

# What Does it Take for Children to Link Words to Their Grammar? A Study on Learning Universal Quantification

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## Abstract

It is a matter of great wonder how children can link words with grammar and make appropriate sentences. Achieving this in a second language is equally remarkable. For example, words or phrases used to express quantification—every, all, some, none—refer to some numbers or sets of individuals/objects that do not have ready referents in the real world, unlike the referents of lexical noun phrases (NPs) such as “Rita”, “the blue book”. So, learning the meaning of quantification noun phrases (QNPs) or their scope in sentences is a complex task. In this paper, we will report a study conducted on thirty 5 to 7-year-old ESL learners' understanding of the scope of “every”. The implications of the findings for ESL teaching are briefly discussed.

## Introduction

What leads children to link words to grammar? In their mother tongue, children begin to demonstrate this link by the time they are 24 months old, when they produce two-word utterances by combining nouns and verbs. Research in language acquisition in children bears testimony to the fact that children master their first language by the age of 4 or 5 years, when linking between words and their grammar becomes quite robust. This linking, according to Brown (1973), is possible because human beings are endowed with an innate language learning capacity. This capacity allows children to link words according to the corresponding rules of grammar (word order, pluralization, tense usage, etc.), thereby lending meaning to their utterances. Alongside, children keep acquiring lexicon from the linguistic environment, they are exposed to. This process helps to increase their repertoire of vocabulary and gradually build a mental network of lexicon, and connect to relevant grammar (Gentner, 1982).

Children also learn to use complex vocabulary in a semantically appropriate manner and acceptable grammatical sentences. For instance, some vocabulary items need them to understand the logico-semantic meanings of determiners such as 'the' or quantifiers 'all' or 'none' and apply their meanings in sentences. These items are particularly difficult because they do not have ready reckoners; their logical referents are not present in the external world, unlike lexical NPs such as 'John' or 'an apple'. Establishing the links between vocabularies, their logical interpretation and application in grammar involves the working of the innate language faculty, also known as the Universal Grammar (UG) (Chomsky, 1957).

In this paper, we propose to study the development of the logico-semantic properties of specific kinds of NPs and

QNPs, and their referential interpretation. We will also study the knowledge of quantification in young ESL learners in India to understand how children establish abstract and complex links between word meaning and their grammar for which they never receive any explicit instruction.

## Quantifiers in English

In a language, there are various kinds of NPs. Of them, lexical NPs such as 'a blue chair' or 'Mr. Krishnan' have a one-to-one mapping of the form to a unique referent, namely a real object or a person in the external world. The reference is a perceptually salient feature that a child can easily extract from the environment; therefore, the acquisition of concrete nouns happens quite early in children (Gentner, 1982). Pronominal NPs, such as 'he', 'him', 'his book', fall in the second NP category, and they derive their reference from other NPs present and as understood from a discourse. Nevertheless, this category is more abstract as a child needs to attach a syntactic value of co-referencing to retrieve the actual referent of each pronominal NP from the context of its use. The third kind of NPs are quantifying NPs (QNPs). These are of two types:

Numerical quantifiers: For example:

1a. One cat has whiskers.

1b. Three cats have whiskers.

Determiner quantifiers – Such as most, many, every, each, all, none, any, a/an – that can be expressed as 1(c-d). Some examples include (Chierchia & McConnell-Ginet, 2000, pp. 113-114):

1c. Every cat has whiskers.

1d. All cats have whiskers.

In this paper, we will look at the learning of the determiner quantifier 'every'.

A QNP has two parts: the first is the quantity it denotes (e.g. all, none, a, an) and the second is the corresponding individuals or members that it refers to. What delimits the referents of the QNPs is not clear from the context. It therefore involves a cognitive understanding of the quantity that a QNP such as 'every' specifies. To understand the quantity entailed by 'every', a child must understand the concept of 'a set' or 'collection of objects', and the 'referents' to which they are bound. In other words, the quantifier can 'delimit' its referential meaning or 'scope' in a grammatical sentence. For example:

2a. Everyone likes Loren.

The semantic content of this sentence can be expressed in a truth-condition manner in (2a') as:

2a'. John likes Loren, James likes Loren, Mary likes Loren . . .

If the domain of discourse only involves these three people, then "everyone" in (2a') refers to all of them. However, if there are some additional individuals for consideration who like Loren, then such individuals would also be referred to in (2a'). Thus, understanding the meaning of QNPs such as 'all', 'every' and 'none' involves an understanding of a collection of a set of entities and sometimes of the referents present within a set. So QNPs move beyond referring to specific properties of individuals to 'generalizing a set of properties to a set of referents' (a collection of individuals). This generalizable property of QNPs is crucial to link these words to their grammar, and is a part of Universal Grammar (UG). Children acquire such words and their links to L1 grammar by the time they are three years old.

## Issues Faced by Children in Learning the Referential Meaning of 'Every'

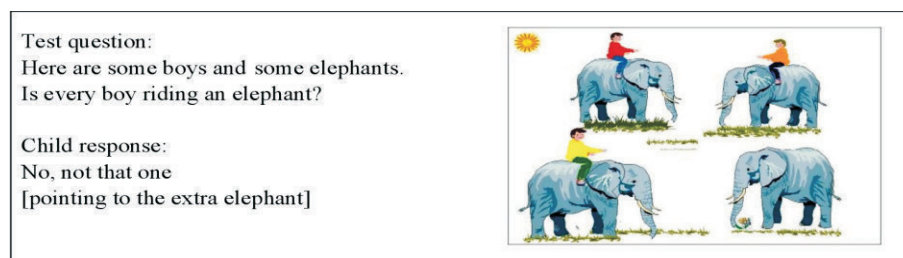
Young children's interpretation of the universal quantifier 'every' in English has been the subject of debate over the last 40 years. Children respond differently to sentences containing lexical NPs and quantifying NPs. Let us look at the following sentences to see how children interpret lexical versus quantifying NPs:

3a. John<sub>i</sub> scratches him<sub>i</sub>.

3b. Every boy<sub>i</sub> scratches him<sub>j</sub>.

Sentence (3a) requires overextending the referencing of the lexical NP 'John' to an antecedent not mentioned in the sentence. So, the lexical NP 'John' and the pronominal NP 'him' maybe interpreted by children to refer to the same individual or someone else. However, the adult interpretation is that they refer to two different individuals. Research shows that in (3b), the quantifying NP 'every boy' is not misinterpreted by children as they can distinguish between 'everyone' and 'him' to be from two different sets of individuals (Philip, 1995). An analysis of L1 quantification data (Inhelder & Piaget, 1964; Philip, 1995; Brooks & Braine, 1996; Crain & Thornton, 1998) supports the claim that children of various language backgrounds between the ages of three and five years, fail to correctly assign 'scope' to sentences with the universal quantifier 'every' (Figure 1)

Figure 1. Example item and a child's response (Crain & Thornton, 1998)



Children say 'NO' as they interpret sentences such as 'Every boy is riding an elephant' in a non-adult way. This is because when they find an extra object, in this case 'an elephant', they are not able to generalize that in the other three pictures wherever there is a boy, he is riding an elephant. So, the scope is over the event 'a boy riding an elephant'. The non-adult like interpretation is called the 'symmetrical interpretation' or a bias for a one-to-one mapping between the agent and the object. Children fail to fix the scope of 'every' across the entire event (e.g. a boy riding on an elephant) as a set.

## The Study

We examined the young ESL learners' knowledge of the universal quantifier 'every'. Following Crain and Thornton (1998), we used their unique methodology of examining the knowledge of quantification for different types of verb frames. We looked at two frames: the transitive and the intransitive frames, to answer the question: Do ESL learners correctly interpret the referential property of 'every' in transitive and intransitive constructions?

### Participants

Thirty children (16 girls, 14 boys), with the mean age of 7 years and 7 months (ranging between 5 years 5 months to 7 years 5 month) learning English as a second language participated in the study. They were enrolled in Grades I and II in two English medium schools in Hyderabad. They had Hindi, Bengali, Telugu, Kannada, Tamil and Malayalam as their L1s.

### Methodology

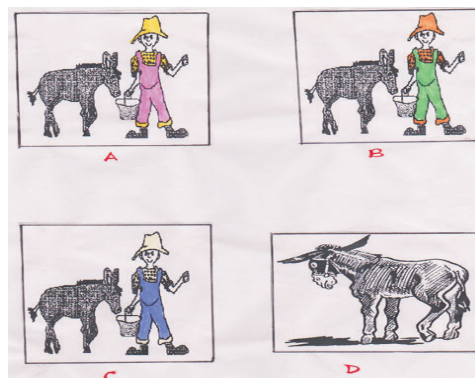
The task used to collect data was a picture based truth- value judgment task, adapted from a study by Crain and Thornton (1998). The comprehension of the scope of 'every' was tested across ten verbs (Table 1) using two frames (Figures 2 and 3)

Table 1  
*List of Verbs and Frames*

Transitive Frames	Intransitive Frames
Is every farmer <b>feeding</b> a donkey?	Is every boy <b>jogging</b> ?
Is every man <b>bathing</b> a dog?	Is every bird <b>flying</b> ?
Is every woman <b>holding</b> a baby?	Is every girl <b>drinking</b> ?
Is every hunter <b>riding</b> a horse?	Is every woman <b>cooking</b> ?
Is every girl <b>walking</b> a dog?	Is every boy <b>swimming</b> ?

The students were given some cue cards. Each cue card had four panels, out of which three panels had pictures depicting actions, and the fourth panel had a picture indicating a static action with either an extra object or an extra subject condition.

Figure 2. Extra Same Object Condition



1. What do you see in the pictures?
2. Is every farmer feeding a donkey?  
[adult answer is "yes"]

Figure 3. Extra Same Agent Condition



1. What do you see in the pictures?
2. Is every farmer feeding a donkey?  
[adult answer "no"]

## Findings

The overall performance of the 30 learners on all ten instances of the use of the universal quantifier 'every' was high, with the rejection of the 'extra agent' condition: 82 per cent for transitive frames and 86 per cent for intransitive frames. Looking at this performance, it seems that all children have knowledge of the scope of quantification and do not differentiate between transitive and intransitive frames.

However, in the extra 'object' condition of transitive verbs, the accuracy of response dropped to the range of 30 per cent to 10 per cent. The incorrect response occurred when children were unable to reject the condition and say 'yes, every farmer is feeding a donkey', as the last picture has only one donkey. This gives us evidence that children are applying the rule of the symmetrical bias that is found in L1 acquisition, and therefore are not able to detect the extra 'object' condition.

Further, the performance of children across the five transitive verbs showed that the application of the scope of 'every' is differential (Figures 4 and 5):

Figure 4.

Extra Same Agent Condition

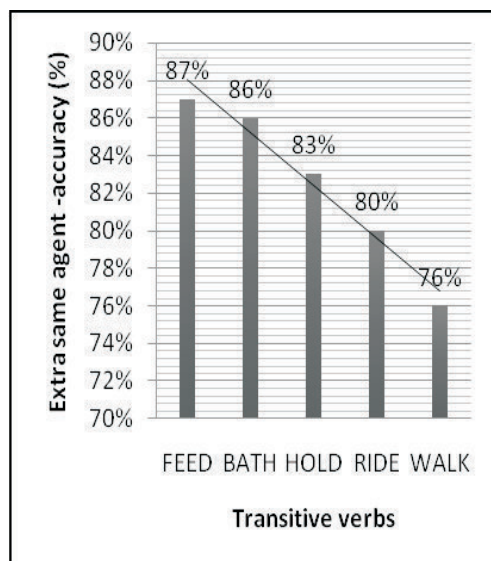
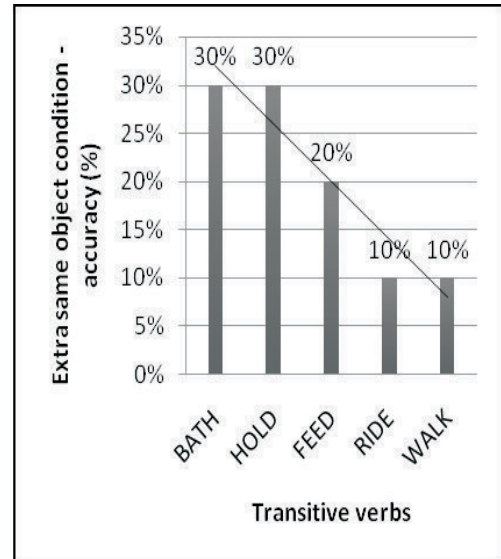


Figure 5.

Extra Same Object Condition



This finding highlights an interesting feature of the concept of quantification. The concept is tied to verb sub-types occurring in the transitive frames: verbs such as 'bath', 'hold' and 'feed' presupposes a 'patient/theme', whereas 'ride' and 'walk' are seen as unergative verbs (bodily action). This feature is conceptually available in both L1 and L2.

The responses of young ESL learners in our study indicates that they are at a stage where the referential properties of 'every' is still partial, as they are not able to interpret the extra 'object' condition. They will take more time to get the adult-like interpretation. Nevertheless, overall, the children's responses are systematic and prove that their knowledge of link words such as QNPs to their grammar is UG governed (for an advanced version of this study refer to Mukhopadhyay & Bhattacharya, 2020). Previous research on quantifiers in child language acquisition has shown that children use quantification in their spontaneous speech, not before two and a half years; and, even till five years of age, they continue to face difficulties in using sentences with quantifiers. This is because they find the interpretation of the distributive properties of quantifiers to be

very ambiguous (Philip, 1995; Brooks & Braine, 1996; Crain & Thornton, 1998). Quite naturally then, the problem of interpreting quantifiers and their scope poses a learning complexity for the second language development, even though exposure to quantification through L1 is early. So, research on English speaking children and ESL child learners reveals that quantification and its application to sentences is a challenging issue.

## Conclusion

Based on the children's learning of referential properties of 'every', we would like to propose that ESL teachers consider

ways of building on the knowledge of this category of vocabulary, with its complex links between word meaning and grammar. To this end, they can focus on teaching grammar and the meaning of quantification in a contextualized manner. They can also design picture-based tasks and short story-based tasks to draw children's attention to the referential properties of quantifiers in an interesting and interactive manner. Task-based learning will be useful for concept learning and solving math word problems. Overall, drawing links between the meaning of phrases and their grammatical features make for an exciting area of exploration in the SL learning context.

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