective in the question. Thus, the negative answer in (389) can be interpreted as meaning that John speaks neither Spanish nor French and the negative answer in (390) can be interpreted as meaning that John doesn't speak both Spanish and French.

(389) Q: John-wa supeingo *ka* furansugo-o hanasu-no?  
John-TOP Spanish or French-ACC speak-Q  
“Does John speak French or Spanish?”

A: Iie  
no  
“No”  
→ John doesn't speak Spanish AND doesn't speak French

(390) Q: John-wa supeingo *mo* furansugo *mo* hanas-u-no?  
John-TOP Spanish also French also speak-PRES-Q  
“Does John speak French and Spanish?”

A: Iie  
no  
“No”  
→ John doesn't speak Spanish OR doesn't speak French

In contrast, if we spell out the whole negative proposition using overt negation, then those De Morgan interpretations are no longer available. (391) only allows the wide-scope interpretation of *ka*, and sounds awkward as an answer to the question in (389), because that interpretation does not address the question asked. Similarly, (392) only allows the wide-scope interpretation of ...*mo...mo*, and therefore cannot be truthfully uttered when John speaks either Spanish or French:

(391) Iie, John-wa supeingo *ka* furansugo-o hanasa-nai desu  
No John-TOP Spanish or French-ACC speak- -NEG COP  
Lit. “No, John doesn't speak Spanish or French”  
→ John doesn't speak Spanish OR doesn't speak French

- (392) Iie, John-wa supeingo *mo* furansugo *mo* hanasa-nai desu  
No John-TOP Spanish also French also speak-NEG COP  
Lit. “No, John doesn’t speak both Spanish and French”  
→ John doesn’t speak Spanish AND doesn’t speak French

Those observations lead me to conclude that the scope restriction on Japanese connectives is uniformly insensitive to negation that is not expressed overtly. Assuming that the cases we examined above do not involve syntactically represented negation (i.e., negation in NegP), the data straightforwardly follow from the syntactic movement analysis. In contrast, any attempt to state the scope restriction on *ka/...mo...mo* in semantic terms would be hard-pressed to explain these data. There is no clear semantic primitive that distinguishes overt negation from various types of non-overt negation, and therefore, a semantic approach would face a serious challenge in explaining why the restriction is insensitive to non-overt negation in general.

## 5.5 Revisiting the learnability problem

Given the theoretical analysis of the scope constraint on *ka/...mo...mo* that I have developed so far, I am now in a position to discuss its implications for the acquisition of those connectives. The results of the experimental studies reviewed in the previous chapter present a learnability puzzle: children assign a non-adult scope interpretation to *ka* in simple negative sentences, and the scope interpretation cannot be purged on the basis of input data about possible scope interpretations. Therefore, there must be some way for children to block their non-adult scope interpretation by learning something else. In what follows I discuss how the movement account contributes to a resolution of this puzzle.



Under the present analysis, the acquisition of the scope property of *ka* is reduced to the acquisition of the correct lexical feature assignment to the lexical item. The fact that Japanese children allowed the narrow scope interpretation of *ka* in simple negative sentences suggests that *ka* lacks the uninterpretable feature that triggers obligatory movement to *fP* within children's grammar. Once children learn that *ka* is a PPI – it has an uninterpretable feature that triggers obligatory movement to *fP* – the ban on narrow scope interpretations under overt local negation follows. This, however, is not enough to resolve the puzzle: it does not explain how children learn that *ka* is a PPI. As I pointed out in section 4.7, cases that involve *ka* in the object position with overt local negation are quite rare, and therefore the possible hypothesis that *ka* may take scope under overt local negation (i.e., it is not a PPI) cannot be rejected on the basis of input data about possible scope interpretations. I therefore propose that innate linguistic knowledge restricts possible hypotheses about the scope of natural language disjunctions, so that learners may not consider the interfering hypotheses in the first place. Specifically, I propose that (393) is a part of innate linguistic knowledge:

(393) Boolean disjunctions in natural language are associated with a lexical parameter with the following values: {+PPI, –PPI}.

A +PPI disjunction has an uninterpretable feature that triggers covert raising to *fP*. I assume that the syntactic position of *fP* is also specified in innate linguistic knowledge. As for the –PPI value, let us stipulate (394):

(394) A –PPI disjunction may not be subject to an optional CSS operation.

Something like (394) is in any case necessary to explain the scope behavior of the English disjunction *or*. As we have seen above, the wide scope interpretation of *or* is not possible when it is c-commanded by negation. Given that this is not a property of quantificational elements in general (e.g., quantifiers like *many*, *two*, etc. can take scope over c-commanding negation), the wide scope interpretation of *or* over c-commanding negation must somehow be blocked by some independent mechanism. I leave the issue about the theoretical implementation of (394) open here.<sup>75</sup>

Given (393), the learner's task is to determine which value of the parameter a particular disjunction in her target language has. For Japanese children, their behavior suggests that they initially have the –PPI setting for *ka*, and therefore they need to reset the value to +PPI. The crucial evidence is whether or not the disjunction can take wider scope than c-commanding negation; due to the constraint in (394), such inverse scope interpretations can only be obtained by feature-driven movement to *fP*. Hence, an input utterance in which a disjunction takes wider scope than c-commanding negation provides unambiguous evidence for the +PPI setting. With the +PPI setting, the disjunction may not be interpreted within the scope of negation in local NegP. In this model, the learning is essentially a “triggering”: a single piece of crucial evidence can in principle trigger the learning of the +PPI setting, and probabilistic generalizations over large amount of data are not required. Nonetheless, the acquisition of the +PPI value is expected to take a considerable amount of time, given the sparseness of the crucially relevant data. In addition, a certain kind of

---

<sup>75</sup> Thus, having the –PPI value is not equivalent to being a non-PPI (i.e., lacking the relevant syntactic feature), and –PPI items are subject to an independent scope constraint, i.e., they must be interpreted under the scope of c-commanding negation.

psychological development might be required to find out the crucial evidence in the input data. An intended wide scope interpretation of *ka* over negation would most effectively be detected by recognizing that the form is intended to express the speaker's uncertainty. Unless the uncertainty is explicitly expressed (e.g., by saying "but I don't know which"), children must infer the speaker's intention, which young children have been found to be not very good at. Thus until children develop "Theory of Mind", they might not be able to reliably detect the crucial evidence in input data.

Under this scenario, the hypotheses that the learner considers are very narrowly restricted so that she can concentrate on a very specific piece of input evidence: an intended wide scope of *ka* over overt local negation. Although the learner crucially uses information about scope in fixing the parameter, she is not learning possible scope interpretations directly from scope interpretations: the constraint on scope is derived as a consequence of fixing the parameter. Note also that choosing the +PPI value does not entirely eliminate the possibility of scope ambiguity. All that the setting does is force the disjunction to be raised to *fP*. If negation can subsequently be raised to a position that is higher than *fP*, the scope relation is reversed again. This is what happens in the antecedents of conditionals (and some other constructions) in Japanese, and it would not be surprising to find a language that allows the option of neg-raising in larger contexts. In such a language, negation and disjunction would show extensive scope ambiguity, and input data that involve such scope ambiguity would be interpreted by learners as showing the extensive availability of neg-raising.

I extend the same account to the acquisition of conjunction. Specifically, I propose that (395) is also a part of innate linguistic knowledge:

(395) Boolean conjunctions in natural language are associated with a lexical parameter with the following values: {+PPI, -PPI}.

With respect to ...*mo...mo*, the data sparseness problem is not as severe as with *ka*. Among the same 100,000 sentences from internet forums that were used to search for *ka*, there were 81 cases in which ...*mo...mo* appears in the object position with local negation.<sup>76</sup> Given the higher frequency of crucially relevant data, the parameter setting for ...*mo...mo* would possibly take less time than the setting for *ka*.<sup>77</sup> By setting the correct +PPI value for ...*mo...mo*, the learner's grammar correctly constrains possible scope interpretations of the connective. This approach explains why Japanese children did not endorse non-adult scope hypotheses that seem to be compatible with the vast majority of input evidence: those hypotheses are simply not possible hypotheses for children, and hence they do not consider them.

In Goro (2004) and Goro and Akiba (2004a; 2004b) I argued the lexical parameter for disjunction/conjunction has a different default value. The argument is based on a learnability consideration. Assuming that direct negative evidence does not play a crucial role in language acquisition, the learnability argument goes as follows. Suppose that a language L has Boolean disjunction OR and conjunction AND. In order to determine whether these items are +PPI or -PPI, the crucial data is a single clause negative sentence, in which the form A OR B or A AND B appears in the potential scope domain of sentential negation (e.g., the object position in

---

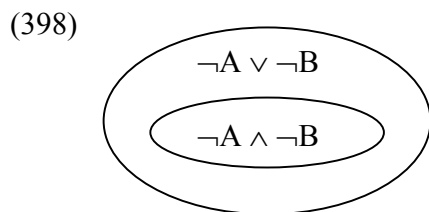
<sup>76</sup> Pullum and Scholz (2002) estimate the number of utterances that a child hear by the age of 3 to be 2.5 million. Under a very rough estimate using the number, Japanese children would hear the crucial sentences about 1.85 times per day.

<sup>77</sup> The .081% frequency of the relevant sentences, on the face of it, is not very common within all the sentences that would constitute the input data. However, it is necessary to relativize the frequencies of the occurrences of related materials, e.g., with similar word order, similar lexical items (especially negation and a quantifier), etc.

transitive sentences). With such a form as input, there are two different output truth conditions for each of the two connectives, corresponding to whether the item is +PPI or -PPI:

- (396) Disjunction OR:  
 a. OR [-PPI]  $\rightarrow \neg A \wedge \neg B$   
 b. OR [+PPI]  $\rightarrow \neg A \vee \neg B$
- (397) Conjunction AND:  
 a. AND [-PPI]  $\rightarrow \neg A \vee \neg B$   
 b. AND [+PPI]  $\rightarrow \neg A \wedge \neg B$

The truth conditions in (a) correspond to the narrow-scope interpretation of the logical connectives, and the truth conditions in (b) correspond to the wide-scope interpretation of the connectives. As shown in the diagram in 0, the situations in which “ $\neg A \wedge \neg B$ ” is true are a subset of the situations in which “ $\neg A \vee \neg B$ ” is true.



Thus, in every logical situation where  $\neg A \wedge \neg B$  is true,  $\neg A \vee \neg B$  is also true. Given this, the learnability argument claims that an incorrect hypothesis that yields the superset truth conditions can never be falsified by positive input data. Therefore, the relevant parameters must have a default value so that the children always start with a hypothesis that yields the subset truth condition. Such a default value for disjunction is [-PPI]; for conjunction it is [+PPI]

The experimental data from Japanese children are compatible with the predicted default values for the parameters of *ka* and *...mo...mo*: Japanese children consider *ka* to be [-PPI], and they consider *...mo...mo* to be [+PPI]. However, I am not so sure if the learnability argument still stands: it is built upon the classic learnability assumption that subset-superset grammars cannot be distinguished by positive evidence, which is not a logical necessity once we take indirect negative evidence into account (e.g., Regier and Gahl 2004). Gualmini and Schwarz (2007) also argue that the semantic entailment problem can be gotten around either by taking pragmatic implicature into account, or by considering cases in which the relevant forms are embedded under a downward-entailing operator (see Gualmini and Schwarz (2007) for details). In short, the conceptual underpinnings for the learnability argument have been challenged (in reasonable ways, in my opinion) in recent research in the domain. But even if the conceptual argument has to be lifted, the question of whether or not the relevant parameter has a default value remains as a valid empirical issue. I will leave this issue for future research.

## **5.6 On the “wide-scope” interpretation of English *or***

A crucial component of my theory of the acquisition of disjunction is the assumption in (394): a -PPI disjunction may not take scope over local negation. This assumption is necessary to restrict the set of possible hypotheses about the scope of disjunction in order to assure the acquisition with sparse input data. However, one possible problem arises, once we take Schwarz’s (1999) *reduction theory* into account. Schwarz (1999) argues that the derivation of (399) involves an IP-disjunction and ellipsis, as illustrated in (400):

(399) Either John ate rice or beans

(400) Either [IP John ate rice] or [IP ~~John ate~~ beans]

Under the reduction theory, it should also be possible to derive (401) from (402). In (402), *or* is not inside the scope domain of negation. Therefore, it is predicted that (401) can have a “wide scope” interpretation of *or*, which is paraphrased as “John didn’t eat rice OR didn’t eat beans”:

(401) John didn’t eat rice or beans

(402) [IP John didn’t eat rice] or [IP ~~John didn’t eat~~ beans]

Although this wide scope interpretation of *or* is highly dispreferred (as shown in the experiments I reviewed in 5.2), Jing (2006) showed that English speakers did nonetheless access the reading under a particular kind of experimental context. A sample story and test sentence used in Jing’s TVJT is given in (403) and (404):

(403) Bear brother and bear sister came to play a pushing-the-cart game. The judge said:

You need to play a pre-game to see whether you can play the real game. See this passage here? I’ll make it an obstacle course. In the pre-game, I’ll put this bench in the middle. You are supposed to push the cart through this obstacle course. If you don’t hit the bench, you can play the real game. Bear sister was very nervous and hit the bench. Bear brother made it to the end without hitting the bench, so he was able to play the real game.

The judge said: the real game is much harder. Look, now I put two obstacles on the way, this barrel and this rock. It seems that bear brother is very good at pushing the cart. Bear brother, if you push the cart through the obstacle course and don’t hit the barrel, I’ll give you a shell as reward; and if you don’t hit the rock, I’ll also give you a shell as reward. So, you can get two shells if you don’t hit anything. You did really good in the pre-game, try hard this time!  
(Curtain put down)

(Kermit said: I wonder how well bear brother is doing in the real game.)

(After some time, curtain removed)

Bear brother had one shell. He says: The real game was much harder. I only didn’t hit one thing, that’s why I got one shell as a reward.

(404) Bear brother didn't hit the barrel or the rock

This experimental story has two crucial features. First, what Bear brother actually did (or didn't) was not shown to the participant throughout the story: the curtain was put down while Bear brother was on his trial. This feature makes the wide scope interpretation of *or* pragmatically felicitous, since it is quite clear that the speaker (i.e., the puppet) is not certain about what Bear brother didn't actually hit. Second, the story explicitly presents the two propositions that correspond to the disjoined propositions under the wide scope interpretation of *or*, i.e., "If you...don't hit the barrel...if you don't hit the rock...". The independent presentations of those two propositions could have primed the structure that involves IP-disjunction and subsequent ellipsis, as illustrated in (405). The second point was not discussed by Jing, but under the reduction theory of wide-scope *or*, it could be quite relevant.

(405) [<sub>IP</sub> Bear brother didn't hit the barrel] or [<sub>IP</sub> ~~Bear brother didn't hit~~ the rock]

In Jing's experiment, both English-speaking children and adults accepted the test sentences like (404) about 50% of the time. This suggests that the "wide scope" interpretation of *or* with sentences like (404) is not totally excluded in English, even though the interpretation is still not consistently available to speakers.

This observation raises the possibility that English children may encounter cases that involve *or* with an intended wide scope interpretation in a simple negative sentence. Here, a problem arises: English children must avoid taking such cases as evidence for the [+PPI] setting for *or*. Given the dispreference for the wide scope interpretation, such data would presumably be rare in English, but the same is true in



Japanese: wide-scope *ka* in simple negative sentences is rare, as we have seen above. Nonetheless, Japanese children learn that *ka* is a PPI on the basis of the rare evidence. Therefore, it appears that learners of the two languages must interpret the same kind of input data differently.

These considerations suggest that learners of the [ $\pm$ PPI] parameter must take the amount of confirming evidence into account. I argued that that the default value of the parameter for disjunction is  $-$ PPI. English children would encounter a nontrivial amount of confirming evidence for this setting, i.e., *or* with the narrow-scope, conjunctive interpretation in simple negative sentences. Let us assume that each encounter with such confirming evidence reinforces the learner's confidence in his current hypothesis (i.e., the  $-$ PPI setting), and once the confidence level reaches a certain threshold, the learner may not take a case with wide-scope *or* to be disconfirming evidence for the  $-$ PPI setting. This assumption seems intuitively plausible, and can easily be implemented in a probabilistic learning model. By contrast, Japanese children would encounter significantly less cases with *ka* being interpreted under the scope of local negation. Therefore, the default  $-$ PPI setting is not strongly supported by input evidence, and the learner's confidence level may not reach the critical threshold. I assume that small number of encounters with wide-scope *ka* can trigger the re-setting of the parameter under this situation. The contrast between English and Japanese is thus the relative plausibility of the  $-$ PPI setting with respect to the input data. When the  $-$ PPI setting is highly plausible within given input data, the learner chooses to analyze "exceptional" cases as involving a distinct derivation, i.e., IP-conjunction with ellipsis. These considerations suggest that

learners of Japanese do not rely solely on positive evidence for the +PPI setting: the lack of positive evidence for the –PPI setting also plays a crucial role.

## 5.7 Summary

In this chapter, I presented a theoretical analysis of the scope constraint on Japanese logical connectives. I proposed that *ka/...mo...mo* are PPIs, which have a syntactic feature that triggers obligatory movement to *fP*. Under the analysis, the scope constraint is actually a constraint on LF-syntax, and it yields the following empirical consequences: (i) locality, and (ii) insensitivity to covert negation. In the last parts of the chapter, I revisited the learnability problem in the acquisition of the scope of *ka*. I argued that innate linguistic knowledge must restrict possible hypotheses so that children can successfully learn that *ka* is a PPI from available input evidence. Specifically, the assumptions in (393) and (394) were required to resolve the learnability puzzle. With the restrictions on possible hypotheses about the scope of Boolean disjunctions, learners are able to restrict their attention to a certain specific piece of positive evidence, which would allow them to get around the data sparseness problem.

The assumptions in (393) and (394) yield empirical predictions about possible cross-linguistic variation on the scope of Boolean disjunctions in natural language. For example, it is predicted that the narrow scope interpretation of a +PPI disjunction under local negation can only be possible when negation takes sentential scope (via neg-raising or some other means). Likewise, the wide scope interpretation of a –PPI disjunction over local c-commanding negation is predicted to be possible only when the “reduction analysis” provides a possible derivation (i.e., IP-conjunction with

subsequent ellipsis). Testing these predictions with Boolean disjunctions in languages other than English or Japanese is an interesting issue for future research.

## **Chapter 6: Anti-reconstruction and Grammar Variation in Adult Japanese<sup>78</sup>**

### **6.1 Introduction**

The experimental studies I have reviewed in the previous chapters revealed that there are variations between Japanese children and adults with respect to possible scope interpretations: Japanese children often allow scope interpretations that adults do not allow. This chapter presents a case that involves the same kind of variation among Japanese adults: some adults allow a certain scope interpretation that other adults do not allow. The experimental observation leads to the conclusion that two populations with a different grammar coexist among adult speakers of Japanese. I take the observation as supporting evidence for the claim that input evidence about possible scope interpretations is too unreliable as a basis of learning what is not possible.

The scope constraint that I examine in this chapter concerns the scope relation between a certain type of verbs and a quantificational argument. Once again, I keep the assumption that scope interpretations are determined by the configuration of LF representations. As a consequence, I assume that certain scope interpretations are derived by syntactic movement. The issue of whether such movement occurs in the overt or covert component of syntax is largely irrelevant to the discussion in this chapter.

---

<sup>78</sup> Most of the contents of this chapter are based on collaboration research with Tomo Fujii and Utako Minai that we carried out in 2005.

The chapter is organized as follows. Section 6.2 provides a description of the properties of *implicative verbs*, which were first discussed by Karttunen (1971). Section 6.3 points out that negative implicative verbs in Japanese must take lower scope than a quantificational argument of the complement predicate. Following Bobaljik and Wurmbrand (2005; 2007), I refer to this constraint as *the anti-reconstruction constraint*. In section 6.3 and 6.4, I report the results of experimental studies that investigated Japanese adults and children's sensitivity to the constraint. The experimental results revealed that a certain proportion of Japanese adult speakers do not obey the constraint, allowing the scope interpretation that the literature claims to be impossible. Based on the results, section 6.6 proposes that two different grammars of anti-reconstruction coexist within adult speakers of Japanese. This conclusion adds support to the claim that constraints on scope interpretations are not reliably learnable from evidence about possible scope interpretations.

## 6.2 Implicative verbs

It was first observed by Karttunen (1971) that a certain class of verbs entails the truth of their complement proposition. Consider the following examples:

- (406) a. John managed to solve the problem  
       $\Rightarrow$  John solved the problem
- b. John remembered to lock his door  
       $\Rightarrow$  John locked his door
- c. John saw fit to remain silent  
       $\Rightarrow$  John remained silent

(Karttunen 1971: 341)

As shown in (406), sentences that involve verbs like *manage*, *remember*, or *see fit* entail the proposition expressed by their infinitival complement. Thus, for example, (406)a entails that *John solved the problem*, and therefore a continuation with negation of the proposition results in a contradiction, as illustrated in (407):

(407) \*John managed to solve the problem, but he didn't solve it. (ibid.: 342)

This class of verbs is called *implicative verbs*. Implicative verbs contrast with verbs that take an irrealis infinitival complement, and hence do not entail the truth of the complement proposition. The example in (408) illustrates the point, where the verb *hope* takes an irrealis complement whose truth is left unspecified at the time of speech:

(408) John hoped to solve the problem, but he didn't / will not solve it (ibid.)

Karttunen pointed out that implicative verbs must be distinguished from factive verbs. The difference between the two classes appears in sentences that contain negation. With factive verbs, the presupposition expressed in the complement is not affected by the presence of negation in the matrix clause. Thus, (409)a and (409)b share the same presupposition that is given in (409)c:

- (409) a. John realized that he had no money  
b. John didn't realize that he had no money  
c. John had no money

(ibid.: 343)

In contrast, with implicative verbs, the presence of negation affects what is entailed. Specifically, negation of implicative verbs entails negation of their complement clauses, as shown in (410):

- (410) a. John didn't manage to solve the problem  
           $\Rightarrow$  John didn't solve the problem
- b. John didn't remember to lock his door  
           $\Rightarrow$  John didn't lock his door
- c. John didn't see fit to remain silent  
           $\Rightarrow$  John didn't remain silent

(*ibid.*)

In this chapter, I am primarily concerned with a subclass of implicative verbs that are called *negative implicatives*. Those verbs entail the negation of the complement proposition, as illustrated in (411):

- (411) a. John failed to solve the problem  
           $\Rightarrow$  John didn't solve the problem
- b. John forgot to lock his door  
           $\Rightarrow$  John didn't lock his door

The entailed negation associated with negative implicatives scope-interacts with quantificational elements in the complement clause. For example, the sentences in (412) exhibit the familiar scope ambiguity between negation and a universal quantifier:

- (412) a. John failed to solve all the problems  
           $\neg >> \forall$  interpretation: John solved some, but not all of the problems  
           $\forall >> \neg$  interpretation: John solved none of the problems

- b. John forgot to lock all the doors  
 $\neg >> \forall$  interpretation: John locked some, but not all of the doors  
 $\forall >> \neg$  interpretation: John locked none of the doors

The narrow scope interpretation of the universal quantifier corresponds to the surface hierarchical relations. The wide scope interpretation of the universal is not problematic either, given that in English CSS can generally cross an infinitival clause boundary (see discussion in Chapter 3).

Against this background, we now turn to Japanese. Let us take the verb *wasureru* “forget” for example. Like its English counterpart, the verb is a negative implicative, and entails the negation of its complement proposition:

- (413) Taroo-wa sono hon-o yomi-wasureta  
 Taroo-TOP that book-ACC read-forgot  
 “Taroo forgot to read that book”  
 $\Rightarrow$  Taroo didn’t read that book

In (413), the complement predicate *yomu* “read” forms a morphological unit with the main predicate *wasureru*, without having an independent tense marker within the complement clause. A lexical subject is excluded from the complement clause, as is the case in other infinitival complement clauses. *Wasureru* may also take an NP, or a nominalized clause with an accusative case maker as its complement:

- (414) Taroo-wa sono hon-o wasureta  
 Taroo-TOP sono book-ACC forgot  
 “Taroo forgot that book”
- (415) Taroo-wa sono hon-o yomu no/koto-o wasureta  
 Taroo-TOP that book-ACC read thing-ACC forgot  
 “Taroo forgot to read that book”



The nominalized complement may have a lexical subject, but in that case a somewhat different interpretation arises. Specifically, when the nominalized complement has a lexical subject, *wasureru* is interpreted as taking a factive complement, just like the English *forget* taking a finite clause complement:

- (416) Taroo-wa Hanako-ga sono hon-o yomu no/koto-o wasure-teiru<sup>79</sup>  
Taroo-TOP Hanako-NOM that book-ACC read thing-ACC forget-teiru  
“Taroo has forgotten that Hanako is going to read that book”

The factivity presupposition of the complement clause in (416) is not affected by the presence of negation in the matrix clause, as shown in (417):

- (417) Taroo-wa Hanako-ga sono hon-o yomu no/koto-o wasure-tei-nai  
Taroo-TOP Hanako-NOM that book-ACC read thing-ACC forget-teiru-NEG  
“Taroo has not forgotten that Hanako is going to read that book”  
⇒ Hanako is going to read that book

In contrast, adding negation to (415) reverses the truth conditions of the entailed proposition:

- (418) Taroo-wa sono hon-o yomu no/koto-o wasure-nakata  
Taroo-TOP that book-ACC read thing-ACC forget-NEG  
“Taroo didn’t forget to read that book”  
⇒ Taroo read that book

Given these observations, I conclude that while nominalized complements with a controlled subject such as (415) are infinitival, complements with a lexical subject such as (416) are finite. I will put the finite/factive cases aside for the remainder of this discussion.

---

<sup>79</sup> For some reason that I am not going to examine closely, a simple past tense (i.e., *wasureta*) sounds somewhat odd here, if not totally unacceptable.

### 6.3 Anti-reconstruction

Bobaljik and Wurmbrand (2005; 2007) discuss a curious property of infinitival complements like the one in (413). They report that a quantificational element within this type of complement is forced to take scope over the matrix predicate. Observe that Japanese (419) is scopally unambiguous, only allowing the wide scope interpretation of the universal quantifier. This contrasts with the scope ambiguity of its English counterpart, given in (420):

- (419) Taroo-wa subete-no hon-o yomi-wasureta  
Taroo-TOP all-GEN book-ACC read-forgot  
Lit. “Taroo forgot to read all the books”  
*\*forget* >>  $\forall$  /  $\forall$  >> *forget*
- (420) Taroo forgot to read all the books  
*forget* >>  $\forall$  /  $\forall$  >> *forget*

Thus, (419) is judged to be false if Taroo did read some of the books, if not all; (420), in contrast, is true in the same situation. In other words, the Japanese sentence prohibits the “surface scope” interpretation: the QNP is thematically related to the complement predicate *yomu* “read”, but it is forced to take scope over the matrix predicate. The lack of the surface scope interpretation cannot be reduced to the lexical property of the universal quantifier *subete-no* *X*. In simple negative sentences, the same form shows scope ambiguity:

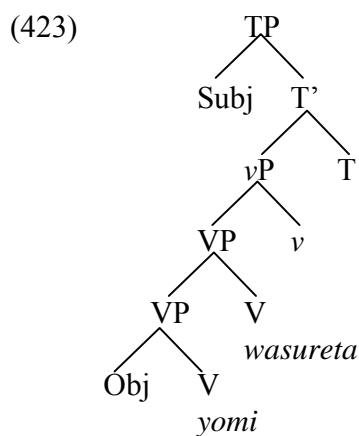
- (421) Taroo-wa subete-no hon-o yoma-nakatta  
Taroo-TOP all-GEN book-ACC read-NEG  
“Taroo didn’t read all the books”  
 $\neg$  >>  $\forall$  /  $\forall$  >>  $\neg$

Furthermore, within the nominalized clausal complement of *wasureru* “forget”, the universal quantifier can be interpreted under the scope of the matrix predicate:

- (422) Taroo-wa subete-no hon-o yomu no/koto-o wasureta  
 Taroo-TOP all-GEN book-ACC read thing-ACC forgot  
 “Taroo forgot to read all the books”  
*forget* >>  $\forall / \forall$  >> *forget*

The constraint on scope interpretation observed in (419) is referred to as the *anti-reconstruction effect* by Bobaljik and Wurmbrand (2005; 2007: henceforth B & W).

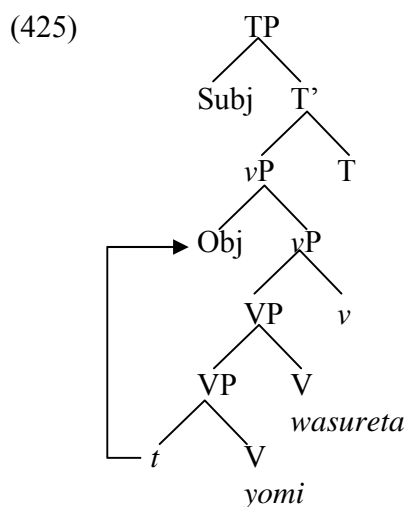
According to B & W, the anti-reconstruction effect is a characteristic property of a certain class of “restructuring” predicates, and the same scope constraint is observed with the corresponding German and Itelmen sentences, and related infinitival constructions in Japanese (e.g., Koizumi, 1995; Takano, 2003). B & W argue that the complement clause of (419) has undergone a “clause union” process with the matrix clause and accordingly has lost its status as an independent clause. Specifically, B & W assume that the complement clause is a VP complement, crucially lacking the *vP* projection which is responsible for checking the case-feature of the complement object. The base structure of (419) under B & W’s analysis is represented in (423):



Since the complement clause lacks any functional projections, the complement object must have its case checked by a functional projection in the matrix clause. B & W argue that the case-checking cannot be carried out via the long-distance agreement process (i.e., the operation Agree: e.g., Chomsky 2000) due to the following locality constraint on the agreement process:

(424) The (verbal) complement to a lexical verb delineates an *agreement domain*.  
(Bobaljik and Wurmbrand 2005: 828)

The complement clause in (423) forms an agreement domain that makes a DP within that domain inaccessible for *Agree*. This forces the complement object to move to the *vP* in the matrix clause in order to check its case-feature:



B & W further propose that case/agreement-checking relations must be LF-visible (cf. Koizumi 1995) and therefore (426), which is called the agreement-scope correlation, holds for the semantic interpretation of a DP that has undergone movement for case/agreement checking:

- (426) A DP may not be interpreted (for scope and binding) in a position lower than in the domain in which it undergoes Case/agreement-checking. (ibid.: 812)

Given the constraint in (426), the raised object in (425) cannot be reconstructed into its base position (hence the name *anti-reconstruction effect*), and therefore, it must take scope over the matrix predicate. Thus, B & W's account for the scope constraint in sentences like (419) has three components: i) the lack of a *vP* in the complement clause due to the restructuring process, ii) the obligatory raising of the complement object, and iii) the ban on reconstruction. Under this account, the cross-linguistic contrast between Japanese (419) and English (420), and also the contrast between Japanese (419) and (422) are reduced to the obligatoriness of restructuring: while sentential infinitival complements of Japanese *wasureru* obligatory undergo restructuring, infinitival complements of English *forget* and nominalized infinitival complements of *wasureru* do not (at least not obligatorily).

Concerning the scope of negative implicative predicates, there is one thing that is not addressed in B & W's approach. As I mentioned above, Japanese *wasureru* may directly take a NP as its complement. The English counterpart *forget* also shows the same property:

- (427) a. Taroo-wa sono hon-o wasureta  
Taroo-TOP that book-ACC forgot  
"Taroo forgot that book"  
b. Taroo forgot that book

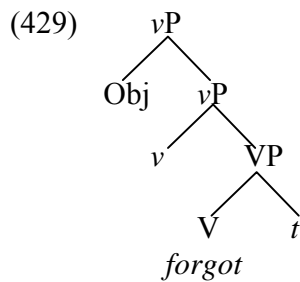
If the object is a quantificational phrase, it must take scope over *wasureru/forget*. The lack of a scope ambiguity resembles the anti-reconstruction effect observed in

restructuring complements. For example, (428) can truthfully describe a situation where Taroo didn't bring any of the books, but is false when Taroo did bring some of the books:

- (428) a. Taroo-wa subete-no hon-o wasureta  
 Taroo-TOP all-GEN book-ACC forgot  
 "Taroo forgot all the books"  
 \**forget* >>  $\forall$  /  $\forall$  >> *forget*
- b. Taroo forgot all the books  
 \**forget* >>  $\forall$  /  $\forall$  >> *forget*

However, it is not clear under B & W's approach why the narrow scope of the universal quantifier is not possible in (428). Presumably, the case-feature of the object is checked in situ via Agree, and therefore there seems to be no case-theoretic reason to motivate a configuration in which the object asymmetrically c-commands the predicate.

One way to resolve the puzzle is to assume that a quantifier in the object position must be covertly raised (i.e., via Quantifier Raising) to the closest node of type <t> in order to resolve a semantic type mismatch (e.g., Heim and Kratzer 1998). Since the movement is motivated purely by semantic reasons, it seems reasonable to assume that the object must be interpreted at the raised position (see the discussion in section 3.5.1). In sentences in (428), the type <t> node that is closest to the object position is  $\nu$ P. The resultant syntactic configuration after the covert raising of the object is represented in (429):



In this structure, the raised object is higher than the predicate.<sup>80</sup> Under the assumption that the object cannot undergo scope-reconstruction, the obligatory wide scope of the object in the sentences in (428) follows. We refer to this account as the *QR account*.

The QR account can be straightforwardly extended to anti-reconstruction examples like (419). Once we adopt the assumption that the complement clause in (419) lacks a *vP* node, it follows that the type-mismatch between the complement predicate and the object cannot be resolved within the complement clause. In this case, the closest node of type  $\langle \triangleright \rangle$  is the matrix *vP*, and the quantified object is forced to raise to that position. Thus, the QR account motivates exactly the same movement of the complement object as in (425), independently of case-theoretic considerations. One advantage of the QR account for the anti-reconstruction effects in restructuring complements is that it allows a uniform account with the cases that involve nominal complements. Given this, I will tentatively adopt the QR account for the anti-reconstruction effects in restructuring complements, but the choice is not crucial to the discussion that follows. The QR account and B & W's case-theoretic approach share the core assumption that the scope constraint in sentences like (419) is crucially related to the lack of a *vP* projection in the complement clause and subsequent

---

<sup>80</sup> Head-movement of the predicate into  $v^0$  does not affect the c-command relation.

movement of the complement object to the matrix  $\nu$ P. They only differ in what triggers the movement, and the difference does not crucially affect the acquisition issues that I am going to discuss in the subsequent sections.

Under the restructuring account of the anti-reconstruction constraint, the acquisition of the constraint is reduced to the acquisition of obligatory restructuring in certain infinitival complements. However, it remains unclear how children can determine whether or not a certain complement clause undergoes restructuring. In fact, it is not enough to learn that a certain complement clause can undergo restructuring; the anti-reconstruction effect follows only when restructuring is obligatory. There seems to be no overt indication for restructuring of infinitival complement clauses in Japanese. For example, a bare indefinite that is embedded within the infinitival complement of an intensional predicate can easily have a narrow scope/*de dicto* reading, suggesting that such complement clauses are not subject to obligatory restructuring. For example, the following sentence can naturally mean that I have a general desire to read some English book, without having a particular book in the real world in mind:<sup>81</sup>

(430) Boku-wa eigo-no hon-o yomi-tai  
 I-TOP English-GEN book-ACC read-want  
 “I want to read a English book/English books”

---

<sup>81</sup> In both English and Japanese, a QNP complement of intensional verbs like *want* may receive a *de dicto* interpretation. Thus, the following sentences can mean that John has a general desire of having an English book, without having any particular book in mind:

- (i) John wants an English book
- (ii) John-wa eigo-no hon-ga hosii  
 John-TOP English-GEN book-NOM want  
 “John wants an English book”

Larson et al. (1997) argue that the complements of such “intensional transitive verbs” involve a concealed clausal structure. Given that the narrow scope interpretation of the object QNP is possible, the abstract complement clause is not subject to obligatory restructuring.



Note that the morphological form of the complement verb *yomu* “read” is exactly the same as in (419), which involves obligatory restructuring. This indicates that restructuring complements and non-restructuring complements cannot be discriminated by their forms.

If there is no independently observable indication of obligatory restructuring, then learners of Japanese would be forced to learn the scope constraint of anti-reconstruction from evidence of the possible scope interpretations. Presumably, learners of the scope constraint would face the same kind of data sparseness problem that we have discussed in previous chapters: the scope constraint is only relevant to a limited set of scope-taking predicates (e.g., negative implicatives) that take an infinitival complement<sup>82</sup>, and hence the relevant data would not be abundant in the input data. Against this background, we carried out several experimental studies with Japanese adults and children, aiming to collect empirical data to shed light on the question of how learners of Japanese solve the learning problem. Interestingly, the

---

<sup>82</sup> Among the following negative implicative verbs, only *wasureru* “forget” and *sokoneru* “fail” may take an infinitival complement:

- |   |   |
|---|---|
| a. <i>wasureru</i> “forget”<br>tabe-wasureru “forget to eat”    | b. <i>sokoneru</i> “fail”<br>tabe-sokoneru “fail to eat”          |
| c. <i>sippaisuru</i> “fail”<br>*tabe-shippaisuru “fail to eat”  | d. <i>okotaru</i> “neglect”<br>*tabe-okotaru “neglect to eat”     |
| e. <i>kotowaru</i> “decline”<br>*tabe-kotowaru “decline to eat” | f. <i>kyohisuru</i> “decline”<br>*tabe-kyohisuru “decline to eat” |
| g. <i>sakeru</i> “avoid”<br>*tabe-sakeru “avoid to eat”         | h. <i>nogareru</i> “avoid”<br>*tabe-nogareru “avoid to eat”       |
| i. <i>koraeru</i> “refrain”<br>*tabe-koraeru “refrain to eat”   | j. <i>enryosuru</i> “refrain”<br>*tabe-enryosuru “refrain to eat” |

In contrast, all of these verbs can take a nominalized complement clause. This is not a complete list of Japanese negative implicative verbs, but it suggests that a majority of negative implicatives do not take an infinitival complement. In fact, I am not aware of any infinitival-complement taking negative implicative other than *wasureru* and *sokoneru*.

results of our experiments suggest that the learners do not really “solve” the learning problem. The following subsections review the experiments and the results.

## 6.4 Experiment #1

### 6.4.1 Design and participants

The main purpose of the first experiment was to examine the robustness of the anti-reconstruction effect in Japanese. Both adult Japanese speakers and children participated in the experiment. The participants were divided into four groups, depending on their age and the type of test sentence they hear in the experiment. The  $2 \times 2$  design is illustrated in (431).

|       |          |            |               |
|-------|----------|------------|---------------|
| (431) |          | <i>neg</i> | <i>forget</i> |
|       | Adults   | Group I    | Group II      |
|       | Children | Group III  | Group IV      |

Groups I and III are control groups, and they were presented test sentences with sentential negation. Group II and IV were presented test sentence with *wasureru* “forget”. Sample test sentences of each type are given in (432) and (433):

(432) *Pikachu-wa omocha-o zenbu katazuke-nakatta*  
*Pikachu-TOP toy-ACC all clean up-NEG*  
“Pikachu didn’t clean up all the toys”

(433) *Pikachu-wa omocha-o zenbu katazuke-wasureta*  
*Pikachu-TOP toy-ACC all clean up-forgot*  
“Pikachu forgot to clean up all the toys”

In (432), the universal quantifier *zenbu* can be interpreted under the scope of negation, and therefore the sentence is true in a situation where Pikachu cleaned up some of the

toys, but not all. By contrast, given the effect of the anti-reconstruction constraint, (433) should only allow the wide scope interpretation of *zenbu*, and thus the sentence should be judged false in the same situation.

Note that in those test sentences, we used “floated” quantifiers instead of genitive-marked pronominal quantifiers. One motivation for this choice is because a pronominal version of the universal quantifier *zenbu-no omocha* “all the toys” sounds less natural. A more general concern is that genitive-marked pronominal quantifiers in Japanese induce certain semantic interpretations. First, indefinites with genitive-marked pronominal quantifiers strongly favor specific interpretations. The specificity effect can be illustrated by the following dialogue between a waiter and a customer at a restaurant<sup>83</sup>:

(434) Waiter: Gochuumon-wa okimari desu ka?  
          order-TOP       decide COP Q  
          “Are you ready to order?”

Customer: Hai.

Yes

- a. Biiru-o *nihon* kudasai.  
   Beer-ACC two take
- b. #*Nihon*-no biiru-o kudasai  
   Two-GEN beer-ACC take  
   “I’ll take two bottles of beer”

In this context, the use of genitive-marked pronominal quantifier creates awkwardness, due to the specific interpretation of *nihon-no biiru* “two bottles of beer”: it sounds as if the customer wants two specific bottles of beer. In fact, the form can felicitously be used when it is clear that the customer refers to a specific two

---

<sup>83</sup> I owe this example to Koichi Miyakoshi (Personal Communication).

bottles of beer (e.g., there are bottles of various kinds of beer lined up on the counter: ten bottles of Bud Light, ten bottles of Sam Adams, etc. The customer noticed that there are only two bottles of Heineken left, and decided to try the brand, because he thought that that was a popular one).

Second, and more directly relevant to our current concern, genitive-marked prenominal quantifiers embedded within intensional contexts strongly prefer a wide-scope, *de re* reading. For example, while (435)a is perfectly natural under a *de dicto* reading in which Taroo is trying to buy every book on linguistics in general, (435)b only allows a *de re* reading in which for each book on linguistics, Taroo has the intent of buying it:

- (435) a. Taroo-wa gengogaku-no hon-o *subete* ka-ou-to siteiru  
Taroo-TOP linguistics-GEN book-ACC all buy-MOOD-COMP doing  
“Taroo is trying to buy every book on linguistics”
- b. Taroo-wa *subete*-no gengogaku-no hon-o ka-ou-to siteiru  
Taroo-TOP all-GEN linguistics-GEN book-ACC buy-MOOD-COMP doing  
“Taroo is trying to buy every book on linguistics”

In general, prenominal quantifiers favor taking wider scope than other quantificational elements. In order to avoid possible interference from these semantic properties of prenominal quantifiers, we decided to avoid using those forms. Our intuition<sup>84</sup> is that the use of floated quantifiers in sentences like (433) does not affect possible scope interpretations: the anti-reconstruction effect persists, and the narrow scope of the universal quantifier is not possible.<sup>85</sup>

---

<sup>84</sup> This is based on the judgments by TG, Tomo Fujii, and Utako Minai.

<sup>85</sup> A floated quantifier can be “stranded” by its host NP that undergoes overt movement like scrambling. In such a case, the position of the stranded QP determines its scope, as illustrated in the following pair of examples:

A sample story goes as follows. Pikachu was playing with his toys (a robot, a soccer ball, and blocks) in his room. In the room, the toys and some forks were scattered on the floor, and the room was quite messy. Then Satoshi showed up with a hamburger. Satoshi told Pikachu that he would give the hamburger to Pikachu, but then he noticed that Pikachu's room was littered with toys and forks. Satoshi told Pikachu to clean up his room, and he promised to give Pikachu the hamburger if Pikachu successfully cleaned up all the toys. Pikachu got back to his room, and started cleaning up. He first put the forks into the cabinet. At this point Pikachu thought he was done, and left the room, leaving all the toys on the floor. This makes the wide scope interpretation of the universal quantifier in the test sentences almost true: Pikachu didn't clean up any of the toys at this point. But then something occurred to him: he remembered that he had not cleaned up the toys, and he went back to his room again. He put the robot and the soccer-ball into the toy box, and thought he was done. Satoshi then checked Pikachu's room, and found out that the blocks were still left on the floor. Satoshi told Pikachu that he could not give the

- 
- a. Kyoujyu-o dareka-ga *t* zenin hihansita  
 professor-<sub>ACC</sub> someone-<sub>NOM</sub> all criticized  
 Lit. "Professors, someone criticized all"  
 \* $\forall >> \exists$
- b. Kyoujyu-o zenin dareka-ga *t* hihansita  
 professor-<sub>ACC</sub> all someone-<sub>NOM</sub> criticized  
 Lit. All the professors, someone criticized"  
 $\text{OK} \forall >> \exists$

In the (a) example, the stranded universal quantifier *zenin* cannot take wider scope than the subject *dareka* "someone". Given this, it is necessary to explain why a floated quantifier in anti-reconstruction contexts cannot be stranded within the lower clause, taking narrower scope than the matrix predicate. The QR approach to the anti-reconstruction effect provides an answer: if a quantified object QP must be moved to the closest  $\nu$ P edge in order to resolve the type mismatch, then it would be possible to argue that a floated quantifier associated with an object must also be raised to the closest  $\nu$ P. In cases like (a), the floated quantifier is stranded at the edge of  $\nu$ P that is still lower than the subject position. However in the anti-reconstruction context, a floated quantifier that is raised to the edge of the closest  $\nu$ P ends up c-commanding the matrix predicate.

humburger to Pikachu, because Pikachu didn't clean up the blocks. However, Satoshi felt pity for Pikachu, and decided to give him a lesser reward – a carrot.

At the end of each story, Kermit the Frog said what he thought happened in the story. With the story described above, the participants in Group I and III heard the test sentence with sentential negation in (432); the participants in Group II and IV heard the test sentence with *wasureru* “forget” in (433). If the participants know that the complement clause of *wasureru* in (433) must undergo obligatory restructuring, then due to the anti-reconstruction effect, the test sentence cannot have the narrow scope interpretation of the universal quantifier. Consequently, the participants should reject the test sentence. In contrast, if the participants (especially children) do not know about the obligatory restructuring of the complement of (433), then for such participants the sentence should have the narrow scope interpretation of *zenbu* just as in the control sentence (432), and therefore (433) should be accepted in the test condition as often as (432). There were two crucial test conditions and six filler trials. Those participants who made more than two errors with filler trials were excluded from the final data analysis.

Adult participants were undergraduate students of Ritsumeikan University, recruited at American University, Washington D.C.. There were 15 participants in Group I, and 18 in Group II. The adult participants watched a video-taped version of the TVJT experiment in the respective groups. Child participants were recruited in Totsuka Sumire Kindergarten. Group III consisted of 20 children (Age 4;4 - 6;0, Mean: 5;2), and Group IV also consisted of 20 children (Age 4;8 - 6;2, Mean: 5;6). The child participants were tested individually by two native speakers of Japanese.

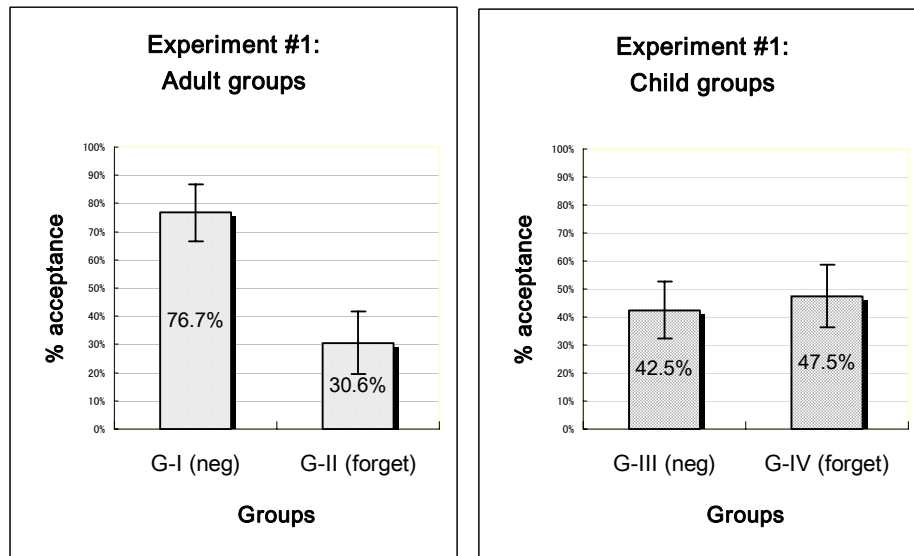
## 6.4.2 Results

The results from the experiment are analyzed in terms of the acceptance rate of the narrow scope interpretation of the universal quantifier *zenbu* in the crucial test sentences. The percentages are presented in the table and the figures below:

(436)

|          | <i>neg</i> (e.g. (432))       | <i>forget</i> (e.g. (433))   |
|----------|-------------------------------|------------------------------|
| Adults   | G-I (n=15)<br>76.7% (23/30)   | G-II (n=18)<br>30.6% (11/36) |
| Children | G-III (n=20)<br>42.5% (17/40) | G-IV (n=20)<br>47.5% (19/40) |

(437) Figure 4: percentages of acceptances of narrow scope universal in Experiment #1



A 2 x 2 ANOVA (Age x Condition) revealed a significant interaction between age ( $\pm$ Adult) and condition (*neg* vs. *forget*) ( $F(1, 69) = 5.8, p = 0.018$ ). There was no main effect of age ( $F(1, 69) = 0.6, p = 0.418$ ), but a marginal main effect of condition ( $F(1, 69) = 3.8, p = 0.056$ ) was observed. Simple main effect tests showed that a simple main effect of condition was significant for the adult groups ( $F(1, 69) = 9.5, p$

< 0.01), but was not significant for the child groups ( $F(1, 69) < 1$ ). A simple main effect of age was significant for the negation condition ( $F(1, 69) = 5.2, p = 0.025$ ), but was not significant for the forget condition ( $F(1, 69) = 1.3, p = 0.261$ ).

### 6.4.3 Discussion

A significant finding of the experiment is the inconsistency in the adult response patterns. Although adult participants in Group I (those who were presented with test sentences with negation) accepted test sentences significantly more often than participants in Group II (those who were presented test sentences with *wasureru* “forget”), there were a considerable amount of unexpected responses from both of the groups. As for the lack of consistent acceptance of the narrow scope interpretation of the universal quantifier under negation (i.e., Group I), it can be interpreted as reflecting adults’ bias towards the other possible scope interpretation – the wide scope interpretation of the universal quantifier. Such a general preference for wide scope interpretations of a quantifier over negation may be related to the function of the “topic” marker *wa* in negative sentences. Generally, when *wa* appears in negative sentences, it forces the *wa*-marked quantificational element to be interpreted within the scope of negation, as illustrated in (438):

- (438) *Pikachu-wa omocha-o zenbu-wa katazuke-nakatta*  
*Pikachau-TOP toy-ACC all-TOP clean up-NEG*  
 “Pikachu didn’t clean up all the toys”  
 $\neg \gg \forall / * \forall \gg \neg$

Since *wa*-marking unambiguously signals the narrow-scope interpretation of the host QP, it is possible that the absence of *wa* may create a (weak) pragmatic implicature



that the wide-scope interpretation is intended. The implicature can be canceled easily, but still it biases the listener towards the inverse scope interpretation of sentences like (432). I suspect that this is one major reason behind the lack of consistent acceptance of test sentences like (432).

The lack of consistent rejection of the narrow scope interpretation of *zenbu* in sentences like (433) is more problematic. Within Group II, 5 out of 18 adult participants consistently accepted the scope interpretation that the literature claims to be impossible in Japanese. One participant accepted the interpretation in one out of the two crucial trials, and the remaining 12 participants consistently rejected the test sentences in the crucial trials. Thus, it looks as if for about the 30% of adult participants sentences like (433) do not show the anti-reconstruction effect, and the narrow scope interpretation of the complement object QP is a possible scope interpretation of the relevant sentences. In order to determine if this is actually the case, it would be useful to test if the variation among individuals persists with a different set of test sentences. This issue is addressed in the next experiment.

Let us now turn to the results from children. Both in Group III and Group IV, children performed around chance. The poor performance by children might be due to some problem in the experimental design. Alternatively, it could be interpreted as an exaggerated version of the adults' inconsistency. In any case, given the lack of consistency in the adult groups and the fact that there were only two crucial test trials, we cannot draw any firm conclusions about children's knowledge of anti-reconstruction based solely on the data. A follow-up experiment is necessary to

determine whether the response pattern is due to the particular experimental design or due to children's linguistic knowledge.

## 6.5 Experiment #2

### 6.5.1 Design and participants

The second experiment involved the following modifications to Experiment 1. First, the number of crucial test trials was increased to four from two. Second, the complement object quantifier was replaced by *ni*<sup>86</sup> “two”. Third, the control sentences were replaced by sentences involving a nominalized complement clause of *wasureru* “forget”. A sample test sentence and the corresponding control sentence are given in (439) and (440), respectively:

(439) Usagisan-wa gyuunyuu-o nihon todoke-wasureta  
Rabbit-TOP milk-ACC two deliver-forgot  
“The rabbit forgot to deliver two bottles of milk”

(440) Usagisan-wa gyuunyuu-o nihon todokeru-no-o wasureta  
Rabbit-TOP milk-ACC two deliver-thing-ACC forgot  
“The rabbit forgot to deliver two bottles of milk”

As we have discussed above, sentences like (440) allow the narrow scope interpretation of the complement object quantifier. This construction excludes a *wa*-marked QP from inside the complement clause as shown in (441). We expect that this property of the construction reduces the listener's preference for the wide scope

---

<sup>86</sup> In actual usage, a classifier that matches the semantic type of the host noun is added to the quantifier, e.g., *ni-hon* (two bar-shaped objects), *ni-ko* (two solid objects), *ni-hiki* (two small animals), etc. For ease of exposition I will omit the gloss for the classifiers in these examples.

interpretation of the complement object QP, since the unambiguous marking of the narrow scope by *wa* is not possible as in negative sentences (e.g., (438)).

- (441) \*Usagisan-wa gyuunyuu-o nihon-wa todokeru-no-o wasureta  
Rabbit-TOP milk-ACC two deliver-thing-ACC forgot  
“The rabbit forgot to deliver two bottles of milk”

In a sample trial the participant was first introduced to a rabbit and a pig. The rabbit runs a milk delivery service, and he delivers a bottle of milk to the pig every morning. One day, the pig told the rabbit that instead of the usual one bottle of milk, he wanted two bottles of milk and a pancake for the next morning, because his brother was going to stay at his place. That night the rabbit prepared two bottles of milk and a pancake for the pig. The next morning the rabbit overslept, and in a mad rush he grabbed only the pancake and headed to the pig’s house. At the last moment the rabbit recalled that he forgot about the milk, but since he was in such a hurry he didn’t remember the special order, and delivered only one bottle of milk like ordinary mornings. The pig pointed out that the rabbit didn’t bring two bottles of milk as he ordered. The rabbit apologized, and the pig said that he would share the bottle of milk with his brother.

At this point Kermit the frog presented either (439) or (440) to the participant. Under the narrow scope interpretation of *nihon* “two”, the test sentences are true in the situation, because it was not the case that the rabbit delivered two bottles of milk – he only delivered one. By contrast, the wide scope interpretation of *nihon* means that there were two bottles of milk that the rabbit did not deliver, and under that interpretation the sentences are false, because there was only one bottle of milk that the rabbit failed to deliver. Therefore, accepting the test sentences in the situation

suggests that the narrow scope interpretation of *nihon* is possible for the participant. Note also that in the story an event that corresponds to the wide scope interpretation almost happened: the rabbit first left his house only with the pancake, forgetting about milk. This feature of the story serves a function of satisfying the Condition of Plausible Denial (e.g. Crain and Thornton 1998)

The experiment employed the same 2 x 2 design as the first experiment. Participants were divided into four groups, depending on their age ( $\pm$ adult) and the type of test sentences that they heard in the crucial trials (nominalized complement like (440) or infinitival complement like (439)). The 2 x 2 design is represented in (442).

|       |          |                            |                          |
|-------|----------|----------------------------|--------------------------|
| (442) |          | <i>nominal. complement</i> | <i>infin. complement</i> |
|       | Adults   | Group I                    | Group II                 |
|       | Children | Group III                  | Group IV                 |

As noted above, there were four crucial test trials interspersed with four filler trials. Those participants who made more than one error in the filler trials were excluded from the final data analysis.

The adult participants in group I (n=20) were undergraduate students of Miyagi Gakuin University, and the adult participants in Group II (n=16) were undergraduate and graduate students of Tohoku University. Those adult participants watched a video-taped version of the TVJT experiment in their respective groups. Child participants were recruited in Miyagi Gakuin Kindergarten. Group III consisted of 16 children (Age 4;6 - 5;7, Mean: 5;2), and Group IV also consisted of 16 children (Age 4;8 - 5;7, Mean: 5;2). The child participants were tested individually by two native speakers of Japanese.

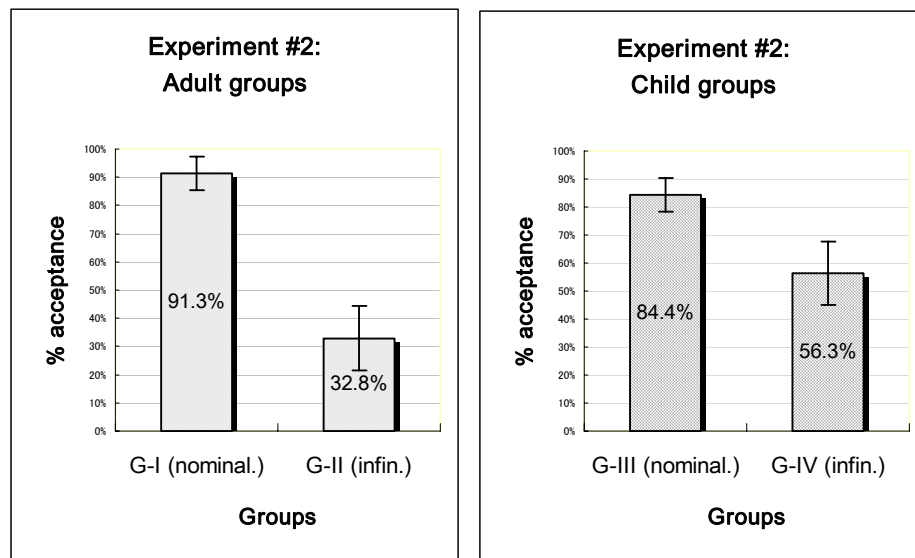
### 6.5.2 Results

The results from the experiment are analyzed in terms of the acceptance rate of the narrow scope interpretation of the complement object quantifier in the crucial test sentences. The percentages are presented in the table and the figures below:

(443)

|          | <i>nominal.</i> (e.g. (440))  | <i>infin.</i> (e.g. (439))   |
|----------|-------------------------------|------------------------------|
| Adults   | G-I (n=20)<br>91.3% (73/80)   | G-II (n=16)<br>32.8% (21/64) |
| Children | G-III (n=16)<br>84.4% (54/64) | G-IV (n=16)<br>56.3% (36/64) |

(444) Figure 6: percentages of acceptances of narrow scope numeral in Experiment #2



The result of a 2 x 2 ANOVA (Age x Condition) showed a significant main effect of condition (nominalized complements vs. infinitival complements) ( $F(1, 64) = 22.3, p < 0.01$ ). There was no main effect of age ( $\pm$ adult) ( $F < 1$ ). The interaction between age and condition was marginally significant ( $F(1, 64) = 2.7, p = 0.103$ ).

### 6.5.3 Discussion

In this experiment, no significant difference between child groups and adult groups was observed. Both children and adults accepted the sentences with a nominalized complement reliably more often than the sentences with an infinitival complement. In other words, with respect to the grammar of anti-reconstruction, Japanese children and adults are similar – but in an interesting way. Note that the overall acceptance rate from Group II adults was 32.8%, which is quite similar to the number from Group II in the previous experiment (30.6%). Moreover, the distribution of individual acceptance patterns is strictly bimodal: 5 participants consistently accepted the test sentences in all of the four crucial test trials, and 10 participants consistently accepted the test sentences in all of the trials. The remaining one participant accepted a test sentence only once out of four trials, which can possibly be regarded as noise. In short, the results from Group II adults replicated the individual variation observed in the previous experiment: for about 30% of adult Japanese speakers, sentences like (439) do not show the anti-reconstruction effect and the narrow scope interpretation of the complement object QP is possible; but for the remaining 70% of adult speakers, the same scope interpretation is strictly impossible.

In the experiment in 2.4, adult English speakers accepted the inverse scope interpretation of the test sentence “*someone ate every food*” about 30% of the time. I interpreted the result as reflecting a general preference for the surface scope interpretation, rather than showing that the inverse scope interpretation is grammatically excluded by 70% of adult English speakers. This conclusion is based on the theoretical assumption that the grammar of English generates inverse scope

interpretations between QNP arguments of simple transitive sentences, and also on the psycholinguistic observations that inverse scope interpretations are generally dispreferred by the human processing mechanism. In other words, we have good reasons to believe that the lack of consistent acceptance of the inverse scope interpretation in the particular experimental context is due to some performance problem. The anti-reconstruction effect, in contrast, can hardly be regarded as a performance problem. For speakers that are sensitive to the effect, the lack of the narrow scope of the complement object QP is quite robust, conditioned systematically by the type of complement clause, rather than by the choice of a particular quantificational element. Below I provide several examples that illustrate the robustness of the anti-reconstruction effect. The judgments are by TG and Tomo Fujii, who are both sensitive to the anti-reconstruction effect.

First, the choice of the complement object QP does not affect the anti-reconstruction effect. We have discussed cases that involve a universal quantifier or a bare numeral. In addition to that, the narrow scope interpretation of the complement object QP is systematically unavailable in the following examples:<sup>87</sup>

---

<sup>87</sup> I avoided using quantifiers that are positive polarity items (e.g., *A ka B* “A or B”, *A mo B mo* “both A and B”, *nanika* “something”, etc.), because if the analysis of PPIs given in Chapter 5 is correct, it is predicted that those quantifiers in an anti-reconstruction context must move to the matrix *fP* (due to the lack of *fP* projection in the complement clause), and consequently take wider scope than the matrix predicate. As a matter of fact, a PPI in the anti-reconstruction context must take wider scope than the matrix predicate as shown in the following example, but this could be due to the lexical property of PPIs, rather than due to the property of the construction.

- a. Taroo-wa piza ka pasuta-o tabe-wasureta  
 Taroo-TOP pizza or pasta-ACC eat-forgot  
 “Taroo forgot to eat pizza or pasta”  
 $\vee \gg \textit{forget} / * \textit{forget} \gg \vee$
- b. Taroo-wa piza mo pasuta mo tabe-wasureta  
 Taroo-TOP pizza also pasta also eat-forgot  
 “Taroo forgot to eat both pizza and pasta”  
 $\wedge \gg \textit{forget} / * \textit{forget} \gg \wedge$

(445) *dake* “only”

Taroo-wa sono hon-dake-o yomi-wasureta  
Taroo-TOP that book-only-ACC read-forgot  
Lit. “Taroo forgot to read only that book”

can mean: “That book was the only thing that Taroo forgot to read”  
(only >> forget)

cannot mean: “It was not the case that Taroo read only that book”  
(forget >> only)

(446) *takusan* “many”

Taroo-wa hon-o *takusan* yomi-wasureta  
Taroo-TOP book-ACC many read-forgot  
“Taroo forgot to read many books”

can mean: “There were many books that Taroo forgot to read”  
(many >> forget)

cannot mean: “It was not the case that Taroo read many books”  
(forget >> many)

(447) *sukunakutomo nisatu* “at least two”

Taroo-wa hon-o *sukunakutomo nisatu* yomi-wasureta  
Taroo-TOP book-ACC at least two read-forgot  
“Taroo forgot to read at least two books”

can mean: “There were at least two books that Taroo forgot to read”  
(at least two >> forget)

cannot mean: “It was not the case that Taroo read at least two books”

Second, adding a positive lead-in (cf. Musolino and Lidz 2002) does not save the narrow scope interpretation of the universal quantifier in the following example:

(448) Taroo-wa syntax-no ronbun-o subete yonda ga,

Taroo-TOP syntax-GEN paper-ACC all read but  
semantics-no ronbun-wa subete yomi-wasureta  
semantix-GEN paper-TOP all read-forgot

“Taroo read all the syntax papers, but he forgot to read all the semantics papers”

$\forall$  >> forget / \*forget >>  $\forall$

- 
- c. Taroo-wa nanika-o tabe-wasureta  
Taroo-TOP something-ACC eat-forgot  
“Taroo forgot to eat something”  
 $\exists$  >> forget / \*forget >>  $\exists$



Thirdly, the anti-reconstruction effect cannot be “canceled” by adding a continuation that is compatible only with the narrow scope interpretation of the complement object QP. Thus, the following sentence results in a contradiction:

- (449) #Taroo-wa hon-o subete yomi-wasureta ga, nansatuka-wa yonda  
Taroo-TOP book-ACC all read-forgot but some books-TOP read  
“Taroo forgot to read all the books, but he did read some”

Given these observations, I conclude that the anti-reconstruction effect is a grammatical phenomenon. This conclusion precludes the possibility of interpreting the experimental data as reflecting a performance problem in accessing the relevant scope interpretation. Rather, I contend that about 70% of our participants simply obeyed the grammatical anti-reconstruction constraint, excluding the narrow scope interpretation of the complement object QP. The problem, then, is how we interpret the data from the remaining 30% of adult speakers. It is highly unlikely that adult participants of a TVJT experiment consistently accept a scope interpretation that is prohibited by their grammar. For example, in the experiments reviewed in previous chapters, Japanese adults showed almost no variation in rejecting scope interpretations that violate some constraint. Thus, the only remaining possibility is that the grammar of the 30% of the adult speakers is different, and in fact allows the “reconstructed” scope interpretation in anti-reconstruction contexts. This conclusion amounts to claiming that there are two populations among adult Japanese speakers: one with the anti-reconstruction constraint and one without.

Given the split in the adult population, it is not surprising that children also showed the same split. The following table summarizes the distribution of individual acceptance rates from Group IV:

(450)

| <i>% acceptance of narrow scope complement obj.</i> | <b>0%</b> | <b>25%</b> | <b>50%</b> | <b>75%</b> | <b>100%</b> | <b>Total N</b> |
|---|-----------|------------|------------|------------|-------------|----------------|
| <b>Children in G-IV (n)</b>                         | 4         | 2          | 2          | 2          | 6           | <b>16</b>      |
| <b>Adults in G-II (n)</b>                           | <b>10</b> | <b>1</b>   | <b>0</b>   | <b>0</b>   | <b>5</b>    | <b>16</b>      |

A Chi-square analysis comparing the children's distribution with adults' distribution found a marginal difference ( $\chi^2 = 6.99$ ,  $p = 0.136$ ) between the two groups. For those children who behaved inconsistently, it is possible that the competition between the two grammars of anti-reconstruction (one that yields scope ambiguity and one that blocks scope ambiguity) has not been settled yet for them. Such a situation would be most likely to occur if a child is exposed to conflicting input data, which is possible given that the adult generation is not uniform with respect to the grammar of anti-reconstruction. I discuss the issue of the acquisition of the scope constraint in the next section.

## **6.6 General discussion**

In this section, I discuss some consequences of the overall experimental findings. The following table summarizes the results from the crucial test trials in the two experiments. A significant part of the findings is that about 30% of the adult participants consistently accepted the narrow scope of the complement object QP in anti-reconstruction contexts:

(451)

| %/n of acceptances of the narrow scope of the complement object QP | Experiment #1 (all + forget) | Experiment #2 (two + forget) |
|--|------------------------------|------------------------------|
| Adults   | 30.6% (11/36)                | 32.8% (21/64)                |
| Children   | 47.5% (19/40)                | 56.3% (36/64)                |

Given the results, I argued that two populations with distinct grammars of anti-reconstruction coexist among adult speakers of Japanese, and that the split in the adult population leads to the inconsistency in the acquisition of the relevant grammatical knowledge by the younger generation.

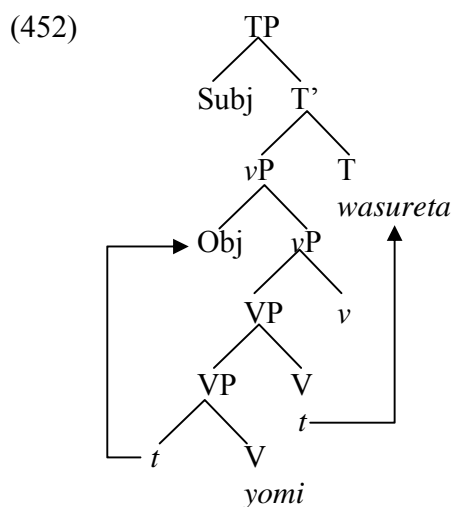
A similar proposal has been put forward by Han et al. (2006) about the grammar of Korean verb raising. Based on results from their experimental investigation on the relative scope interpretation between sentential negation and a quantified object QP, Han et al. argue that there are two populations of Korean speakers: one with V-raising and one without. For the speakers who allow V-raising to a higher functional projection, sentential negation that is cliticized onto the verb head can take wider scope than a quantified object QP. By contrast, the wide scope reading of negation is impossible for the speakers who do not have V-raising.<sup>88</sup> Korean is a head-final language, and hence overt raising of V to higher functional projections may not yield directly observable consequences such as changes in word order. Han et al. argue that this property of the language leads to a “poverty of the stimulus” with respect to the acquisition of the grammar of V-raising, and learners thus choose the relevant

---

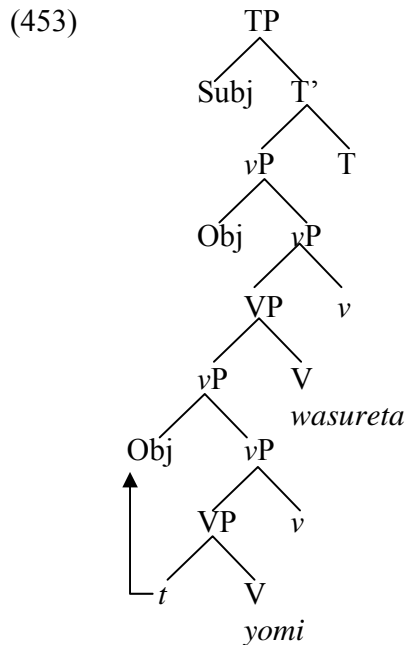
<sup>88</sup> Han et al’s analysis crucially depends on the assumption that in Korean objects raise from a VP-internal position to a functional projection that is higher than negation. To my knowledge, there is no strong argument for the same movement of objects in Japanese. As we have seen, quantified object QPs in Japanese generally show scope ambiguity with sentential negation, although there seems to be a certain degree of preference for the wide scope interpretation of an object QP over negation.

parameter value (i.e.,  $\pm$ V-raising) essentially randomly, due to the lack of crucial evidence in the input data.

Japanese is similar to Korean in that crucial evidence for V-raising is generally lacking. In fact, there is an ongoing debate in the theoretical literature about whether or not Japanese has V-raising to a functional projection (e.g., Koizumi 2000; Fukui and Sakai 2003). Given this similarity in the sparseness of evidence concerning the V-raising parameter, Han et al.'s approach would predict that the same kind of grammar variation also exists in Japanese. The possibility of V-raising might possibly underlie the variation with the anti-reconstruction effect among Japanese speakers. If V-raising is possible, then verbs like *wasureru* can be moved into a position that is higher than the position of the raised complement object, as shown in (452):



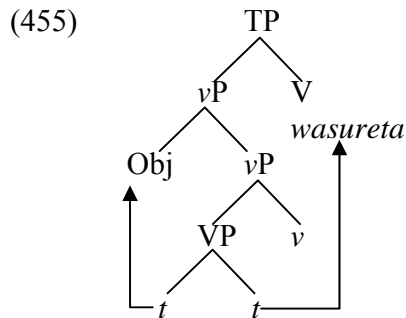
Alternatively, the variation in the anti-reconstruction effect might be due to variation in the restructuring process applied to infinitival complements of predicates like *wasureru*. This approach assumes that restructuring of infinitival complement of *wasureru* is not obligatory for some speakers, and hence for such speakers the complement clause can sustain the vP layer, which can be the target of QR:



One way to tease these two possibilities apart is to run an experiment with test sentences in which *wasureru* directly takes a quantificational NP as its complement. As I pointed out above, such an object QNP must take scope over *wasureru*:

- (454) Taroo-wa subete-no hon-o wasureta  
 Taroo-TOP all-GEN book-ACC forgot  
 “Taroo forgot all the books”  
 \**forget* >>  $\forall / \forall$  >> *forget*

I argued that this is because the object QNP must undergo QR targeting the closest vP. But if V-raising is possible, then the verb can further be raised to a position that is higher than the target landing site of QR:



Thus, if a Japanese speaker allows V-raising, then sentences like (454) should be ambiguous to her. Consequently, if V-raising is what underlies the variation in the anti-reconstruction effect, then we expect that the same proportion of adult Japanese speakers (i.e., around 30%) should accept the narrow scope reading of the object QNP in sentences like (454). Conversely, if Japanese adults consistently reject the relevant interpretation of sentences like (454), the variation in the anti-reconstruction effect cannot be due to V-raising. This is a topic for future research.

In any case, there is some variation in the grammar of adult speakers of Japanese. About 70% of speakers do not allow V-raising, and apply obligatory restructuring to infinitival complements of *wasureru*; the remaining 30% of speakers either allow V-raising, or allow a derivation without restructuring (or possibly both). I interpret this as suggesting that evidence concerning those grammatical options is not systematically available to learners of Japanese. Due to the surface word order and morphology of the language, V-raising and restructuring of infinitival complements do not have any directly observable consequences on linguistic signals. This would pose a particularly difficult problem for learners who try to distinguish the relevant hypotheses. For example, suppose that a learner considers the two hypotheses in

(456) about restructuring. Hypothesis I is a subset hypothesis of Hypothesis II, in the sense that it generates a subset of the representations that Hypothesis II generates:

- (456) a. Hypothesis I: obligatory restructuring  
Prediction: [<sub>VP</sub> ...V] *wasureru*
- b. Hypothesis II: optional restructuring  
Prediction: [<sub>VP</sub>...V] *wasureru* / [<sub>vP</sub>...V] *wasureru*

If VP complements and vP complements could systematically be distinguished on the basis of, for example, overt morphological cues, then distinguishing between those two hypotheses would not be too serious a problem. If evidence for vP complements is absent in the input data, then a probabilistic learner could use the absence as indirect negative evidence against the superset hypothesis. However, given the lack of a morphological distinction between VP and vP complements in Japanese, the learner would be hard-pressed to identify the categorical status of infinitival complements in the input data. It is possible that the learner hears a sentence that involves a VP infinitival complement and mis-analyzes the complement as vP. If that happens, then the two hypotheses cannot be reliably distinguished on the basis of indirect negative evidence. The same problem would occur with the grammar of V-raising.

Because of the lack of independently observable evidence that correlates with obligatory restructuring, learners can obtain useful information only from scope interpretations, or more specifically, from the lack of a certain scope interpretation. In other words, learners are forced to learn the grammar of anti-reconstruction on the basis of input evidence about possible scope interpretations. However, as I have pointed out in the previous chapters, it is not clear whether input evidence about possible scope interpretations provides reliable evidence for learners to learn what is

impossible. For both scope rigidity (Chapters 2 and 3) and positive polarity (Chapters 4 and 5), I argued that the relevant scope constraints (i.e., knowledge that a particular scope interpretation is impossible) cannot be learned from input evidence about possible scope interpretations, and hence there must be some way to derive the effect of the relevant constraint by learning something else. These conclusions would lead us to expect that Japanese learners may not be able to learn the grammar anti-reconstruction reliably, because in this case there is no “something else” from which learners can derive the effect of the constraint. The grammar variation observed among adult Japanese speakers suggests that this is indeed the case: some learners actually do not learn the constraint. Thus, the present experimental data can be interpreted as providing empirical support for the claim that input evidence about possible scope interpretations is unreliable for learning what is impossible.

Let us now turn to the difference between children and adults. The strict bi-modal distributions of individual response patterns from adult participants suggest that learners of Japanese eventually converge on one of two distinct grammars, rather than something messier. Compared to that, children’s behavior is generally more inconsistent, which can be interpreted as showing that some child participants still have not chosen between those grammars. The contrast between adults and children suggests that learners must somehow make a decision about the grammar of anti-reconstruction at a certain point of development, even without enough decisive evidence for/against one of the options. It remains an interesting puzzle to determine how learners make such a choice. One possibility is that they choose one of the options totally randomly (e.g., Han et al. 2006). Another possibility is that they



choose the grammar that is maximally consistent with whatever they have heard in the input. For example, some learners would conclude that the narrow scope of the object QP is excluded on the basis of the lack of supporting evidence for the interpretation; others would reach the opposite conclusion either because they in fact encountered cases that involve a narrow-scope object QP, or because they misinterpreted some of input data as involving the intended narrow scope interpretation of the object QP. I currently do not have a basis for choosing between those possibilities. The problem clearly awaits more detailed investigations.

## Chapter 7: Conclusions

The central question that I have pursued in this thesis is how first language learners learn possible scope interpretations. Scope interpretation in natural language poses an especially difficult challenge for learners, because (a) surface syntactic structures often fail to uniquely determine the corresponding scope interpretations, and (b) the range of possible scope interpretations varies across languages and across constructions. The former characteristic leads to the indirectness of relevant evidence in the input, yet the existence of variation suggests that experience must play a nontrivial role in the acquisition process. Given the empirical data that I have collected from my experimental investigations, I am now in a position to discuss general consequences of my findings for a theory of the acquisition of scope, and for a theory of language acquisition in general.

### 7.1 Productivity, no negative evidence, and arbitrariness

Let us first recap the empirical questions that I set up in Chapter 1. The questions are repeated here as (457):

- (457) a. *Productivity*: How productive are Japanese children in the acquisition of possible scope interpretations? Do they generate scope interpretations that have not been exemplified in the input? Do they allow scope interpretations that Japanese adults do not allow?
- b. *No negative evidence*: Do input data provide children with any form of negative evidence against particular scope interpretations? If direct negative evidence is not available, is there any other way for children to discover useful information that shows that those scope interpretations are impossible?

- c. *Arbitrariness*: How arbitrary are the language-specific constraints on scope interpretation? Can the impossibility of specific scope interpretations be predicted based upon (some) other properties of the language? If so, are the crucial properties learnable from experience?

These questions are important, if we are to identify the nature of the learnability problem involved in the acquisition of language-specific constraints on scope in Japanese, and consequently, to construct a theory of how first language learners acquire the constraints.

With respect to the question about children's productivity, a significant finding from my experimental studies is that Japanese children allow scope interpretations that Japanese adults do not allow. This observation clearly shows that children do not learn the language-specific constraints on scope interpretations through some form of conservative learning. Rather, children may allow a particular scope interpretation without waiting for direct supporting evidence for that interpretation in the input. Extending the terminology employed in Chapter 2, I refer to children's non-conservative scope assignments in general as the *Freedom of Scope*:

(458) *Freedom of Scope*

Given a particular construction/sentence, children may assign a scope interpretation to the construction/sentence that has never been supported by input evidence.

Given the productivity of children's scope assignments, the acquisition of language-specific constraints on scope in Japanese resists a conceptually simple explanation in terms of conservatism. Children do make mistakes, and therefore they need to correct their mistakes by the time they become adults. Accordingly, the remaining two questions in (457) (i.e., (b) and (c)) become quite important: a theory of the

acquisition of the scope constraints must specify how the “unlearning” is carried out by children.

In Chapters 2 and 4, I considered whether input data about possible scope interpretations can provide a basis for children to purge their non-adult scope interpretations (i.e., inverse scope interpretations with sentences that contain two quantificational arguments, and the narrow scope interpretation of *ka* in simple negative evidence). My general conclusion was that input data do not provide learners with reliable negative evidence (direct or indirect) against those scope interpretations, and consequently, Japanese children cannot learn to purge their non-adult scope interpretations on the basis of evidence about possible scope interpretations. The unreliability of indirect negative evidence against those scope interpretations is due to inherent properties of the input data concerning possible scope interpretations, namely data sparseness and the indirectness of the evidence. Given these properties, it is difficult for learners to build up the observation that those scope interpretations are consistently absent across a reasonable amount of examples. The case of anti-reconstruction adds independent support for the conclusion about the unreliability of indirect negative evidence: when the learning of a given piece of linguistic knowledge depends on evidence about the impossibility of certain scope interpretations, learners do not reliably acquire that knowledge.

Taken together, children’s productivity and the lack of negative evidence create nontrivial learnability problems. If the relevant constraints on scope interpretation in Japanese are arbitrary, then the learnability problems become paradoxes: there can be no logical explanation for how Japanese children expunge their non-adult scope

interpretations. Given this, I explored the possibility of denying the arbitrariness of the constraints. In Chapter 3, I argued that scope rigidity in Japanese is a consequence of semantic/pragmatic/syntactic properties of certain particles (i.e., the uniqueness/maximality implicature on *ga*-subjects, and the lack of formal case features on *mo*-QNPs), and that learning those properties derives the effects of the scope constraint. Similarly, I proposed in Chapter 4 that Boolean disjunctions in natural languages are either [+PPI] or [-PPI], and learning that *ka* is a [+PPI] disjunction (i.e., *ka* can take scope over local negation) automatically blocks its narrow scope interpretation under local negation. The anti-reconstruction effect is also a consequence of something else (i.e., obligatory restructuring of certain infinitival complements), but it contrasts with the other constraints in that the “something else” may not be independently learned on the basis of observable properties of the language. Restructuring of infinitival complements is not overtly marked by linguistic signals, and possible positive evidence for the availability of restructuring (e.g., long passive of the complement object) is not sufficient to show that the process is obligatory. Therefore, learners cannot learn the impossibility of particular scope interpretations in anti-reconstruction contexts from something else, and hence the results of the acquisition process show variation among individual speakers.

It remains an interesting empirical question to determine to what extent Freedom of Scope is a general phenomenon. In the earlier part of this decade it was claimed that children only access a subset of the possible scope interpretations in their language – the original Observation of Isomorphism (e.g., Musolino et al. 2000).

However, as I discussed in Chapter 2, recent experimental studies revealed that children's bias towards isomorphic scope interpretations can be lifted by manipulating experimental designs, which has led to the conclusion that the conclusion that the Observation of Isomorphism is due to a performance/pragmatic factor and is not due to children's grammar. In addition, several experimental studies have also reported that children accessed non-adultlike scope interpretations (e.g., Hulseley et al. 2004; Krämer 2000). In short, there is (to my knowledge) no established observation that the set of children's scope representations constitutes a proper subset of adults' scope representations (i.e., children's grammar generates only one scope interpretation for a sentence that is ambiguous for adults). In other words, there is no known evidence that shows that children are conservative learners of possible scope interpretations. Thus, the Freedom of Scope, as defined in (458), is compatible with the empirical facts observed in previous research. It is, however, still important to determine how productive children are: do children also violate universal constraints on scope interpretation (e.g., the ban on QR across an island)? Do children at different ages show different degrees of scope productivity? To what extent is children's scope productivity affected by properties of lexical items (i.e., semantics, frequency in the input, etc.), and by properties of constructions? Answering these questions in future research should provide important insights about the nature of children's learning mechanism and innate constraints imposed on the mechanism.

Another remaining question is about the robustness of the lack of (indirect) negative evidence against a particular scope interpretation. In this thesis, I only considered the possibility of obtaining indirect negative evidence on the basis of

“passive” computations of scope interpretations: the learner is presented with a form, and assigns a scope interpretation to the form, which is counted as evidence for the scope interpretation. Another possibility is that the learner actively makes predictions about what kind of forms can express a particular scope interpretation, and takes the lack of supporting evidence for a prediction to be evidence against the hypothesis that yields the prediction. Suppose, for example, that the learner considers the hypothesis that *ka* can take scope under local negation. Then the learner predicts that a form in which *ka* is c-commanded by local negation would be used in situations where the  $\neg$   $\gg$   $\vee$  interpretation is true (i.e., a “neither A nor B” type situation). Since adult Japanese speakers presumably use *...mo...mo* instead of *ka* in such situations, the learner’s prediction would not be supported by the input data, and the learner uses the absence of supporting evidence for the prediction as evidence against the hypothesis that *ka* can take scope under local negation. This scenario does not strike me as totally far-fetched, but the details of such a prediction mechanism remain unclear. The prediction mechanism that is required in this case is far more complex and sophisticated than, for example, a mechanism that predicts the subsequent word given a word in the input (e.g., the Simple Recurrent Network in Elman 1993). Given how little we know about to what extent first language learners make predictions about forms that express a given meaning, I am currently not be able to judge the psychological plausibility of such a prediction mechanism. In this connection, it must be pointed out that a theory that resorts to such a prediction mechanism must explain why Japanese children at age 5 still have not learned the constraint on *ka*, even though they seem to have already mastered the “neither” interpretation of *...mo...mo*

in simple negative sentences. This fact might require the introduction of further complexities to the theory, such as maturation of the prediction mechanism.

A possibly relevant point can be raised from observations on the acquisition of the semantics of scalar terms. Previous experimental studies commonly found that young children do not reliably compute scalar implicatures, and fail to reject test sentences in TVJT on the basis of scalar implicatures. For example, in one of Papafragou and Musolino's (2003) experiments, 5-year-olds almost consistently accepted the test sentence *Some of the horses jumped over the fence* under a situation where all of the horses jumped over the fence, while adults overwhelmingly rejected the same sentence in that situation. From another point of view, however, this kind of results can be interpreted as showing that children have the correct knowledge of the logical meanings of scalar terms: *some*, for example, does not mean *not all*, and children know the logical meaning of the word. This fact yields an implication about the nature of the learning mechanism that children use in the acquisition of the lexical semantics of weak scalar terms. Because of scalar implicatures, it is presumably the case that adult speakers avoid using weak scalar terms when corresponding stronger terms are appropriate. For example, to describe a situation where every horse jumped over the fence, adult speakers use *every/all* instead of *some*. As a result, *some* is excluded from the contexts in which *every/all* is true, and the distribution of *some* in the input data would therefore be compatible with the hypothesis that the logical meaning of *some* is, for example, *at least one and not all*. However, children's behavior in the experimental studies suggests that they do not take the absence of *some* in such contexts as evidence against their hypothesis that the logical meaning of



*some is at least one*. Thus, the absence of a logical word in a certain kind of semantic context does not lead children to conclude that the meaning of the word contradicts the relevant semantic context. This conclusion can potentially be problematic for the learning scenario that I outlined above: in the scenario, children must use the absence of *ka* in a certain kind of semantic context as evidence against the hypothesis that the use of *ka* is compatible with the semantic context. Although it is logically possible to assume that children use different learning mechanisms for the acquisition of lexical semantics and for the acquisition of scope interpretation, I do not find such a move to be well-motivated.

## **7.2 Covert scope-shifting in natural languages**

CSS, or scope ambiguity due to CSS, is a curious property of natural language. For one thing, it introduces a lot of complications to language use. For example, CSS complicates sentence processing, because it requires reanalysis of a parsed surface structure. CSS also complicates communication, because it prevents the hearer from uniquely determining the intended scope interpretation from the linguistic signals. Moreover, natural languages often provide alternative ways to express a particular scope interpretation in a way that it matches surface syntactic configuration (e.g., overt movement, constituent negation, etc.). These complexities and the existence of alternative forms can be a part of reasons for why inverse scope is generally more “marked”, less preferred interpretive option.

Within the input data to children, the dispreference for inverse scope should result in a lowered frequency of input sentences with the intended inverse scope interpretations. That is, within the input data, sentences would regularly be associated

with surface scope interpretations, with a small number of exceptional inverse scope interpretations. If children must find out the availability of CSS from experience, then it is expected that such low-frequency “irregular” cases will gradually be regularized into more frequent patterns across generations, eventually to the point that scope ambiguities cease to exist. Such a loss of irregular patterns has been observed in the historical change of verb inflection. For example, Bybee (1985) found that low-frequency irregular verbs in Old English have now been regularized through historical changes. CSS, by contrast, still survives even in a language like Japanese, in which the input evidence for the availability of CSS is presumably exceedingly rare. The difference between irregular verb inflection and CSS, then, should reside in how the knowledge is passed down to the next generation. Irregular verb inflections must be learned from experience, therefore their survival depends on input frequency. By contrast, I argue that the availability of CSS is not learned from experience: it is a part of innate linguistic knowledge. The knowledge is inherited by genes and therefore input frequency is simply irrelevant.

The Freedom of Scope exhibited by Japanese children corroborates the argument that the availability of CSS is a part of innate linguistic knowledge. Given that the possibility of inverse scope in Japanese is highly restricted, it is highly unlikely that Japanese children receive a lot of positive evidence for inverse scope interpretations. Nonetheless, Japanese children access inverse scope interpretations as often as English children/adults, which suggests that the contrast in adult languages does not have an impact on the acquisition of the availability of CSS. This is expected under

the assumption that the option of shifting the scope of an element covertly is innately given to children: children do not learn the availability of CSS from experience.

Under the theoretical framework that I endorse in the thesis, the innateness argument for CSS amounts to claiming that innate linguistic knowledge involves some specific knowledge about the syntax of LF, e.g., phrase structure and covert movement/reconstruction, etc. Such innate knowledge might also be required for the acquisition of the language-specific constraints on scope. My account for the acquisition of scope rigidity and positive polarity depends on the assumption that learners are equipped with a grammatical system with a rich covert component that yields appropriate consequences for learning the crucial properties (e.g., the case-resistant nature of *mo*-QNP). I assume that the grammatical system is largely innate, because I cannot imagine a way to learn such a system from experience, and know of no proposals that solve this problem. Under this line of reasoning, the covert component of language faculty should be largely universal, with possible cross-linguistic variation restricted to cases that are learnable from observable properties of languages. This conclusion conforms to the assumption of LF invariance advocated by Higginbotham (1985) and Chomsky (1995).

## Bibliography

- Abbott, B. (2004) Definiteness and indefiniteness. in L. Horn and G. Ward (eds) *Handbook of Pragmatics*. Oxford: Blackwell.
- Ahn, S.-H. (1990) *Korean quantification and Universal Grammar*. Ph.D. dissertation, University of Connecticut, Storrs.
- Atlas, J. D. (1991) Topic/comment, presupposition, logical form and focus stress implicatures: The case of focal particles *only* and *also*. *Journal of Semantics* 8, 127-124.
- Atlas, J. D. (1993) The importance of being "Only": Testing the neo-Gricean versus neo-entailment paradigms. *Journal of Semantics* 10, 301-318.
- Atlas, J. D. (1996) 'Only' noun phrases, pseudo-negative generalized quantifiers, negative polarity items, and monotonicity. *Journal of Semantics* 13, 265-328.
- Anderson, C. (2005) Context and the real-time comprehension of scope ambiguity. To appear in *Cahiers Linguistiques d'Ottawa*
- Aoun, J. and A. Li (1989) Constituency and scope. *Linguistic Inquiry* 20: 141-172.
- Aoun, J. and A. Li (1993) *Syntax of Scope*. Cambridge, MA: MIT Press.
- Baker, C. L. (1979) Syntactic theory and the projection problem. *Linguistic Inquiry* 10: 533-581.
- Baker, M. (2002) *The Atoms of Language*. Basic Books.
- Baker, C. L. and J. J. McCarthy (1981) *The Logical Problem of Language Acquisition*. Cambridge, Mass: MIT Press.
- Beck, S. and S.-S. Kim (1997) On wh- and operator scope in Korean. *Journal of East Asian Linguistics* 6: 339-384.
- Beghelli, F. (1995) *The Phrase Structure of Quantifier Scope*. Ph.D. dissertation, University of California, Los Angeles.
- Beghelli, F and T. Stowell (1997) Distributivity and negation: the syntax of *each* and *every*. In A. Szabolcsi (ed.) *Ways of Scope Taking*, 349-408. Dordrecht: Kluwer.
- Berwick, R. (1985) *The Acquisition of Syntactic Knowledge*. Cambridge, Mass: MIT Press.

- Bobaljik, J. D., and S. Wurmbrand (2003) Long distance object agreement, restructuring and anti-reconstruction. In M. Kadowaki and S. Kawahara (eds.), *Proceedings of NELS 33*, 67-86. Amherst, MA: GLSA Publications.
- Bobaljik, J. D., and S. Wurmbrand (2004) Anti-reconstruction effects are anti-reconstruction effects. In S. Burelle and S. Somesfalean (eds.), *Proceedings of the 2003 Annual Conference of the Canadian Linguistic Association*, 13-25.
- Bobaljik, J. D., and S. Wurmbrand (2005) The domain of agreement. *Natural Language and Linguistic Theory* 23: 809-865.
- Bobaljik, J. D., and S. Wurmbrand (2007) Complex predicates, aspect and anti-reconstruction. *Journal of East Asian Linguistics* 16:27-42.
- Boster, C. T. and S. Crain (1993) On children's understanding of *every* and *or*. *Conference Proceedings: Early Cognition and the Transition to Language*. Austin, TX: University of Texas at Austin.
- Bowerman, M. (1983) How do children avoid constructing an overly general grammar in the absence of feedback about what is not a sentence? *Paper and Reports on Child Language Development*, 22. Stanford: Stanford University Department of Linguistics.
- Bowerman, M (1987) The 'no negative evidence' problem: How do children avoid overly general grammar? In J. A. Hawkins (ed.), *Explaining Language Universals*. Oxford: Blackwell.
- Bošković, Ž., and D. Takahashi (1998) Scrambling and last resort. *Linguistic Inquiry* 29, 347-366.
- Brawn, R., and C. Hanlon (1970) Derivational complexity and order of acquisition in child speech. In J. R. Hayes (ed.), *Cognition and the Development of Language*. New York: Wiley.
- Bruening, B. (2001) QR obeys superiority: scope and ACD. *Linguistic Inquiry* 32. 233-273.
- Bybee, J. L. (1995) *Morphology: A study of the relation between meaning and form*. Philadelphia: Benjamins.
- Chierchia, G. (2000) Scalar Implications and Polarity Phenomena. Paper presented at NELS 31, Georgetown University, Washington, D. C.
- Chierchia, G., S. Crain, M. T. Guasti, A. Gualmini and L. Meroni (2001) The Acquisition of Disjunction: Evidence for a Grammatical View of Scalar Implicatures, *Proceedings of the 25th Boston University Conference on Language Development*, 157-168, Somerville, MA: Cascadilla Press.

- Chomsky, N. (1965) *Aspects in the Theory of Syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. (1975) *Reflections on Language*. New York: Random House.
- Chomsky, N. (1981) *Lectures on Government and Binding*. Dordrecht: Foris Publications.
- Chomsky, N. (1986) *Knowledge of Language: its Nature, Origin and Use*. New York: Praeger Publishers.
- Chomsky, N. (1995) *The Minimalist Program*. Cambridge, MA: MIT Press.
- Chomsky, N. (2000) Minimalist Inquiries. In R. Martin and J. Uriagereka (eds), *Step by Step: Essays in Honor of Howard Lasnik*. Cambridge, MA: MIT Press.
- Chomsky, N. (2001) Derivation by Phase. In M. Kenstowicz (ed), *Ken Hale: A Life in Language*. Cambridge, MA: MIT Press.
- Chomsky, N., and H. Lasnik (1977) *Filters and control*. *Linguistic Inquiry* 8: 425-504.
- Chomsky, N., and H. Lasnik (1995) Principles and parameters. in Chomsky (1995).
- Chung, S., W. Ladusaw, and J. McCloskey (1995) Sluicing and logical form. *Natural Language Semantics* 3, 239-282.
- Clark, R. (1992). The selection of syntactic knowledge. *Language Acquisition* 2. 83–149.
- Collins, C., and H. Thrainsson (1996) VP-internal structure and object shift in Icelandic. *Linguistic Inquiry* 27, 391-444.
- Cooper, R. (1983). *Quantification and syntactic theory*. Dordrecht: Reidel.
- Conroy, S. E. Takahashi, J. Lidz and C. Phillips (2006) *Equal Treatment for All Antecedents: How Children Succeed with Principle B*. ms, University of Maryland at College Park.
- Crain, S. (1991) Language Acquisition in the absence of experience. *Behavioral and Brain Sciences*, 14, 597-650.
- Crain, S. and C. McKee (1985) The acquisition of structural restrictions on anaphora. *Proceedings of NELS* 15. Amherst, MA: GLSA Publications.
- Crain, S. and M. Nakayama (1987) Structure dependence in grammar formation. *Language* 63, 522-543.

- Crain, S., W. Ni and L. Conway (1994) Learning, parsing, and modularity. In C. Clifton, Jr., L. Frazier and K. Rayner (eds.), *Prospectives on Sentence Processing*, 443-466. Amsterdam: Lawrence Erlbaum.
- Crain, S., Thornton, R., Boster, C., Conway, L., Lillo-Martin, D., & Woodams, E. (1996). Quantification without qualification. *Language Acquisition*, 5 (2), 83–153.
- Crain, S., and R. Thornton (1998) *Investigations in Universal Grammar: A Guide to Experiments on the Acquisition of Syntax and Semantics*. Cambridge, MA: MIT Press.
- Crain, S. and P. Pietroski (2001) Nature, nurture and Universal Grammar. *Linguistics and Philosophy*.
- Crain, S., A. Gardner, A. Gualmini and B. Rabbin (2002) “Children’s Command of Negation,” *Proceedings of the Third Tokyo Conference on Psycholinguistics*, 71-95, Tokyo: Hituzi Publishing Company.
- Crain, S., A. Gualmini and P. Pietroski (in press) Brass tacks in linguistic theory: innate grammatical principles. *Proceedings of the First Annual AHRB Conference on Innateness and the Structure of the Mind*, University of Sheffield, England.
- Crain, S. and P. Pietroski (2004) *It's not Wise to Fool with Mother Nature*. Ms. University of Maryland at College Park.
- Croft, W. (1983) Quantifier scope ambiguity and definiteness. *Proceedings of the Ninth Annual Meeting of the Berkeley Linguistics Society*, 25-36.
- de Villiers, J. and H. Tager Flusberg (1975) Some facts one simply cannot deny. *Journal of Child Language* 2: 279-286.
- Diesing, M. (2003) *Indefinites*. Cambridge, MA: MIT Press.
- Drozd, K. (2000) Children’s weak interpretation of universally quantified sentences.” In M. Bowerman and S. Levinson (eds.) *Conceptual Development and Language Acquisition*, 340-376. Cambridge: Cambridge University Press.
- Drozd, K., & Philip, W. (1993). Event quantification in preschoolers’ comprehension of negation. In E. V. Clark (ed.), *Proceedings of the 24th Annual Child Language Research Forum*, 72–86. Stanford, CA: Center for the Study of Language and Information.
- Drozd, K. and E. van Loosbroek. (1998) Weak quantification, plausible dissent, and the development of children’s pragmatic competence. In *Proceedings of the 23rd Boston University Conference on Language Development*, 184-195. Somerville, MA: Cascadilla Press.

- Elbourne, Paul. 2005. On the acquisition of Principle B. *Linguistic Inquiry* 36:333-365.
- Elman, J. L. (1993) Learning and development in neural networks: the importance of starting small. *Cognition* 48, 71-99.
- Elman, J. L., E. A. Bates, M. H. Johnson, A. Karmiloff-Smith, D. Parisi, and K. Plunkett (1996) *Rethinking Innateness: A Connectionist Perspective on Development*. Cambridge, Mass: MIT Press.
- Farkas, D. (1981) Quantifier scope and syntactic islands. In G. N. Carlson (ed), *Papers from the Seventeenth Regional Meeting of the Chicago Linguistic Society*, 59-66. Chicago: University of Chicago.
- Farkas, D. (1994) Specificity and scope. in L. Nash and G. Tsoulas (eds) *Langues et Grammaires* 1, 119-137.
- Forget, D., P. Hirschbuhler, F. Martinon and M.-L. Rivero (1997) *Negation and Polarity: Syntax and Semantics*. Amsterdam: John Benjamins.
- Fodor, J. D. (1992). Learnability of phrase structure grammars. In Levine, R. (ed.), *Formal Grammar: Theory and Implementation* (Vancouver Studies in Cognitive Science 2), 3-68. Oxford: Oxford University Press.
- Fodor, J. D. (1994). How to obey the subset principle: binding and locality. In B. Lust, G. Hermon, G. and J. Kornfilt (eds.), *Syntactic Theory and First Language Acquisition: Cross-linguistic Perspectives (vol. 2): Binding, Dependencies, and Learnability*, 429–451. Hillsdale, NJ: Lawrence Erlbaum.
- Fodor, J. D. (1998) Unambiguous triggers. *Linguistic Inquiry* 29: 1-36.
- Fodor, J. D. and I. A. Sag (1982) Referential and quantificational indefinites. *Linguistics and Philosophy* 5: 355-398.
- Fodor, J. D. and W. G. Sakas (2005) The subset principle in syntax: costs of compliance. *Journal of Linguistics*, 41:513–569
- Frazier, L. (2000) On interpretation: minimal ‘lowering’. In M.W. Crocker, M. Pickering and C. Clifton (eds) *Architectures and Mechanisms for Language Processing*. Cambridge: Cambridge University Press.
- Fukui, N. (1986) *A theory of category projection and its applications*. Ph.D. Dissertation: MIT.
- Fukui, N. and H. Sakai (2003) The visibility guideline for functional categories: Verb-raising in Japanese and related issues. *Lingua* 113: 321-375.



- Giannakidou, A. (1998) *Polarity sensitivity as (non)veridical dependency*. Amsterdam: John Benjamins.
- Giannakidou, A. (2000) Negative ... concord?, *Natural Language and Linguistic Theory* 18, 457-523.
- Giannakidou, A. (2002) Licensing and Sensitivity in Polarity Items: From Downward Entailment to (non)Veridicality, *Proceedings of Chicago Linguistic Society* 38.
- Gibson, T. and K. Wexler (1994) Triggers. *Linguistic Inquiry* 25: 407-454.
- Gil, D. (1982) Quantifier scope, linguistic variation and natural language semantics. *Linguistics and Philosophy* 5: 541-472.
- Gold, E. M. (1967) Language identification in the limit. *Information and Control* 16: 447-474.
- Goro, T. (2004) *The emergence of Universal Grammar in the emergence of language: the acquisition of Japanese logical connectives and positive polarity*. ms: University of Maryland at College Park.
- Goro, T. (2006) Positive polarity as a syntactic phenomenon. Paper presented at the 133th meeting of the Japan Linguistic Society. 11/19/2006, Sapporo-Gakuin University, Sapporo.
- Goro, T. and S. Akiba (2004a) The acquisition of disjunction and positive polarity in Japanese. In *WCCFL 23: Proceedings of the 23rd West Coast Conference on Formal Linguistics*. eds. V. Chand, A. Kelleher, A. J. Rodríguez, and B. Schmeiser, 251-264, Somerville, MA: Cascadilla Press.
- Goro, T. and S. Akiba (2004b) Japanese disjunction and the acquisition of positive polarity. In *Proceedings of the Fifth Tokyo Conference on Psycholinguistics*, ed. Y. Otsu, 137-162, Tokyo: Hituzi Shobo Publishing Company.
- Goro, T., U. Minai and S. Crain (2004) Boolean conjunction in child Japanese. Poster presented at the Inaugral Conference on Generative Approach to Language Acquisition, 12/19/2004, University of Hawaii at Manoa, Honolulu.
- Goro, T., U. Minai and S. Crain (2005) Bringing out the logic in child language. In L. Bateman and C. Ussery (eds.), *Proceedings of the Thirty-Fifth Annual Meeting of the North East Linguistic Society*, 245-256. Amherst, MA: GLSA Publications.
- Gouro, T., H. Norita, M. Nakajima and K. Arijji (2000) Children's interpretation of universal quantifier and pragmatic interference. In Y. Otsu (ed.) *Proceedings of the Second Tokyo Conference on Psycholinguistics*. Hitsuji Shobo: Tokyo

- Gropen, J., S. Pinker, M., Hollander, M. R. Goldberg, and R. Wilson (1989) The learnability and acquisition of the dative alternation in English. *Language* 65.
- Gualmini, A. (2003) Some Knowledge Children Don't Lack. *Proceedings of the 27th Boston University Conference on Language Development*, Somerville, MA: Cascadilla Press.
- Gualmini, A., L. Meroni and S. Crain (2003) Children's Asymmetrical Responses. *Proceedings of 4th Tokyo Conference on Psycholinguistics*. Hitsuji Shobo. Tokyo, Japan
- Gualmini, A., and S. Crain (2002) Why No Child or Adult Must Learn De Morgan's Laws. *Proceedings of the 26th Boston University Conference on Language Development*, 243-254, Cascadilla Press, Somerville, MA.
- Gualmini, A., and S. Crain (2005) The structure of children's linguistic knowledge. *Linguistic Inquiry* 36: 463-473.
- Gualmini, A. and B. Schwarz (2007) Negation and downward entailingness: Consequences for learnability theory. To appear in *Proceedings of the Workshop on Negation and Polarity*, University of Tübingen.
- Guasti, M.T., G. Chierchia, S. Crain, F. Foppolo, A. Gualmini and L. Meroni, (2005) Why Children and Adults Sometimes (but not always) Compute Implicatures. *Language and Cognitive Processes*, 20, 667-696.
- Han, C.-H., D. R. Storoshenko and Y. Sakurai (2004) Scope of negation, and clause structure in Japanese. *Proceedings of the 30th Annual Meetings of Berkeley Linguistic Society*.
- Han, C.-H., J. Lidz and J. Musolino (2007) V-raising and grammar competition in Korean: Evidence from negation and quantifier scope. *Linguistic Inquiry* 38: 1-47.
- Haspelmath, M. (1997) *Indefinite Pronouns*. Oxford: Clarendon Press.
- Hayashibe, H. (1975) Word order and particles: a developmental study in Japanese. *Descriptive and Applied Linguistics* 8, 1-18.
- Hayashishita, J.-R. (1999) Two ways of deriving distributive readings. *Proceedings of the 23rd annual Penn Linguistics Colloquium: University of Pennsylvania Working Papers in Linguistics*, Vol 6. 201-216.
- Hayashishita, J.-R. (2004) *Syntactic and non-syntactic scope*. Ph.D. dissertation, University of Southern California.
- Haspelmath, Martin (1997) *Indefinite pronouns*. Oxford: Clarendon Press.

- Higginbotham, J. (1985) On semantics. *Linguistic Inquiry* 16: 547-593.
- Higginbotham, J. (1991) Either/or. *Proceedings of NELS*, 21, 143-155. Amherst, MA: GLSA.
- Heim, I. (1984) A note on negative polarity and downward entailingness. *Proceedings of NELS* 14, Amherst, MA: GLSA, University of Massachusetts.
- Heim, I. (2001) Degree operators and scope. in C. Fery and W. Sternfeld (eds) *Audiat Vox Sapientiae: A Festschrift for Arnim von Stechow*, 214-239. Berlin: Akademie Verlag.
- Heim, I. and A. Kratzer (1998) *Semantics in Generative Grammar*. Oxford: Blackwell.
- Hoji, H. (1985) *Logical form constraints and configurational structures in Japanese*. Ph.D. dissertation, University of Washington.
- Herburger, E. (2000) *What Counts: Focus and Quantification*. Cambridge, MA: MIT Press.
- Herburger, E. (2001) The negative concord puzzle revisited. *Natural Language Semantics* 9, 289-333.
- Hirshbühler, P. (1982) VP deletion and across-the-board quantifier scope. In J. Pustejovsky and P. Sells (eds), *NELS* 12, 132-139. Amherst: GLSA Publications
- Horn, L. (1969) A presuppositional approach to *Only* and *Even*. *Proceedings of the Chicago Linguistic Society* 5: 98-107.
- Horn, L. (1989) *A Natural History of Negation*. Chicago: Chicago University Press.
- Horn, L. (1996) Exclusive company: *Only* and the dynamics of vertical inference. *Journal of Semantics* 13, 1-40.
- Horn, L. and Y. Kato (2000) *Negation and Polarity: Syntactic and Semantic Perspectives*. Oxford: Oxford University Press.
- Hornstein, N. (1995) *Logical Form*. Oxford: Blackwell.
- Hornstein, N., & Lightfoot, D. (1981). Introduction. In N. Hornstein, & D. Lightfoot (Eds.), *Explanation in linguistics: The logical problem of language acquisition*. London: Longman.
- Huang, J.-T. (1982) *Logical relations in Chinese and the theory of grammar*. Ph.D. dissertation, MIT.

- Hulsey, S., V. Hacquard, D. Fox and A. Gualmini (2004) The question-answer requirement and scope assignment. *MIT Working Papers in Linguistics* 46: 71-90.
- Inhelder, B., & Piaget, J. (1964). *The Early Growth of Logic in the Child*. London: Routledge.
- Ioup, G. L. (1975) *The Treatment of Quantifier Scope in a Transformational Grammar*. Ph.D. dissertation, City University of New York.
- Jing, C. (2006) *Semantic and Pragmatic Factors in the Acquisition of Disjunction: Evidence from Chinese and English*. ms, University of Maryland at College Park.
- Jing, C., S. Crain and C.-F. Hsu (2005) The interpretation of focus in Chinese: child vs. adult language. In Y. Otsu (ed.), *Proceedings of the Sixth Tokyo Conference on Psycholinguistics*, 165-190. Tokyo: Hitsuji Shobo.
- Johnson, K. (2000) How far will quantifiers go? in R. Martin, D. Michaels and J. Uriagereka (eds), *Step by Step*, 187-210. Cambridge Mass: MIT Press.
- Johnson, K., and S. Tomioka (1997) Lowering and mid-size clauses. *Proceedings of the Tübingen Workshop on Reconstruction*, Tübingen, Germany.
- Johnston, M. (1993) Because clauses and negative polarity licensing, *ESCOL* 93: 163-174.
- Karmiloff-Smith, A. (1979) *A Functional Approach to Child Language*. Cambridge University Press.
- Karttunen, L. (1971) Implicative verbs. *Language* 47: 340-358.
- Kato, Y. (1985) Negative Sentences in Japanese. *Sophia Linguistica* 19.
- Kato, Y. (1994) Negative Polarity and Movement. *MIT Working Papers in Linguistics* 24: 101-120.
- Kato, Y. (1997) Negation, Focus, and Interface Economy. *Sophia Linguistica* 41, 29-36.
- Kennedy, C. (1997) Antecedent-contained deletion and the syntax of quantification. *Linguistic Inquiry* 28: 662-688.
- Kennedy, C. (1999) Polar opposition and the ontology of 'degrees'. *Linguistics and Philosophy* 24: 33-70.

- Kim, S.-W. (1989) The QP status of wh-phrases in Korean and Japanese. In E. Jane Fee (ed.) *Proceedings of the Eighth West Coast Conference on Formal Linguistics*, 358-372. Stanford: CSLI Publications.
- Koizumi, M. (1995) *Phrase structure in minimalist syntax*. Ph.D. dissertation, MIT.
- Koizumi, M. (2000) String vacuous overt verb raising. *Journal of East Asian Linguistics* 9: 227-285.
- Krämer, I. (2000) *Interpreting Indefinites: An Experimental Study of Children's Language Comprehension*. Ph.D. dissertation. Utrecht University.
- Kratzer, A. (1995) Scope or pseudo scope? Are there wide scope indefinites? In F. Hamm and A. von Stechow (eds.) *Proceedings of Recent Developments in the Theory of Natural Language*.
- Krifka, M. (1998) Scope-inversion under the rise-fall contour in German. *Linguistic Inquiry* 29: 75-112.
- Kuno, S. (1973). *The Structure of the Japanese Language*. Cambridge, MA: MIT Press
- Kuno, S. (1980) The scope of question and negation in some verb-final languages. In *Proceedings of the Chicago Linguistic Society* 16, 155-169. Chicago Linguistic Society.
- Kuroda, S.-Y. (1965) *Generative grammatical studies in the Japanese language*. Doctoral dissertation, MIT.
- Kuroda, S.-Y. (1972) The categorial and the thetic judgments. *Foundation of Language* 9: 153-185.
- Kuroda, S.-Y. (1990) Cognitive and Syntactic Bases of Topicalized and Nontopicalized sentences in Japanese. in H. Hoji (ed), *Japanese/Korean Linguistics*, 1-26.
- Kuroda, S.-Y. (1992) *Japanese Syntax and Semantics*. Dordrecht: Kluwer.
- Kuroda, S.-Y. (2005) Focusing on the matter of topic: a study of *wa* and *ga* in Japanese. *Journal of East Asian Linguistics* 14: 1-58.
- Kurtzman, H. and M. MacDonald (1993) Resolution of quantifier scope ambiguities. *Cognition* 48: 243-279.
- Ladshaw, W. (1980) Affective *or*, factive verbs, and negative polarity items. *Proceedings of Chicago Linguistic Society* 20, 170-184.

- Ladusaw, W. (1980) *Polarity sensitivity as inherent scope relations*. Ph.D. dissertation. Published by Garland Publishing, New York.
- Ladusaw, W. (1996) Negation and Polarity Items. in S. Lappin, ed. *Handbook of Contemporary Semantic Theory*. Cambridge, MA: Blackwell Publishers
- Lahiri, Utpal. (1997) Focus and Negative Polarity in Hindi, *Natural Language Semantics* 6, 57–123.
- Larson, R. (1985) On the syntax of disjunction scope. *Natural Language and Linguistic Theory*, 3, 217–264.
- Larson, R., and R. May (1990) Antecedent containment or vacuous movement: reply to Baltin. *Linguistic Inquiry* 21: 103-122
- Larson, R., M. den Dikken and P. Ludlow (1997) *Intensional transitive verbs and abstract clausal complementation*. ms., SUNY Stony Brook.
- Lasnik, H. (1998) On a scope reconstruction paradox. *Celebration: An Electronic Festschrift in Honor of Noam Chomsky's 70th Birthday*.
- Lasnik, H. (1999) Chains of arguments. in S. Epstein and N. Hornstein (eds). *Working Minimalism*. Cambridge Mass: MIT Press.
- Lasnik, H., and M. Saito (1992) *Move  $\alpha$ : Conditions on its Application and Output*. Cambridge, MA: MIT Press.
- Lebeaux, D. (2000) *Language Acquisition and the Form of the Grammar*. Amsterdam: John Benjamins.
- Lechner, W. (1997) Two types of reconstruction. *Studia Linguistica* 52.3: 276-310
- Lewis, J.D., & Elman, J.L. (2001). Learnability and the statistical structure of language: Poverty of stimulus arguments revisited. *Proceedings of the 26th Annual Boston University Conference on Language Development*, Somerville, MA: Cascadilla Press.
- Lidz, J., E. McMahon, K. Syrett, J. Viau, F. Anggoro, J. Peterson-Hicks, E. Sneed, A. Bunker, T. Flevaris, A. Graham, K. Grohne, Y. Lee, and J. E. Strid (2004) Quantifier raiding in 4-year-olds. In A. Brugos, L. Micciulla, and C. E. Smith (eds.) *Proceedings of Boston University Conference on Language Development* 28, Somerville, MA: Cascadilla Press.
- Lidz, J., and J. Musolino (2002) Children's command of quantification. *Cognition* 84, 113-154.

- Lidz, J., S. Waxman and J. Freedman (2003) What infants know about syntax but couldn't have learned: Evidence for syntactic structure at 18-months. *Cognition* 89, B65-N73.
- Liu, F.-H. (1990) *Scope Dependency in English and Chinese*. PhD Dissertation, UCLA.
- Liu, F.-H. (1997) *Scope and specificity*. Amsterdam: John Benjamins.
- Lyons, C. (1999) *Definiteness*. Cambridge University Press.
- Manzini, M. R. & Wexler, K. (1987). Parameters, binding theory, and learnability. *Linguistic Inquiry* 18. 413–444.
- Maratsos, M. (1972) *The Use of Definite and Indefinite Reference in Young Children*. Cambridge University Press.
- Marcus, G. F. (1993). Negative evidence in language acquisition. *Cognition* 46, 53-85.
- Marsden, H. (2004) *Quantifier scope in no-native Japanese: a comparative study of Chinese, English, and Korean-speaking learners*. Ph.D. dissertation, University of Durham.
- Merchant, J. (2001) *The Syntax of Silence*. Oxford University Press.
- May, R. (1977) *The grammar of quantification*. Ph.D. dissertation, MIT.
- May, R. (1985) *Logical Form: Its Structure and Derivation*. Cambridge, Mass: MIT Press.
- McCawley, J. (1970). Where do noun phrases come from? In R. Jacobs & P. Rosenbaum (Eds.), *Readings in English transformational grammar*. Waltham, MA: Ginn.
- Miyagawa, S. (1989) *Structure and Case Marking in Japanese*. New York: Academic Press.
- Miyamoto, E., and M. Nakamura (2005) Kakimazebun no sokuji shori to shutugen hindo. *Gengo Kenkyu* 128.
- Munn, A., K. Miller, and C. Schmitt (2006) Maximality and plurality in children's interpretation of definites. *Proceedings of the 30th Boston University Conference on Language Development*, 377-387. Cascadilla Press, Somerville, MA.

- Musolino, J. (1998) *Universal Grammar and the Acquisition of Semantic Knowledge: an Experimental Investigation into the Acquisition of Quantifier-Negation Interaction in English*. Ph. D. Dissertation, University of Maryland at College Park.
- Musolino, J., S. Crain and R. Thornton (2000) Navigating negative quantificational space. *Linguistics* 38-1, 1-32.
- Musolino, J., and J. Lidz (2002) Preschool logic: truth and felicity in the acquisition of quantification. *Proceedings of the 26th Boston University Conference on Language Development, Somerville, MA: Cascadilla Press*.
- Musolino, J., and J. Lidz (2003) The scope of isomorphism: turning adults into children. *Language Acquisition* 11: 277-291.
- Musolino, J., and J. Lidz (2006) Why children aren't universally successful with quantification. *Linguistics* 44: 817-852.
- Nakanishi, K. (2001a) Scope Encoding of Indefinite NPs in Japanese. In K. von Stechow, R. Kempson, and W. Meyer-Viol eds., *The Proceedings of the Workshop on Choice Function and Natural Language Semantics: Arbeitspapier* 110, 141-165. Fachbereich Sprachwissenschaft: Universität Konstanz.
- Nakanishi, K. (2001b) Indefinites and Frozen Scope in Japanese: Restriction on QR and Choice Functions. In K. Megerdumian and L.A. Barel eds., *The Proceedings of the 20th West Coast Conference in Formal Linguistics (WCCFL XX)*, 456-469. Somerville, MA.: Cascadilla Press.
- Nakao, C. and T. Goro (forthcoming) *An experimental study on children's interpretation of negation and because-clauses*. ms, University of Maryland at College Park.
- Nishigauchi, T. (1990) *Quantification in the theory of grammar*. Dordrecht: Kluwer.
- Noveck, I. (2001) When children are more logical than adults: Experimental investigations on scalar implicatures. *Cognition* 78: 165-188.
- Osherson, D., M. Stob and S. Weinstein (1986) *Systems that Learn: An Introduction for Cognitive and Computer Scientists*. Cambridge, Mass: MIT Press.
- Otsu, Y. (1994) Early acquisition of scrambling in Japanese. In T. Hoekstra and B.D. Schwartz (eds.), *Language Acquisition Studies in Generative Grammar*, Amsterdam: John Benjamins.
- Pafel, J. (2005) *Quantifier scope in German*. Amsterdam/Philadelphia: John Benjamins.



- Papafragou, A., and J. Musolino (2003) Scalar implicatures at the semantics-pragmatics interface. *Cognition* 80: 253-282.
- Paterson, K., S. Liversedge, C. Rowland and R. Filik (2003) Children's comprehension of sentences with focus particles. *Cognition* 89, 263-294.
- Pearl, L. (2007) *Necessary Bias in Natural Language Learning*. Ph.D. dissertation, University of Maryland at College Park.
- Pearl, L., and J. Lidz (2006) *When domain general learning fails when it succeeds: Identifying the contribution of domain specificity*. ms, University of Maryland at College Park.
- Philip, W. (1995). *Event quantification in the acquisition of universal quantification*. Ph. D. dissertation, University of Massachusetts, Amherst.
- Philip, W., & Aurelio, S. (1991). Quantifier spreading: pilot study of preschooler's "every". In T. Maxfield & B. Plunkett (eds.), *Papers in the acquisition of WH: proceedings of the Umass Roundtable, May 1990*. Amherst, MA: GLSA Publications.
- Philip, W., and E. Lynch. (2000) Felicity, relevance, and acquisition of the grammar of *every* and *only*. In Proceedings of the 24th Boston University Conference on Language Development, 583-596. Somerville, MA: Cascadilla Press.
- Pinker, S. (1979) Formal models of language learning. *Cognition* 7: 217-283.
- Pinker, S. (1984) *Language Learnability and Language Development*. Cambridge, MA: MIT Press.
- Pinker, S. (1989) *Learnability and Cognition*. Cambridge, MA: MIT Press.
- Progovac, L. (1991) Polarity in Serbo-Croatian: Anaphoric NPIs and pronominal PPIs. *Linguistic Inquiry* 22, 567-572.
- Progovac, L. (1994) *Negative and Positive Polarity*. Cambridge University Press.
- Progovac, L. (2000) Negative and positive feature checking and the distribution of polarity items. To appear in S. Brown and A. Przepiorkowski, eds., *Negation in Slavic*, Slavica Publishers.
- Pullum, G., and B. Scholz (2002) Empirical assessment of stimulus poverty arguments. *The Linguistic Review* 19: 9-50.
- Regier, T and S. Gahl (2004) Learning the unlearnable: The role of missing evidence. *Cognition* 93, 147-155.
- Reinhart, T. (1976) *The Syntactic Domain of Anaphora*. Ph. D. dissertation, MIT.

- Reinhart, T. (1983) Coreference and bound anaphora: A restatement of the anaphora question. *Linguistics and Philosophy* 6: 47-88.
- Reinhart, T. (1997). Quantifier scope: how labor is divided between QR and choice functions. *Linguistics and Philosophy* 20, 335–397.
- Reinhart, T. (2006) *Interface Strategies*. Cambridge, Mass: MIT Press.
- Richards, N. (1997) *What moves where when in which language?* Ph.D. dissertation, MIT.
- Roberts, C. (2003) Uniqueness in definite noun phrases. *Linguistics and Philosophy* 26: 287-350.
- Rohde, D., & Plaut, D. (1999). Language acquisition in the absence of explicit negative evidence: How important is starting small? *Cognition* 72, 67–109.
- Roeper, T. & de Villiers, J. (1992). Ordered decisions in the acquisition of wh-questions. In Weissenborn et al. (eds.), *Theoretical Issues in Language Acquisition: Continuity and Change in Development*, 191–236. Hillsdale, NJ: Lawrence Erlbaum.
- Ross, J.R. (1969) Guess who? *Papers from the 5th Regional Meeting of the Chicago Linguistic Society*, 252-286. Chicago Linguistic Society.
- Sadakane, K., and M. Koizumi (1995) On the nature of ‘dative’ particle *ni* in Japanese. *Linguistics* 33: 5-33.
- Saito, M. (1985) *Some Asymmetries in Japanese and Their Theoretical Implications*. Ph.D. dissertation: MIT.
- Sano, M. (1985) LF movement in Japanese. *Descriptive and Applied Linguistics* 18, 245-259.
- Sano, T. (2004) Scope relations of QP’s and scrambling in the acquisition of Japanese. In J. van Kampen and S. Baauw (eds.) *Proceedings of the GALA 2003 Conference on Language Acquisition*. 421-431.
- Sano, T. (2007) Early acquisition of copy & movement in a Japanese OSV sentence. *BUCLD 31 Proceedings Supplement*.
- Schwarz, B. (1999) On the syntax of *either...or*. *Natural Language and Linguistic Theory* 17: 339-370.
- Seidenberg, M. (1997). Language acquisition and use: Learning and applying probabilistic constraints. *Science* 275, 1599–1603.
- Shibatani, M. (1990) *The Languages of Japan*. Cambridge University Press.

- Shlonsky, U. (1992) Resumptive pronouns as a last resort. *Linguistic Inquiry* 23: 443-468.
- Snyder, W. (1995) *Language Acquisition and Language Variation: The role of Morphology*. Ph.D. Dissertation, MIT.
- Snyder, W. (2001) On the nature of syntactic variation: Evidence from complex predicates and complex word-formation. *Language* 77: 324-342.
- Snyder, W. (2007) Children's grammatical conservatism: implications for linguistic theory. A talk given at *Connecticut-Siena-Nanzan Joint Workshop on Linguistic Theory and Language Acquisition*, 2/20/2007, Nanzan University.
- Snyder, W. (in press) *Child Language: The Parametric Approach*. Oxford: Oxford University Press.
- Steedman, M. (1987). Combinatory grammars and parasitic gaps. *Natural Language and Linguistic Theory* 5, 403-440.
- Sohn, K.-W. (1995) *Negative Polarity Items, Scope and Economy*. Ph.D. dissertation, University of Connecticut.
- Sugisaki, K. (2003) *Innate Constraints on Language Variation: Evidence from Child Language*. Ph.D. Dissertation, University of Connecticut.
- Sugisaki, K. and M. Isobe (2000) Resultatives result from the Compounding Parameter: On the acquisitional correlation between resultatives and N-N compounds in Japanese. In *Proceedings of WCCFL 19*. Somerville, MA: Cascadilla Press.
- Sugisaki, K. and M. Isobe (2001) What can child Japanese tell us about the syntax of scrambling? In K. Megerdooimian and L.A. Bar-el (eds.) *Proceedings of WCCFL 20*, 538-551. Somerville, MA: Cascadilla Press.
- Szabolcsi, A. (2002) *Hungarian Disjunctions and Positive Polarity*. In I. Kenesei and P. Siptar eds., *Approaches to Hungarian* 8. Budapest: Akademiai Kiado.
- Szabolcsi, A. (2004) Positive polarity – negative polarity. *atural Language and Linguistic Theory* 22, 409-452.
- Szabolcsi, A. and B. Haddican (2004) Conjunction meets negation: A study in cross-linguistic variation. *Journal of Semantics* 21/3, 219-249
- Takahashi, S. (2006) More than two quantifiers. *Natural Language Semantics* 14: 57-101.
- Takano, Y. (2003) Nominative objects in Japanese complex predicate constructions: A prolepsis analysis. *Natural Language and Linguistic Theory* 21: 779-834.

- Tenenbaum, J., & Griffiths, T. (2001). Generalization, similarity and Bayesian inference. *Behavioral and Brain Sciences* 24, 629–640.
- Tomasello, M. (2000) Do children have adult syntactic competence? *Cognition* 74, 209–253.
- Tomasello, M. (2003) *Constructing a Language: A Usage-Based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press.
- Trueswell, J. C., I. Sekerina, N. Hill, and M. Logrip (1999). The kindergarten-path effect: studying on-line sentence processing in young children. *Cognition* 73, 89–134.
- Ueyama, A. (1998) *Two Types of Dependency*. Ph.D. dissertation, University of Southern California.
- Watanabe, A. (2002) Feature checking and neg-factorization in negative concord. In *Proceedings of the Sophia Symposium on Negation*, Tokyo: Sophia University.
- Watanabe, A. (2004) The genesis of negative concord. *Linguistic Inquiry* 35/4, 559–612.
- Winter, Y. (1997) Choice functions and the scopal semantics of indefinites. *Linguistics and Philosophy* 20: 399-467.
- Wouden, Ton van der (1997) *Negative contexts: Collocation, polarity and multiple negation*. London: Routledge.
- Wexler, K. (1993). The subset principle is an intensional principle. In E. Reuland and W. Abraham (eds.), *Knowledge and Language: Issues in Representation and Acquisition*. Dordrecht: Kluwer. 217–239.
- Wexler, K. (2003) *Maximal trouble*. ms, MIT.
- Wexler, K. & Culicover, P. W. (1980). *Formal Principles of Language Acquisition*. Cambridge, MA: MIT Press.
- Zubizarreta, M. L. (1982) On the relationship of the lexicon and syntatx. Ph.D. dissertation, MIT.
- Zwarts, F. (1996) A hierarchy of negative expressions. in H. Wansing, ed. *Negation: A notion in focus*. Berlin: Walter de Gruyter.
- Zwarts, F. (1998) Three types of polarity, in F. Hamm & E. Hinrichs eds., *Plurality and Quantification*, Kluwer.