

What Do Singular Indefinites Mean in Child English?*

Terue Nakato-Miyashita

teruenm@gmail.com

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1. Introduction

English is a language which expresses the semantic distinction between singular and plural morpho-syntactically with a determiner and a nominal head. In the sentences in (1a) and (1b), the presence/absence of the indefinite determiner *a* and the absence/presence of the plural suffix *-s* mark the singularity/plurality of articles John is looking for. Japanese, on the other hand, is a language which does not necessarily express the semantic distinction morpho-syntactically. The language does not have any indefinite determiner, and the nominal head is “underspecified” in number. It allows nominals to occur in their bare forms and the forms are ambiguous between singular and plural interpretations. Thus, the interpretations associated with (1a) and (1b) are both available with a single sentence in (1c).

- (1) a. John is looking for a linguistic article.
b. John is looking for linguistic articles. (Schmitt and Munn (2002: 191))
c. John-wa ronbun-o sagashi-te-iru.
John-Top article-Acc look-for-Pres.Prog.
i. John is looking for a linguistic article.
ii. John is looking for linguistic articles.

There is another difference between English and Japanese with respect to the form-meaning association. The mass-count distinction is realized morpho-syntactically within the nominal projection in English, but not in Japanese. In English, nominals which denote countable things (count nouns) can be affixed by a plural suffix and directly modified by numerals as in (2), while those which denote uncountable things (mass nouns) cannot be affixed by the plural suffix or directly modified by numerals as in (3). Mass nouns require some expressions to occur with numerals which turn them into countable units. In Japanese, neither countable nouns nor mass nouns can be directly modified by numerals, and both require classifiers to occur with numerals as in (4) and (5).

- (2) a. a book
b. two books
(3) a. *a water
b. *two waters
c. two bottles of water
(4) a. * ichi hon
one/a book
b. * ni hon
two book
c. ni-satsu-no hon
two-CL-Gen book

* This paper is based on Nakato-Miyashita (2011). I would like to thank the audience at the conference. I would also like to express my gratitude to Barbara Pearson, Thomas Roeper, Christopher Tancredi, Akira Watanabe and anonymous reviewers for their helpful comments and suggestions. Needless to say, all remaining errors are my own.

- (5) a. * ichi mizu
 one/a water
 b. * ni mizu
 two water
 c. ni-hai-no mizu
 two-CL-Gen water

If we confine our attention to these examples, the form-meaning association is more transparent in English than in Japanese. However, the association is not so straightforward. For example, when an indefinite singular noun is used with a plural subject as in (6), the sentence becomes ambiguous with respect to the number of entities denoted by the object. It can give a collective interpretation, where the students are looking for a single article together, and a distributive interpretation, where the students are each looking for one article and the number of articles corresponds to the number of the students.

- (6) The students are looking for a linguistic article. (Schmitt and Munn (2002: 191))

Similar ambiguity arises when a bare plural is used with a plural subject as in (7).¹ (7) can give a collective interpretation, where the students are looking for specific articles together, and distributive interpretations where the students are each looking for one linguistic article and where the students are each looking for two or more articles.

- (7) The students are looking for linguistic articles. (Schmitt and Munn (2002: 191))

In these examples, the syntactic number does not necessarily correspond to semantic number of entities denoted by the object. Under the distributive interpretation of (6), the total number of articles is not singular, and under the first distributive interpretation of (7), the number of articles each student is looking for is not plural.

There is still another case where the syntactic number does not correspond to semantic number in a strict sense. A sentence with a singular indefinite can give a generic interpretation. For example, (8a) does not necessarily mean “there is one dog and that dog barks.” It can be interpreted as a statement about dogs in general, which has the same interpretation as (8b).

- (8) a. A dog barks.
 b. Dogs bark.

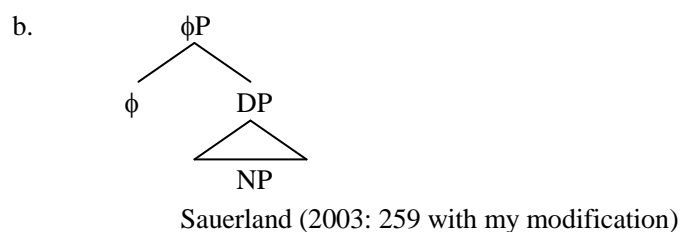
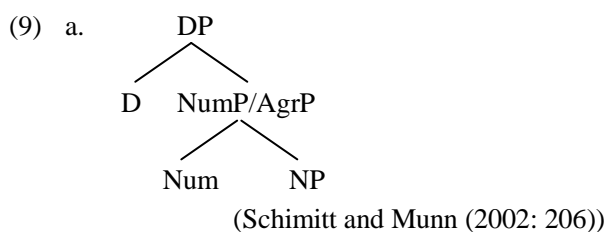
Given the cross-linguistic variation and the complexity behind the interpretation of number morphology in English, questions arise as to how nominals are given semantic interpretations and how children acquire the form-meaning association in their languages. How much is given as universal properties and how much is learned on the basis of language-specific evidence? How do English-learning children attain fully adult-like knowledge about the interpretation of number morphology despite the disadvantage that the form-meaning association they can use as language-specific evidence is not consistent? As a first step to answer these questions, Nakato-Miyashita (2011) conducted an experiment which investigated English children’s comprehension of number morphology by employing two different methods: one was a picture identification task and the other was an act out task. It found

¹ Indefinite singular and bare plural nouns differ in their scope-taking properties. Indefinite singulars can take both wide and narrow scope, while bare plurals can take only narrow scope. Thus (1a) is ambiguous in the specificity of the object; in one reading, John is looking for a “specific” article, while in other reading, John is looking for any article whose topic is linguistics. Such a specific reading is not possible with (1b). Interestingly, when a bare plural is used with a plural subject, it behaves like an indefinite and the reading which is not possible in (1b) becomes available in (7) (Partee (1985)): the wide scope reading of the object noun, which is one instance of a collective reading.

that children's interpretation of indefinite nouns was more strongly biased by their pragmatic knowledge about the head nouns than by the number morphology on them. However, it did not give a discussion with respect to what kind of semantic/pragmatic principles are responsible for that.

Focusing on the results from Nakato-Miyashita's (2011) picture identification task, this paper discusses the issue from the view-point of the semantics of root forms of nouns (henceforth root nouns), projections where the number morphology on nominals is given an interpretation, and parameters associated with the projections. Various proposals have been made with respect to the syntax and semantics of number-marking (e.g. Carlson (1977), Link (1983), Chierchia (1998), Schmitt and Munn (2002), Sauerland (2003), Sauerland et al. (2005), Spector (2007), Bale et al. (2011) among others). Taking the cross-linguistic variation into consideration, Chierchia (1998) argues that the semantics associated with root nouns is parameterized and that a mass/kind semantics is given as a default value. With respect to the semantics of count nouns, two major analyses have been proposed and previous studies have tried to develop either analysis. One analysis assumes that root nouns are associated with a singular semantics and that plural markers map the singular semantics of root forms into a plural semantics (e.g. Link (1983), Chierchia (1998)). The other analysis assumes that root nouns are associated with a plural semantics and that singular markers map the plural semantics of root forms into a singular semantics (e.g. Sauerland (2003), Sauerland et al. (2005)).

The analyses on the structure within nominal projections have also undergone a lot of modifications (Longobardi (2001), Schmitt and Munn (2002), Harbor (2003), Watanabe (2006, 2009) among others). Putting aside the differences in hierarchical positioning of functional heads and notations used for them, the majority of current syntactic literature assume that a noun phrase (henceforth NP) has extended functional projections such as a determiner phrase, a number phrase, and an agreement phrase (henceforth DP, NumP, and AgrP, respectively). Another shared assumption is that a projection which is associated with number is included in the extended projections above NP. For example, Schmitt and Munn (2002) assume the structure in (9a), where NumP is the projection responsible for (morpho-syntactic) number-marking on nominals, and Sauerland (2003) assumes the structure in (9b), where ϕ P is the projection associated with number interpretation of nominals.



Given the dissociation between functional projections and lexical projections within a nominal projection, a natural question arises as to where number marking is semantically interpreted. One possible analysis is that number marking on a nominal head is given an interpretation at NP. The other analysis, which Sauerland (2003) and Sauerland et al. (2005) advance, is that number marking on a nominal head is given an interpretation at a functional projection higher than NP. The latter analysis naturally fits into the recent proposal on parameters (Chomsky (1995) and afterwards), which consider features associated with functional projections to be the loci of parameters. Properties associated with lexical categories are given as universal, and differences in values of features associated with functional categories are responsible for cross-linguistic variations. Given the cross-linguistic variations in morpho-syntactic realization of number-marking, for example, between English and Japanese, a natural expectation is that universal properties associated with number interpretation show up earlier than language-specific properties in child grammar.

The aim of this paper is not to give a comprehensive summary of previous proposals or to propose a fully articulated theory of the acquisition of number. As a preliminary study, this paper argues that children's responses to singular indefinites are not explained under the analysis which associates a singular semantics with root nouns. The alternative analysis which associates a plural semantics with root nouns is preferable, which supports

Chierchia's (1998) claim that English speaking children go through a stage like Japanese where all nouns are associated with a mass/kind semantics. Along the lines of current proposal on parameters mentioned above, this paper also considers a possible acquisitional process followed by English-learning children. Admitting that the proposal made here is immature and needs to be refined, this paper proposes that the feature [\pm singular] associated with a functional projection higher than NP (NumP or ϕ P) plays a crucial role in the semantics of singular indefinites, whose value English-learning children have to set on the basis of language-specific evidence.

This paper is organized as follows. Section 2 briefly summarizes Nakato-Miyashita's (2011) experiment and her tentative conclusion. Section 3 looks closely at individual data and discusses theoretical implications which the overall and individual results have from the view-point of the semantics of root nouns. Section 4 points out that the experimental findings provide an additional support for Sauerland et al.'s (2005) hypothesis on the acquisition of bare plurals. Section 5 is a conclusion.

2. Nakato-Miyashita's (2011) Experiment

2.1. Two Analyses on the Interpretation of Number

Nakato-Miyashita's (2011) experiment was motivated by two different analyses on the interpretation of number. These two analyses, which are given in (10), differ in the following two respects: the projection where plural marking is semantically interpreted and the 'markedness' of singular/plural NPs. With respect to the projection where plural marking is semantically interpreted, (10a) assumes that plural marking is semantically interpreted on NPs and the second analysis (10b) assumes that NP is number neutral and plural marking is interpreted on a projection higher than NP (NumP or ϕ P).² With respect to the semantic markedness of plural morphology, (10a) considers that morpho-syntactic markedness matches semantic markedness. It is clear that plural NPs are more marked than singular NPs from a morpho-syntactic perspective: Plurality is morphologically marked by the presence of a suffix *-s* attached to root nouns. Correspondingly, singular NPs are semantically unmarked, and the meaning of plural NPs is defined in terms of the meaning of singular NPs. (10b) takes the opposite position where morpho-syntactic markedness does not necessarily correspond to semantic markedness. From a semantic point of view, plural NPs are unmarked, and the meaning of singular NPs is stronger than that of plural NPs.

(10) a. Link (1983) among others

- i. Plural marking is semantically interpreted on NPs.
- ii. Singular NPs are neither morpho-syntactically nor semantically 'marked.'
- iii. Plural NPs are morpho-syntactically and semantically 'marked.' Their meaning is defined in terms of the meaning of a singular NP.

b. Sauerland (2003), Sauerland et al. (2005)

- i. Plural marking is not semantically interpreted on NPs. Number is interpreted at a projection higher than NP (i.e. ϕ P in their proposal).
- ii. Plural DPs are semantically 'unmarked.'
- iii. Singular DPs are semantically marked. Their meaning is strictly stronger than that of plural DPs.

Given the hierarchical structure within DP and cross-linguistic variations in DP-internal syntax, a natural question arises with respect to the acquisition of DP-internal properties. One possible assumption, which accords with the Subset Principle (Berwick (1985) among others) or grammatical conservatism (Snyder (2007) among

² Many proposals (Link (1983) among others) about the interpretation of number have been made before the proposal of DP-internal hierarchical structure. It should be noted that they are not denying in their papers the possibility for number morphology to be interpreted at a projection higher than NP. We take their proposal as one possible analysis within the current framework, but we would like to emphasize that it is our hypothetical analysis.

others) and the current proposal about parameters mentioned above, is that children start with the smallest projection(s) and extend projections based on language-specific evidence (Economy of Representation (de Villiers and Roeper (1995), Pérez-Leroux and Roeper (1999))). The smallest projection under discussion is NP, which is a lexical category and considered to be associated with a universal property of language.³ Language-specific properties should be derived as a result of differences in feature-values in functional categories, which children have to set based on language-specific evidence available to them.

Assuming that children's initial grammar starts with the smallest projection, namely NP, the two analyses of adult grammar provide us with two hypotheses on the acquisition of number interpretation as in (11). If plural morphology is interpreted on NP, we expect that early child grammar can make the singular-plural distinction based on number morphology. If plural morphology is not interpreted on NP, on the other hand, we expect that number morphology on NP plays no role in early child grammar.

- (11) a. Hypothesis 1: Number-marking *is* interpreted on NPs; hence early child grammar *does* make the singular-plural distinction based on number morphology on Ns. (cf. (10a))
b. Hypothesis 2: Number-marking *is not* interpreted on NPs; hence early child grammar *does not* make the singular-plural distinction based on number morphology on Ns. (cf. (10b))

In order to see how much semantic contribution number morphology makes in child grammar, Nakato-Miyashita (2011) conducted an experiment. Her experiment employs two different tasks: one is a picture identification task, where children's comprehension of singular indefinites was investigated; the other is an act out task, where children's comprehension of singular indefinites and plural indefinites was explored. The following section reviews the procedure and results of items for the picture-identification task.

2.2. Children's Comprehension of Singular Indefinites: The Picture-Identification Task

2.2.1. Procedure, Subjects and Experimental Conditions

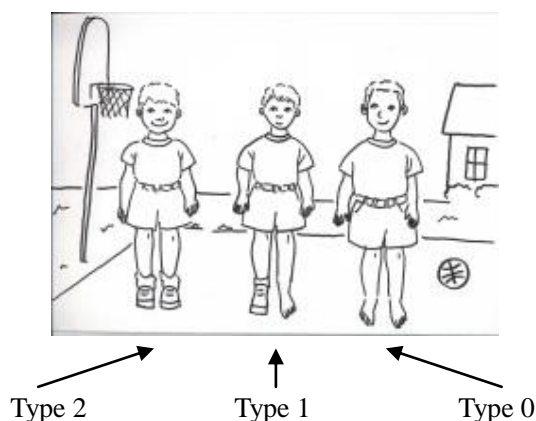
This experiment was intended to see when children start to interpret an indefinite singular object based on number morphology on N. It set up the following two conditions: a many-to-one condition, which was the main target of this experiment, and a one-to-one condition, which was included as a comparison group. They are exemplified in (12).

- (12) a. Many-to-one Condition:

Description: Three boys are playing in the yard. One has shoes on, another has a shoe, and the other has no shoes. Someone needs **a shoe**.

Question: Who needs a shoe?

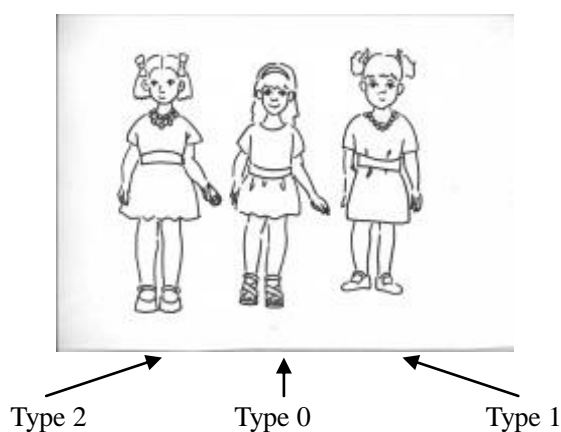
³ In the most current theory, a lexical category itself is not assumed to be a primitive. It is determined after each lexical item is inserted into a syntactic derivation. See Chomsky (2007) for detail.



b. One-to-one Condition:

Description: Three girls are dressing up for a party and putting on jewels. One has necklaces, another has a necklace, and the other has no necklaces. Someone needs **a necklace**.

Question: Who needs a necklace?



In the many-to-one condition, nouns which are biased toward the “plural” interpretation were used as the object. For example, in (12a) the noun ‘shoe’ was used. Our knowledge about ‘shoe’ tells us that people normally wear a pair of shoes and the word itself is normally used in its plural form. In the one-to-one condition, nouns which do not have such a bias were used. For example, in (12b) the noun ‘necklace’ was used. Our knowledge about ‘necklace’ doesn’t presuppose that it has to be used in a pair, although it is possible for a person to wear more than one necklace. In this experiment, children were shown a picture with three people. The people differed in the number of items they wore. For example, in (12a) the leftmost boy has a pair of shoes, the middle one has one shoe, and the rightmost one has no shoes. After listening to a description about the picture, children were asked to answer the question with an indefinite singular noun, “Who needs *a* ...?,” by pointing to the person/people. The pointing to the person who wears only one item under the many-to-one condition is considered as a strong evidence for singular interpretation, because in order to give that response, one has to consciously assign “exactly one” interpretations to singular indefinites. Adults have a better way to say, for example, if they intend to refer to the person without any shoes: “Who needs (a pair of) shoes?” The use of a singular indefinite has a strong implication that the speaker uses that form in order to specify the person who had only one shoe.

The expected responses under each hypothesis in (12) are given as follows.

- (13) a. If children *do* make the singular-plural distinction based on number morphology on NP, children can use the absence of a plural suffix as indicating that the NP does not give a plural interpretation. If children associate the absence of the suffix and the presence of the indefinite determiner ‘a’ as singular interpretation, they will choose a person who wears only one item (type 1 response) for the many-to-one condition.

- b. If children *do not* make the singular-plural distinction based on number morphology on NP, the absence of a plural suffix does not tell anything about the interpretation of the NP. In addition, if ‘a’ does not mean ‘one’ in their grammar, their answer may vary for the many-to-one condition. They might choose a person with only one item (type 1 response), a person without any item (type 0 response), or both (type 0 & type 1).
- c. If semantic/pragmatic knowledge about nouns plays no role in children’s interpretation, no difference will be observed between the many-to-one condition and the one-to-one condition.
- d. If semantic/pragmatic knowledge about nouns does play a role in children’s interpretation, some difference will be observed between the many-to-one condition and the one-to-one condition.
- e. No children will choose the person who wears two items (type 2 response) for either condition.

Three items per condition were given, and in total six target items were given. ‘Ski pole’ and ‘glove’ were used for the many-to-one condition and ‘bracelet’ and ‘ring’ were used for the one-to-one condition.

Thirty mono-lingual English-speaking children participated in this experiment, but the data from four of them was not included because of the following reasons: one seemed to have difficulty in understanding words used in the experiment; another two had a problem with two or three out of six filler items; the other did not pass the practice session, which was intended to familiarize the children with their task. The data from the remaining twenty-six children, whose age-range was from 3 to 6 (six 3-year-olds, seven 4-year-olds, eight 5-year-olds, and five 6-year-olds), were included in the results.⁴ The experiment was individually conducted in a quiet room at a nursery/elementary school. One of the experimenters, who is a native speaker of English, told stories and asked questions to children. Children’s responses were written down by the other experimenter and video-taped if permission was given. Three adult native speakers were informally asked to do the same task as the children.

2.2.2. Results

The percentages of each response-type by the children and adults are given in Tables 1 and 2. No children or adults gave type 2 responses to either condition. The adults consistently gave type 0 responses to the one-to-one condition and type 1 responses to the many-to-one condition. The children gave more consistent responses to the one-to-one condition than to the many-to-one condition (see Table 1). As expected, most of them gave only type 0 responses. Only a few gave type 1 responses (8 out of 78 responses). No one gave multiple choices (type 0 & type 1). The rate at which they gave only type 0 responses reached a peak of 100% at the age of 5. Children’s responses to the many-to-one condition were not so consistent as the one-to-one condition (see Table 2). Children gave type 1 and type 0 & type 1 responses more often under this condition. The percentage of type 1 responses stayed lower than that of type 0 until the age of 5, and at that age it reached its lowest point. As we observed in the one-to-one condition, the percentage of the children who gave type 0 responses reached a peak at the age of 5.

Table 1: Percentage of Each Response-type: One-to-one Condition

⁴ I would like to express my sincere gratitude to teachers and students at the Center for Early Education and Care at University of Massachusetts, Amherst and Sunderland Elementary School in Sunderland, MA. My thanks also go to my research assistants, who helped me conduct the experiments.

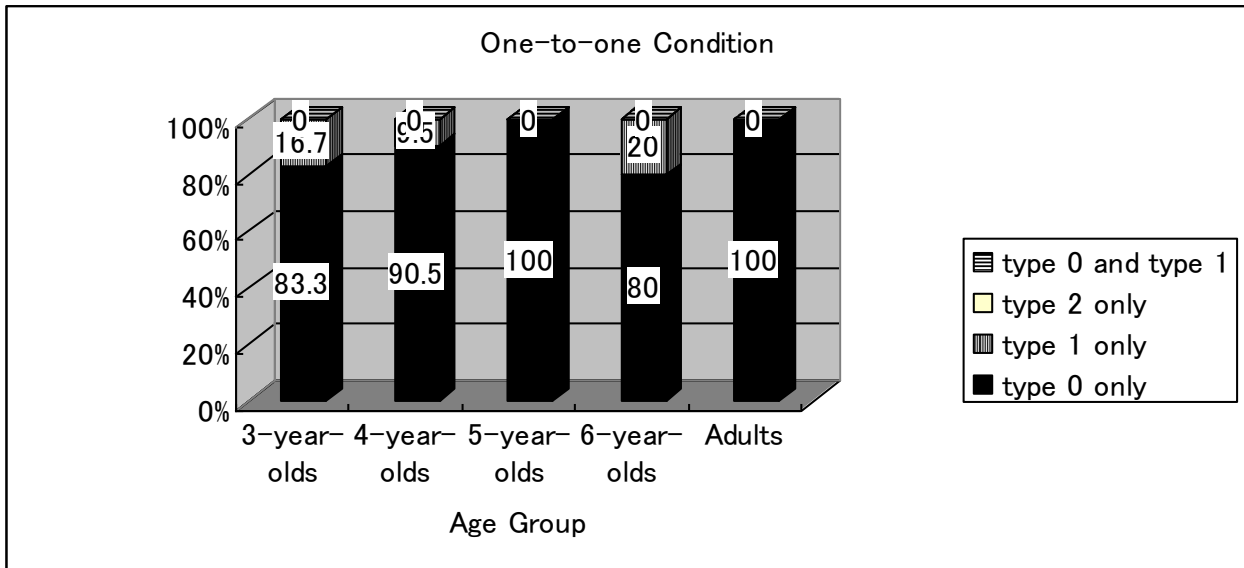
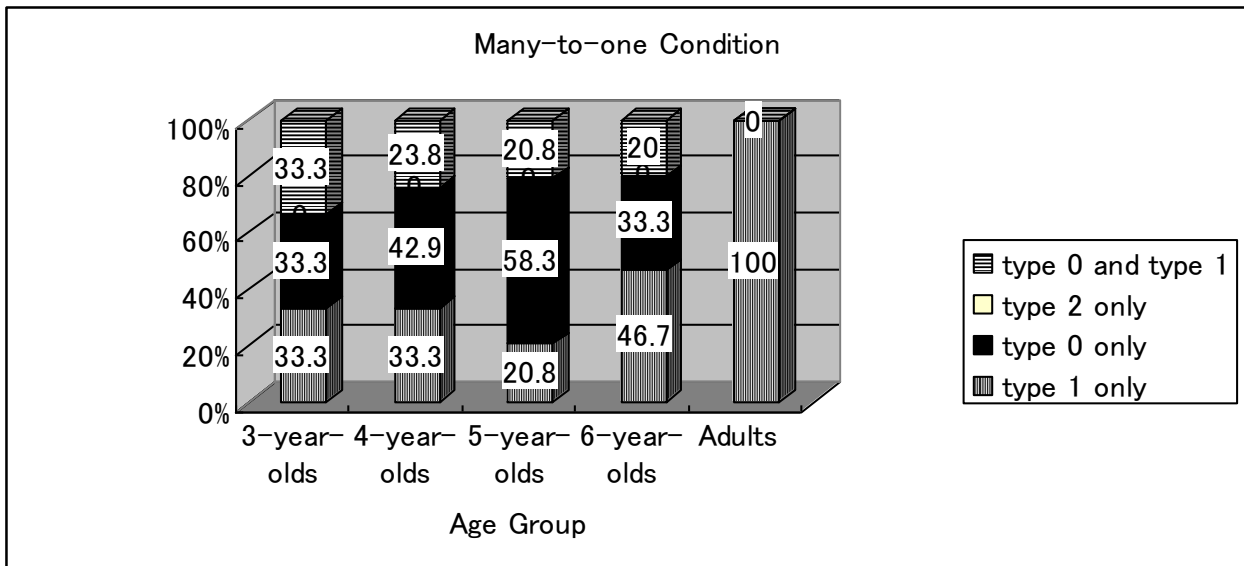


Table 2: Percentage of Each Response-type: Many-to-one Condition



Providing these overall results, Nakato-Miyashita (2011) argued that the predictions (13b) and (13d) were borne out: children did not make a singular-plural distinction (solely) based on the number morphology on nouns; rather, their interpretation of nouns was biased by their pragmatic knowledge about the nouns. The tentative conclusion reached was that hypothesis 2 in (11b) and the background theoretical assumptions in (10b) were preferable.

3. Discussion: Individual Data Analysis and Theoretical Implications of the Results

The previous section has provided the group analysis of the experimental results. Given the results, the following questions arise.

- (14) a. Is there any possibility that children just overlooked the number markers (the presence of the indefinite article and the absence of number morphology on N) and just responded randomly?

- b. Children’s response patterns never reached an adult-like level even at the age of 6 in the many-to-one condition. If children did not respond randomly, what is responsible for their non-adultlike responses?
- c. How do children attain fully adult-like grammar for the interpretation of singular indefinites?⁵

In order to answer these questions, closer investigation of the results is required. This section addresses these questions, providing individual data analysis.

3.1. Individual Data Analysis: Did the Children Respond Randomly?

Let us start our discussion with the first question in (14a). Is there any possibility that the children in our experiment were just unaware of the number markers on singular indefinites and responded randomly? The findings from the previous studies and the individual analysis of our data help us answer this question. Brown (1973) observed that 2-year-old children start to use the plural suffix. Kouider et al. (2006) and Wood et al. (2009) observed that younger children have difficulty in distinguishing a singleton set and a set with multiple entities when the singular-plural distinction was marked only by nominals. In their experiments, children younger than three could select a singleton set or a set with multiple entities when they were given multiple markers such as verbal morphology and quantifiers (there *are/is* and *some/a*), but could not do so when they were given only nominal morphology (the *blicket/blickets*). According to their observation, some children started to make the distinction solely based on nominal morphology at the age of 3.

Our target items lacked linguistic number markers on verbs, but had them as an indefinite determiner (*a*) and on nouns (lack of *-s*). Of course, we cannot deny the possibility that some of the children did not notice the markers, but our children were older than three: hence it would not be tenable that none of them used the morphological cues in interpretation. In fact, a closer investigation of individual children’s response patterns show that children’s responses were not just random and that most of the children followed certain strategies/rules in their grammar. Most of the children gave consistent responses within each condition and none of them gave three different responses to three items. The individual response pattern for the each condition is summarized in Tables 3 and 4.

Table 3: Number of Children for Each Response Type (One-to-one Condition)

Consistent Responses (21/26)	Mixed Responses (5/26)	
Type 0 for three items	Type 0 for two items and Type 1 for one item	Type 1 for two items and Type 0 for one item
21	2 (Child 3 (6;08), Child 31 (3;00))	3 (Child 5 (6;05), Child 19 (4;00), Child 24 (3;00))

⁵ In addition to these questions, many other questions arise about which we do not have so much to say in this paper. Among them is the following question.

(i) Children’s non-adultlike response to the many-to-one condition was most frequently observed at the age of 5 (see Table 2). Why did children’s performance get worse at that age?

Our speculation is that children start to calculate scope-interaction around the age of 5, and this might partially answer the question. Children are exposed to utterances in which an indefinite singular does not necessarily mean singular, for example, the sentence in (6) in Section 1. In such examples, syntactic number marking does not match semantic number, and children who realize that an indefinite singular can be interpreted to refer to plural entities might stick to that interpretation and over-generalize that interpretation. Over-application of a rule is quite often observed in child grammar. For example, most children undergo the stage at which they apply the morphological rule for past-regular forms to verbs with irregular past forms (cf. Pinker (1999)): Children use ‘goed’ in stead of ‘went’ for a few months after they start to use past-regular forms productively. I would like to thank Christopher Tancredi for this suggestion.

Table 4: Number of Children for Each Response Type (Many-to-one Condition)

Consistent Responses (20/26)			Mixed Responses (6/26)		
Type 0 for three items	Type 1 for three items	Type 0 & type 1 for three items	Type 0 for two items and Type 1 for one item	Type 1 for two items and type 0 for one item	Type 0 & type 1 for two items and Type 0 for one item
9	6	5	1 (Child 1 (6;04))	3 (Child 15 (4;11), Child 16 (5;00), Child 21 (4;00))	2 (Child 11 (5;02), Child 25 (4;03))

Out of the twenty-six children, twenty-one gave consistent responses to three items in the one-to-one condition (Table 3) and twenty did so in the many-to-one condition (Table 4). The twenty-one children consistently gave type 0 responses in the one-to-one condition. The response pattern for the many-to-one condition was variable across the twenty children but not within each child. Nine, six, and five children consistently gave type 0, type 1, and type 0 & type 1 responses, respectively, in the many-to-one condition. A small number of children gave mixed responses but none of them gave three different responses to three items. Five children gave mixed responses in the one-to-one condition (Table 3): two children gave two type 0 responses and one type 1 response; three children gave two type 1 responses and one type 0 response. Six children gave mixed responses in the many-to-one condition: one child gave two type 0 responses and one type 1 response; three children gave two type 1 responses and one type 0 response; the remaining two children gave two type 0 & type 1 responses and one type 0 response (Table 4).⁶ As we can tell from the two tables, the children who gave the mixed responses did not overlap between the one-to-one condition and the many-to-one condition. For example, Child 3 gave mixed responses under the one-to-one condition, but did not do so under the many-to-one condition. This also suggests that these children did not respond just randomly. Rather they followed some interpretive rules in their grammar, which seemed to fall under some limited varieties.

3.2. *What Grammar Do Children Have?: Theoretical Implications*

Now that we have shown that the children did not respond just randomly, let us turn to the questions in (14b) and (14c). What kind of rules/principles are responsible for children's non-adult like responses? And how do they attain fully adult-like knowledge about the number interpretation?

The answers to these questions follow under Chierchia's (1998) proposal on the parameters associated with distribution and interpretation of nominals and the assumption with respect to the parameters under the Minimalist Program. Under the Minimalist Program, the loci of parameters are attributed to feature values of functional projections (Chomsky (1995) and afterward). The relevant projections under discussion are NumP (or ϕ P) and DP. Universal properties are associated with NP, where nominals are given default interpretations. Chierchia (1998) argues that a default interpretation for nominals is a mass/kind interpretation, which is applied to all nominals in languages such as Japanese and Chinese. These languages have no morpho-syntactic distinction with respect to singular-plural and mass-count. Under this theory, masses and kinds are semantically similar to plurals, whose extension includes all atomic individuals (if definable) with a property denoted by the noun (such as the property of *being a book*) and groups of individuals. Adapting Chierchia's theory, we can assume that root nouns are universally number-neutral and associated with a plural semantics, which includes in the extension all atomic

⁶ Out of the six children, three gave a type 0 response to the item with "a ski pole" and a type 1 response to the item with "a glove" and "a shoe." The remaining one child gave a type 0 response to the item with "a ski pole" and a multiple response to the item with "a glove" and "a shoe." This might be an item-specific effect. Children might not be familiar with ski poles and they did not think that ski poles were usually used in a pair. If this item-specific effect is taken into consideration, the number of children who gave consistent responses in the many-to-one condition actually is not twenty but twenty four. I would like to thank Alida Davis, Barbara Partee, and Barbara Pearson for their suggestion.

individuals and non-atomic individuals consisting of the atomic individuals.⁷ For example, if there are three books in a given situation, the number neutral BOOK has the following extension. (15) includes all atomic individuals (B1, B2, B3) and all non-atomic individuals made up of these three atomic individuals (B1+B2, B1+B3, B2+B3, B1+B2+B3).

(15) [[BOOK]] = {B1, B2, B3, B1+B2, B1+B3, B2+B3, B1+B2+B3}

If children's initial grammar starts with NP, where all nominals are number-neutral (cf. (11a)), there is a good reason for children to give a wide variety of responses. The extension of nominals has singular and plural entities, and type 0 or type 0 & type 1 responses as well as type 1 responses are permissible options for the interpretation of nominals. On the other hand, if root nouns are associated with a singular semantics and if this is the default interpretation children have in their grammar (cf. (11b)), it is expected that the singular interpretation shows up most frequently among youngest children. Their responses should go consistently with type 1, whether or not they are aware of number morphology. In our results, the 3-year-olds gave a wide variety of responses, which suggests that their grammar allows the options of type 0 and type 0 & type 1 as well as type 1 as default interpretations.

Starting from number neutral NPs, English children have to associate a certain semantic function with a specific morpheme, based on language-specific evidence. Along the lines of Sauerland (2003) and Sauerland et al. (2005), we assume that singular is a marked option in semantics. Children have to set the value associated with number phrase (NumP or ϕ P) above NP into either [+singular] or [-singular].⁸ The feature [+singular], which is morphologically realized as an indefinite determiner in NumP (or DP) and as the lack of plural suffix *-s* on N, has a semantic function to pick up all singular entities from the extension of number neutral N. For example, the extension of 'a book' is formed as follows, by picking all singular entities from (15).

(16) [[a book]] = {B1, B2, B3}

For the children whose parameter has been already set to this value, the type 1 response is the only permissible option in the many-to-one condition. In order to make the association between the value [+singular] and its morpho-syntactic realization as an indefinite determiner and the lack of plural suffix, strong evidence for an "exactly one" interpretation of singular indefinites is required. As noted in Section 1, singular indefinites induce scope interaction as in (6) and allow a generic interpretation as in (8a). In these cases, the number of entities denoted by a singular indefinites is not necessarily singular. Then, it is not so surprising that 6-year-old children still have difficulty in giving an adult-like interpretation to singular indefinites.

4. An Implication for the Hypothesis on the Acquisition of Bare Plurals in English

So far we have considered what knowledge English-learning children have with respect to the acquisition of number morphology. Our experimental results have shown that children are not able to give an "exactly one" interpretation to an indefinite singular in a fully adult-like manner. This provides complementary support for the hypothesis on the acquisition of bare plurals in English. In this section, let us briefly mention that.

Sauerland et al. (2005) observed that even 6-year-old children could not give adult-like responses to a

⁷ This is the divergence from Chierchia's theory on the interpretation of count nouns. Chierchia assumes that after the parameter is set into the non-default value, count nouns and mass nouns are no longer given a uniform interpretation. With respect to the semantics of count nouns, Chierchia's theory takes the position similar to (10a). Root forms of count nouns are associated with singular semantics, and plural morphology is semantically defined as a function which takes a set of atomic individuals and returns sets of two or more individuals. Under this theory, plural nouns do not include atomic individuals in their extension. Following Krifka (1989), Sauerland (2003), Spector (2007) among others, this paper takes the position in (10b), which is preferable in explaining our data.

⁸ Sauerland (2003) proposes that the number feature associated with ϕ P has the value of [Sg] or [Pl]. Following Harbour (2007) and Watanabe (2009), this paper assumes that the values are given as [\pm singular].

above NP. We have not reached a firm conclusion about the ultimate acquisition path English children follow in order to acquire fully adult-like knowledge about number interpretation. We would like to leave the issues open and pursue them in future.

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