Journal of Applied Linguistics and Language Research
Volume 7, Issue 2, 2020, pp. 57-78
Available online at www.jallr.com
ISSN: 2376-760X

What Does ‘*every*’ Mean to Young ESL Learners?

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Abstract

Investigation of sentences that have multiple quantifications like the ones with a combination of a universal quantifier *every* preceding an existential quantifier *a/an* (e.g., *Every boy is on a tractor*) have led to qualitatively different conclusions about children’s linguistic knowledge. This study with young Indian ESL learners was undertaken to understand their knowledge on one universal quantifier *every* in combination with the existential quantifier ‘a/an’ in sentential context. A picture-based truth-value judgment task was used to ascertain knowledge of abstract generalizations quantifying expressions hold over objects and the properties they refer to (Chierchia & Ginet, 2000). Picture cues were constructed to make the task felicitous and fulfill ‘Condition of Plausible Dissent’ (Crain et al. 1996)[1]. The findings suggest that children’s knowledge of *every* runs deep and shows the positive impact of task conditions on generating almost adult-like interpretations. In other words, the findings reveal that even at early stages of second language acquisition, as long as the sentences are presented in felicitous contexts with picture support, children’s interpretation of multiple quantifications appears to be UG governed. A pedagogical implication of this study would be that if young ESL/EFL learners show knowledge of interpretation of quantifiers in English, then their ability to mathematize or compute numerical figures would be easy to achieve in word problems. Therefore, if teachers use contextually rich tasks to help learners notice and arrive at multiple interpretations of quantifiers as presented through different syntactic combinations, then the learnability issue of multiple interpretations of quantifiers would be well addressed.

Keywords: second language acquisition, universal quantification, task felicity, condition of plausible dissent, scope, ambiguity, Universal Grammar

INTRODUCTION

In both L1 and L2 acquisition contexts, children have been found to exhibit a noun advantage (Gentner 1982, Vijaya 2004) followed by acquisition of verbs, especially action

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[1] Crain et al (1996) in a truth value judgment task found non-adult like responses in children with a preference one-to-one or symmetrical or event mapping, i.e., every has scope over the event: [Every [boy is on a tractor]] rather than the head noun [[Every boy] is on a tractor].

words. Alongside the development of linguistic concepts, they also learn quantification as having numerical value (e.g. *one, ten, hundred*) and their role as linguistic markers (e.g. *some, any, all, every*). While the former always has a unique reference (e.g. *one, two, three* and so on), the later receives its meaning in the context of its occurrence and is therefore bound to the syntax of its occurrence:

1a. <u>One</u> boy was found absent in the class.

[unique singular referent]

b. <u>A group of</u> boys participated in the school campaign.

[plural referent of a set of boys]

c. <u>Every</u> boy wanted to participate in the school campaign.

[referent of all the boys in a group]

d. <u>Every</u> boy received <u>a</u> book on Indian architecture.

[referent of all in a group with collective and distributive meaning]

Therefore, a set of combinatorial properties underlying the linguistic quantifiers ascertain their interpretation of a referent as an individual or a set of individuals, and which prepositions and/or articles and adjectives they can combine with to make well-formed utterances in English (Jackendoff, 1968). Thus, quantifiers express numeracy (*a/many*), sets (*a group of/none*), definitiveness (*a man/ the group of men*) and plurality (*each/ every*) as word/phrase level concepts. In addition to these features, they are also governed by different complementation rules (*a group of men/*some of men/some of the men*) and interpretations based on their occurrences in different sentences and the variables they bind.

A word-to-world mapping (Gleitman et al., 2005) in the case of quantifiers pose a complex learning issue for children and has been an area of rigorous enquiry in both L1 and L2 acquisition and cross-linguistic investigations (Katsos et al., 2016). In this paper we examine the learning issues underlying the acquisition of multiple interpretations of a universal quantifier 'every' because it has a significant impact on language as well as math learning in ESL children in primary grades.

ESL children in primary grades, in fact right from grade one, come across linguistic quantifiers such as *all, every, none, some* and so on in their math lessons and other subjects. Their onset of learning of number words and quantifiers is about the same age as 2 years in case of L1 acquisition, though quantifiers are more abstract because they refer to a set of individuals and their specific meaning are learned from their syntactic context of occurrences. So, these quantifiers not only express numeracy but a host of other grammatical properties that often give rise to multiple interpretations of one quantifier based on its occurrences in different sentences. Children may come across such quantifiers with multiple meanings as part of solving word problems and therefore this poses a learning complexity for young ESL/EFL learners. These linguistic terms and their attendant grammatical properties have to be understood correctly to carry out mathematical tasks that involve computations such as addition, subtraction, multiplication, division and so on. Hence, in this paper we report a study on five to seven-year old knowledge of multiple interpretations of 'every' and look at what guides their knowledge of this universal quantifier.

L1 ACQUISITION OF QUANTIFICATION & LEARNABILITY ISSUES

Quantification as a phenomenon is observed quite early in native children's speech – as early as 1;10 years, but till about the age of five years they yet do not master it. At initial stages, they appear to be capable of comprehending properties of quantifying expressions partially when applying the generalizable properties of such expressions. The generalizable property of quantifiers is an abstract concept as it encompasses set(s) of entities having a definite set of properties and not just the specific individuals they determine. This is in contrast to the case of lexical or pronominal NPs, both of which usually have a unique referent - either present in the external world for lexical NPs (e.g. *John$_{NP1}$ gave a ring$_{NP2}$ to Mary$_{NP3}$*.) or can be contextually retrieved in the case of pronominal NPs (e.g. *John$_{NP1}$ gave his$_{NP1/NP2}$ book to Mary$_{NP3}$.*).

Quantifying NPs (QNPs) are a third category of NPs like *most*, *many*, *every, each, none*, *any, a/an* and can be expressed as:

2 a. Three cats have whiskers.

b. Most cats have whiskers.

c. Many cats have whiskers.

d. Every cat has whiskers.

e. One cat has whiskers.

QNPs expresses quantification through words or phrases which specify quantity or amount. They either precede nouns (as determiners) or stand on their own (pronoun):

Table 1. determiners and pronouns

Determiners	Pronouns
3a. Every man loves Mary.	3d. Everyone likes Mary.
3b. All students are busy.	3e. Someone is hungry.
3c. None of the children are crying.	3f. No one is crying.

A QNP has two parts: one is the quantity they denote (e.g., *all, none, a/an*) and the second is their corresponding individuals or members they refer to or its generalizable property of referencing. A complexity entailed in understanding QNPs is that their referents cannot be retrieved as easily as of lexical NPs and pronominal NPs as they are not present in the external world directly. The referents have to be generalized from their contexts of use as is presented below:

4a. *Everyone likes Loren*.

The semantic content of this sentence can be expressed in a truth-condition manner in (4a`) as:

4a`. *Loren likes Loren, James likes Loren, Mary likes Loren …*

If the domain of discourse only involves these three people, then 'everyone' in (4a) refers to all of them. However, if there are some additional individuals for consideration, then such individuals would also be referred to in (4a) who like Loren. So QNPs move beyond referring to specific properties of individuals to expressing *generalized* properties of referents. In a language, this generalizability yielded by QNPs is an extremely powerful logico-semantic concept absent in any other NP categories. So QNPs express

> …what *quantity* of the individuals in a given domain have a given property. The quantificational apparatus of a language is a central plank of its expressive capacity. (Chierchia & McConnell-Ginet 2000, p. 114)

Hence QNPs are a category of words/phrases that capture the expressive capacity of a language and is a very crucial aspect of child acquisition and involves an important learnability issue for children. Quantification in any language in addition to its generalizable property also refers to the binding of a variable or the NP that it qualifies and this can range over a domain of utterance/discourse. The variable becomes bound by an operator called a quantifier. In order to understand how quantification works we need to understand the '*principle of compositionality*' (Gottlob Frege, 1924). This is a second learnability issue related to the acquisition of quantifiers.

The Principle of Compositionality provides us with the most obvious way of specifying rules which tell us how to assign meanings to phrases since the fragments are infinitely large. The meanings of complex expressions are determined by the meanings of its constituent expressions and the rules used to combine them. The principle of compositionality states that in a meaningful sentence, if the lexical parts are taken out of the sentence, what remains will be the rules of composition. For example, the sentence 'Socrates was a man'. Once the meaningful lexical items are taken away—*Socrates* and *man*—what is left is the pseudo-sentence, "S was an M". The task becomes a matter of describing what is the connection between two referring expressions, S and M. So, every construct of the syntax can be associated by a clause of the T-schema such that the relationship between two or three entities is represented in a transparent manner. This representation can specify the meaning of the whole expression built from its constituents and combined by a syntactic rule. This constitutes the principle of compositionality.

In natural languages, NPs are an important way of expressing quantification. One of the major parts of what is involved in knowing the meaning of the sentence such as '*John runs*.' entails knowing the conditions under which it would be true. John is a member of a certain set, namely the set of people who run. In order to capture this, we could have a VP such as 'run'. Thus, it can be summed up as a sentence consisting of an NP followed by a VP is true just in case the individual represented by the NP is a member of the set represented by the VP. It can be said that the NP denotes an individual and the VP denotes a set. However, we cannot always say that a noun denotes an individual. For instance, the NPs like *a woman*, *every man*, *no fish* cannot denote a unique individual in the external world as 'Mr. Thomas'. A woman does not correspond to any particular individual if it is put in a sentence like '*A woman loves Bill*.' It will become true only if some woman is in the set of individuals that love Bill. In order to understand the meaning of 'a woman', one has to needs to understand the syntax especially that of the antecedent marking licensed under Principle B.

In English, universal quantifiers like *each*, *every*, *all* represent that a set of properties in a particular group is true for all the members or for the given members. It expresses that the properties will be true if they can be satisfied by every member of a domain of discourse. In other words, it is the predication of a property or relation to every member of the domain. It is usually denoted by the logical operator symbol ∀, which, when used together with a predicate variable, is called a universal quantifier ("$\forall x$", "$\forall(x)$", or sometimes by "(x)" alone). Let us try to figure out the meaning of the universal quantifiers from the following sentences:

5a. Every boy got a chocolate.

b. Each boy got a chocolate.

c. All boys got chocolates.

The above set of sentences (5a-c) make use of three universal quantifiers *every*, *each* and *all* and they all function as the subject NP in the sentences. The above sentences can be represented as:

6a. $\forall x\ (LxPy)$ ⍰ [For *every* x there is some y such that it is the case that Lx got y.]

b. $\forall x\ (LxPy)$ ⍰ [For *each* x there is some y such that it is the case that Lx got y.]

c. $\forall x\ (LxPy)$ ⍰ [For *all* x there are some y such that it is the case that Lx got y.]

So, it becomes clear from the above set of sentences that the universal quantifiers do not have a uniform representation in the discourse of its use and it is the context from which they need to derive their meaning.

ISSUES IN LEARNING A COMBINATION OF QUANTIFIERS IN SENTENCES

Children need to deal with sentences that may have multiple quantification. Are there more learnability issues involved in those cases? Let us look into this issue of acquisition of multiple quantification now.

A sentence like (7) has two quantifiers- a universal quantifier '*every*' qualifying the subject NP '*boy*' and an existential quantifier '*a*' qualifying the object NP '*woman*'. This sentence has two readings based on the generalizable property of '*every*':

(7) *Every boy*$_{NP1}$ *loves a woman*$_{NP2}$.

Reading 1: There is one boy who loves one woman and then there is a second or a third boy who loves a second or a third woman. [Every boy] loves a woman.]

Reading 2: All boys love one particular woman (e.g., Jenny). [Every [boy loves a woman.]]

These two interpretations are possible because of difference in 'scope' of generalization over sets of entities of the two quantifiers:

In the first reading, *every* takes wide scope over *a* (every> a). This is known as 'the isomorphic reading' where the universal quantifier precedes the existential quantifier. In the second reading, *a* takes wide scope over *every* (a> every). This is called 'the non-isomorphic reading' because the scope relation between *a* and *every* does not coincide with their surface or linear positions.

The change in meaning of *every*, reading 1-2, is semantically generated with the combinatorial property of the two quantifiers. Note that though *every* determines the subject NP but the scope extends over the entire event ⍰ (NP1 VP NP2): whenever there is a boy and a woman and the boy loves the woman, that set comes under the scope of *every*. So, the set that *every* extends its generalization over is not only 'a boy' BUT 'a boy loving a woman'. The scope therefore is on the causative event 'love' and this is called the event reading.

L1 ACQUISITION OF SCOPE OF QUANTIFICATION: ISSUES OF ISOMORPHISM & NON-ISOMORPHISM

One body of research on quantification acquisition, which looks at isomorphic and non-isomorphic scope, has shown that when 3;0 to 4;4-year-old children are presented with sentences like (7), they are able to access only one of the two interpretations. For instance, in a study by Musolino et al. (2000) English speaking children's knowledge of universal quantification and negation was examined through a sentence like (8).

(8) *Every horse did not jump over the fence*.

Reading One (isomorphic): None of the horses jumped over the fence.

(*every>not*)

Reading Two (non-isomorphic): There are some horses which did not jump over the fence. (*not>every*)

It was found that English-speaking children prefer the isomorphic reading.

The researchers cite two reasons to explain children's resistance to the non-isomorphic interpretation in English:

i. Children's interpretation might have been influenced by a linearity bias where the scopal relations follow the linear order in the sentence as we have seen 'reading one' of sentence (8).

ii. Alternatively, their interpretation might have been guided by a hierarchical interpretation. To understand how the hierarchical relationship holds let us look at the following example. The hierarchical relationship is built through the notion of 'c-command' and between two elements X and Y, X c-commands Y *iff*:

   a. The first branching node dominating X also dominates Y

   b. X does not dominate Y

   c. X≠Y

Let us look at c-command relationship between *every* and *not* in sentence (8).

(8) *Every horse did not jump over the fence*.

every=X, *not*=Y, *every* c-commands *not* because[2]:

IP dominates X as well as Y

X does not dominate Y

X≠Y

However, in a language like English, linearity and c-command relationship coincide and therefore it is not clear whether children choose the isomorphic reading being guided by linearity or hierarchy. The researchers provide yet another explanation that in a language like Chinese only the isomorphic reading is possible whereas English has both isomorphic and non-isomorphic readings. So the presence of non-isomorphic reading is a parametric variation: languages (like Chinese, Japanese) have a subset value (only isomorphic reading) while other languages (like English, Spanish) have a superset value (both readings) and children show preference for the subset value and later get the superset value in English (L2) with further positive evidence from the input. This is a developmental stage and UG governed.

It is interesting to note that previous research on quantifier acquisition in L1 and L2 show that children differ from adults in identifying multiple interpretations of quantifiers and the variables they bind (Brooks & Braine 1996; Crain et al 2002; DelliCarpini 2003; Hollebrandse 2006). While adults are more open to both isomorphic and non-isomorphic readings, children seem to prefer the isomorphic reading. Is this true of acquisition of 'every' and its multiple interpretations across languages? Let us attempt to understand this issue in the next section.

QUANTIFICATION INTERPRETATIONS OF EVERY: CROSS-LINGUISTIC PROPERTIES

Let us now briefly look at cross-linguistic examples to understand if in languages where two interpretations are possible, what guides children's knowledge at initial stages – is it the knowledge of linearity or hierarchy?

In study on Kannada speaking children's knowledge of quantification and negation, Lidz and Musolino (2002) examine children's preference for readings in a sentence like (9)

(9) *anoop*	*eradu kaar-u*	*toley-al-illa*
anoop	two car-s	wash-inf-neg

'Anoop didn't wash two cars'

Reading one (isomorphic): two > negation (there are two specific cars that Anoop did not wash)

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[2] In this case 'not' does not c-command the subject.

Reading two (non-isomorphic): negation > two (it is not the case that Anoop washed two cars)

Here 'two cars' (*eradu kaar-u*) linearly precedes the verb 'wash' (*toley*) plus negation (*illa*), but hierarchically, the verb plus negation is higher than the object, so the negation c-commands two but not vice versa. So assuming that negation is outside of the VP, perhaps under IP, and *two* is in the NP inside the VP, then the following is true:

If *not*=X and *two* = Y, then X c-commands Y because,

VP dominates X and also dominates Y

X does not dominate Y

X≠Y

So, from this we can deduce that though *not* does not precede *two,* but c-commands *two*. This is a case of asymmetric c-command.

Lidz and Musolino found that Kannada children access the non-isomorphic reading more easily. It indicates that children respect knowledge of hierarchy more over linearity. So, in a language like English where isomorphic reading coincides with c-command relationship, it is not clear *what* guides children's initial preference of the reading. But in a language like Kannada children's preference for the non-isomorphic reading holds because they prefer the c-command relationship, this doubt is clarified. So, children respect hierarchy when there is a conflict between linearity and hierarchy.

Likewise, in a language like Chinese where no ambiguity is present, children choose the isomorphic reading. But in languages like English and Kannada where two readings are present, it seems to be more plausible that the c-command relationship is more respected as attested by Kannada speaking children (Lidz & Musolino 2002). This is further discussed by Balusu (2010) in the case of Telugu, where the non-isomorphic reading coincides with c-command relationship: (oka>prati) and *oka* c-commands *prati* in a sentence like (10):

(10)	*neenu*	*prati*	*pillavaadiki*	*oka*	*pustakam*	*iccaanu*
	I	every	child to	one	book	gave
	(I gave a book to every child)					

Reading one: *prati>oka:* isomorphic reading (= I gave one particular book to all the children)

Reading two: *oka>prati:* non-isomorphic reading (= To each child I gave one particular book.)

To conclude, when there is a conflict between linearity and hierarchy, children seem to be guided by hierarchy and this is a UG governed pattern of acquisition.

L1 ACQUISITION OF SCOPE: ISOMORPHIC VERSUS EVENT SCOPE

A second body of extensive L1 research has explored children's knowledge of multiple quantifications in sentences that express causative events (e.g., *feed, own*) like (11).

(11) *Every farmer is feeding a donkey*.

The studies have attempted to explore children's extension of generalization property of *every* - is it on the qualifying NP or on the event underlying the verb? Let us look at brief summaries of two such seminal studies: one by Philips in 1995 and another extension and further development of his study by Crain, Thornton, Boster, Conway, Lillo-Martin, and Woodams in 1996.

Philips in his doctoral study in 1995 examined 4 to 5-year-old children's knowledge of generalization property of *every* i.e., its scope in sentences as (12). He used a picture panel as given in Figure 1.1 below:

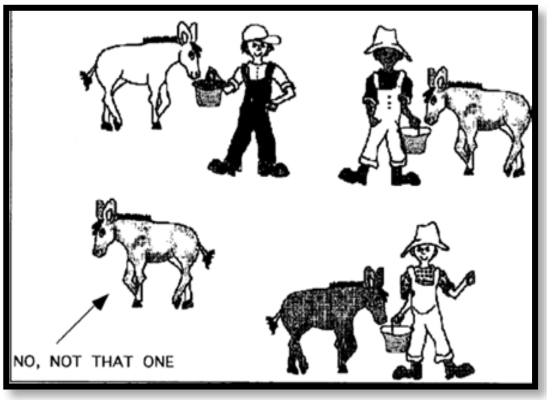

Figure 1. The farmer-donkey event of feeding

(as cited in Crain et al. 1996, p.84)

The children were asked a question like (12):

(12) *Is every farmer feeding a donkey?*

Children responded 'NO' to this question and pointed out at the 'unfed' donkey (the extra object in the four-picture panel). The reason stated for their erroneous interpretation Philips stated was because of 'a symmetrical bias'. The unfed donkey picture provides 'the extra object condition'. Note that this donkey is not involved in the event of feeding. So, wherever the event is present, in every such set one particular farmer is feeding one particular donkey. Hence going by the adult interpretation, the answer to (12) should be 'YES'. However, children give 'NO' as an answer because for them the scope is extended to *every* farmer and *every* donkey, who have to be involved in the event of feeding. As *every* donkey is not being fed by a farmer, here the unfed donkey, they give a negative answer. So, they are guided by a symmetrical bias in that the generalizable property of 'every' maps equally onto both the participants: 'farmer' and 'donkey' (or the subject NP and object NP). So, when a picture does not have 'farmer' they judge this picture to be 'no not that one' meaning - that donkey does not have a farmer feeding it.

The two readings generated for multiple quantification of *every* and *a/an* is given below:

- *Adult reading* (universal wide scope reading): for every *x*, such that *x* is a farmer, there is a *y*, such that *y* is donkey and *x* is riding *y*.
- *Symmetrical reading*: all the events that have a farmer or a donkey (or both) are events of a farmer riding a donkey.

Philips further added that children treat *every* not as a quantification determiner but like an adverb of quantification like *always*, *usually* and *seldom*. These adverbs of quantification can have scope over several indefinite NPs at the same time when there is a preceding conditional clause. For example, the adverb *always* quantifies over both indefinite NPs in the following conditional sentence.

(13) *If a farmer owns a donkey, he always feeds it*.

The domain of quantification for *always* extends to both the nominal *farmer* and *donkey* indefinitely. A formal representation of this relation can be stated as:

(14a). Quantifier	Restrictor	Scope
ALWAYS (x, y)	farmer (x), donkey (y) & *owns* (x, y)	*feeds* (x,y)

Similarly, the universal quantifier 'every' in children's symmetrical interpretation binds both the nominal, it can attach itself to as in (8b):

(14b). Quantifier	Restrictor	Nuclear Scope
EVERY (e)	[PART Farmer (e)) or PART (Donkey (e))]	Farmer-is-feeding-a-donkey (e)

'For all events *e*, in which a farmer participates OR in which a donkey participates (or both), a farmer is feeding a donkey in *e*.'

This, Philips states, gives rise to 'a symmetrical bias' expressed by children and this is a case of linguistic incompetence but is a developmental stage.

Crain et al. (1996) investigated forty-four 3-4 year old children's interpretation of multiple quantifications by using transitive (15a) and single quantification, namely *every* in intransitive frames (15b):

(15) *a. Is every farmer feeding a donkey?* (Transitive frame)

b. Is every cat waving? (Intransitive frame)

The underlying assumption was that children who are guided by a symmetrical bias should respond differently to both the frames: for the transitive question, the quantifier could have scope over more than a single nominal element (*farmer, donkey*) while for the intransitive event, the quantifier can only have scope over the nominal element *cat,* as in the unergative event *wave* there is no scope for ambiguity or extension of indefinite scope. If children prefer the symmetrical interpretation, they should produce incorrect responses (No) for the transitive frame and correct responses (Yes) for the intransitive frame.

Another addition made in the task design by Crain et al. was that both the frames had to be matched to four types of picture panels, each representing one condition:

Condition One: extra same agent

Condition Two: extra same object

Condition Three: extra different agent

Condition Four: extra different object

The extra different agent and the extra different object conditions were used to control the task interpretation. In the third and fourth pictures that showed a different agent or a different object, not part of the original event, event scope could be obtained. So, for these two pictures the children may appear to give adult-like responses. So, Crain's point is that children vacillate between wide scope and event scope responses: when event scope is ruled out by changing the participants in third and fourth pictures, children fall back on wide scope. But this is still not the adult response. So, picture cues were used to make the task felicitous by fulfilling the 'Condition of Plausible Dissent' or that the target sentences could generate both 'yes' and 'no' answers depending on the cues given.

The findings of the study show the children were found to produce significantly more adult-like 'Yes' responses to the intransitive questions, at 75% accuracy rate, than in transitive questions where only 39% responses were correct (that is say 'YES' to the extra same object condition). This proves that the symmetrical bias operates.

Now the four different task conditions that were used in the study revealed a new finding about children's knowledge of multiple quantifications: The symmetrical bias was functional in the extra same object conditions where there was an ambiguity of representation. But when the representation was controlled through 'the extra different agent' and 'the extra different object' picture panels, children assigned scope of *every* on the event and not indefinitely. It can thus be inferred that children can access the adult interpretation in controlled task conditions, which disambiguate the context through task conditions; but when they are exposed to an ambiguity of representation, they opt for the sub-set interpretation or the symmetrical isomorphic interpretation. Thus, Crain et al. (1996) attributed children's erroneous interpretation of *every* as a limitation of the task condition of the previous study and not incomplete learning.

L2 ACQUISITION OF ISOMORPHIC VERSUS EVENT SCOPE OF QUANTIFIERS

DelliCarpini (2003) carried out a study with ESL adult learners in two groups (30 low level and 30 high level of proficiency) in to language groups (Spanish as L1 and has similar superset condition as English) and (Chinese/Japanese as L1 that has a sub set condition or only the isomorphic reading available). The researcher conducted to understand if adult ESL learners have access to the native adult-like interpretation of multiple quantificational contexts as in (16) below:

(16) *Is every boy holding a balloon*?

She used a picture-based truth value judgment task and a story task to test both context-reduced and context-embedded knowledge of multiple quantifications and scope of *every*.

The findings of the study show only 3.75% ESL adult learners at the high proficiency level show symmetrical bias; and another interesting finding of the study is that the adult ESL learners from Chinese and Japanese backgrounds also show evidence of error that is L1 subset based. This helps us conclude that ESL learners, like English speaking children, are also guided by the symmetrical bias at early stages, but once their proficiency levels grow, they are able to access the 'adult-like' responses.

In the rest of the paper we report a study conducted on five to six-year-old ESL children to test their knowledge of multiple quantifications.

THE STUDY

The research we have discussed in sections 3 - 4, we have looked at two bodies of research: one where isomorphic and non-isomorphic scope of 'every' are considered in context of multiple quantifications, concluding that linearity and hierarchy conflict in English. The second body of research considers the isomorphic versus event scope and shows children's symmetrical (or event) bias in acquisition of interpretation of 'every'. In this study we only consider the latter body of research for young ESL learners and examine whether children exhibit a similar bias as in L1 acquisition and this as a case of UG governed acquisition of QNPs. Furthermore, in this study we replicate only a specific condition – the plausible dissent condition.

In our study we make use of a *picture-based truth value judgment task* with four task conditions. The task design we adapted from Crain et al. (1996) and DelliCarpini (2003). This was done to understand if the property of *every* is interpreted in accordance with task felicity conditions such that the task fulfills Crain's 'condition of plausible dissent'. The study addresses the following research question:

Is ESL learners' knowledge of scope of 'every' dependent on task conditions?

If ESL children provide positive evidence for the research question, then it will give us evidence that they are able to access UG governed generalizable properties of multiple quantifications that might not converge with adult-like grammar at initial stages of learning.

Subjects

In the study, thirty-two child ESL learners served as subjects. Children's mean age was 5;9 years (sd= 0.61, range: 5;5- 7;10) and they were in their first and second grade of formal schooling: seventeen from first grade (male = 7; female = 10) and fifteen from second grade (male = 9; female = 6). As previous research in L1 acquisition (Lidz & Musolino 2002; Balusu 2010) show that children need at least two to three years of exposure to show knowledge of multiple quantifications, for our study we chose learners who had at least two years of exposure in the target language.

The subjects were chosen from different Indo-European language backgrounds: (Hindi (11), Bengali (2), English (1)) and Dravidian language backgrounds: (Telugu (11), Kannada (3), Tamil (2) and Malyalam (2)). Though the subjects were from different L1 backgrounds, we did not study the impact of L1 learning on L2 as they were very young and knowledge of such quantifiers will be developmental in both their languages.

At the time of data collection the children were enrolled in Delhi Public School, Nacharam, in Hyderabad a city in south of India. The school is affiliated to the CBSE board of curriculum and English is the medium of instruction.

Tasks Used

The study was conducted in two phases: a screening test followed by the main test. Both the tests were done on a one-to-one basis in a quiet corner of the school from where we collected data. Each candidate took approximately 5-7 minutes in all to complete both the tests.

Screening Test

A screening test was done to determine whether children had knowledge of the meaning of *every* as having distributive and collective properties. In this task, two pictures were shown to the children and they were asked a Yes/No question pertaining to each picture.

Figure 2a. Picture used to test knowledge of distributivity

Question asked: *Is every child holding a balloon?*

Figure 2b. Picture used to test collectivity

Question asked: *Is a child holding every balloon?*

It was observed that 30 children out of the whole group of 32, cleared the screening test; so those 30 participated in the main study.

Main test

For the main test, we used a picture-based truth value judgment task with one causative event *feed*. The event had a farmer as the agent and donkey as the recipient. We used the following sentence:

(17) *Every farmer is feeding a donkey*.

We used pictures to only focus on the isomorphic reading or the distributive reading of the sentence. This one sentence had to be matched with pictures in a four-picture panel. The children had to reply which of the pictures matched with the sentence (17). The pictures were constructed carefully to fulfill 'the condition of plausible dissent' to illustrate four task conditions as in (a-d) and the corresponding panels are shown in Table 1:

a. Extra same agent condition (Picture A)
b. Extra same object condition (Picture B)
c. Extra different agent condition (Picture C)
d. Extra different object condition (Picture D)

Table 2. Picture based truth value judgment task

Task conditions	**Target sentence**	**Expected response**
 *Picture A: Extra same agent condition*	Every farmer is feeding a donkey.	No
 *Picture B: Extra same object condition*	Every farmer is feeding a donkey.	Yes
 *Picture C: Extra different agent condition*	Every farmer is feeding a donkey.	Yes
 *Picture D: Extra different object condition*	Every farmer is feeding a donkey.	Yes

Data analysis

Let us now try to understand how to analyse children's responses with regard to these four frames set up for this experiment.

- If children say NO to picture one with the extra farmer, they are like adults as they are using the universal wide scope reading: [Every farmer feeds a donkey]. But this also follows from the isomorphic approach. However, this experiment is not designed to choose between the isomorphic (wide scope) and non-isomorphic (narrow scope) readings. So children here choose the isomorphic reading of *every*.
- If children say NO to picture two with the extra donkey, then they favour a symmetrical or event reading (the unfed donkey condition) – differently from adults. As this picture does not disambiguate the event reading, children might prefer to reject the sentence as the extra donkey is not being fed.
- If children say YES to the picture with extra different agent condition (17c) and extra different object condition (17d), then it would seem that given guided task conditions children can also access adult like interpretation of universal reading of *every*. In other words, under controlled task conditions, which disambiguate the context, children are led to opt for the universal scope reading. In the absence of such conditions, they prefer the sub-set of symmetrical isomorphic interpretation as has also ben attested in the study by Crain et al (1996). However, if children reject the two frames then it would show that they are using the event interpretation of *every* as indefinite scope and not specific to the context. The extra different agent and extra different object are not part of the causative event [Every farmer is feeding a donkey.]; but in the other three pictures where the causative event is present, the sentence holds true. Children are not able to detect that when event participant(s) change(s) they are no longer a part of the set where event scope can be applied and this is a specific condition and not an indefinite truth condition.

Children's responses on the four conditions have to be analyzed in a componential manner and not as separate responses or percent scores of accuracy (or error) for each condition.

We predict that children are likely to have any one of the following responses:

Type one response: If children are guided by a non-adult like symmetrical bias (Craine 1996) or show preference for an event reading, then they would have the following responses:

NO – NO - YES – YES

17a - 17b - 17c - 17d

Type two responses: If children have adult like responses then they should have the following responses:

NO - YES- YES- YES

17a- 17b- 17c- 17d

So a correct rejection of 17a and acceptance of the other three conditions would indicate full learning of the interpretations of every as with universal scope and isomorphic or event scope.

FINDINGS & DISCUSSION

The findings based on the children's prefereces (N=30) as on each of the four pictures are presented in this section as the performance on the combination of the four frames that suggest devlopmental stages in accessing o multiple interpretations of 'every' in sentential causative context and presented through multiple quantification under four conditions:

a. Extra same agent condition (Picture A)

b. Extra same object condition (Picture B)

c. Extra different agent condition (Picture C)

d. Extra different object condition (Picture D)

It is important to mention here that since this is a study in L2 acquisition of quantification we have used only one token of 'every' under four conditions to study children's preferences for multiple interpretations as being guided by truth felicity conditions. So we do not report any advanced level statistical results but rather show through the findings of their preferences of readings across the four conditions and try to account – if this pattern is UG governed.

The grade-wise performances of the learners do show some interesting similarities and differences. To understand these trends let us refer to the section below. But we present the findings in terms of the patterns shown across the four conditions and in this the grade-wise distinction does not seem to differentiate between different levels of understanding amongst this entire group of 30 learners.

Condition-wise performances

Of the thirty subjects, we present the responses of the children in terms of their patterns of responses as codded into five types and presented across Tables 2a, 2b, 2c, 2d, and 2e. With each type of response pattern we present the frequency count and the percent count of the learners who represent each type and also what does each type indicate in terms of stage(s) of learning the meaning of *every*.

Type one response: rejected 17 (a-b) and accepted 17 (c-d): **15** children show this trend (8 in grade one and 7 in grade two)

Table 2a. Type one responses

Subjects	Picture A (extra same agent condition) Correct response: No	Picture B (extra same object condition) Correct response: Yes	Picture C (extra different agent condition) Correct response: Yes	Picture D (extra different object condition) Correct response: Yes
S2	No	No	Yes	Yes
S3	No	No	Yes	Yes
S6	No	No	Yes	Yes
S9	No	No	Yes	Yes
S11	No	No	Yes	Yes
S13	No	No	Yes	Yes
S14	No	No	Yes	Yes
S15	No	No	Yes	Yes
S16	No	No	Yes	Yes
S22	No	No	Yes	Yes
S24	No	No	Yes	Yes
S25	No	No	Yes	Yes
S27	No	No	Yes	Yes
S28	No	No	Yes	Yes
S29	No	No	Yes	Yes

Type one response is indicative of the fact that 50% of the learners across grades one and two are in the stage where they are guided by the symmetrical bias. However, when the task condition disambiguates the event reading as in the case of extra different agent and extra different object, these learners seem to access the adult like universal scope reading.

Type two responses: rejected 17 (a) and accepted 17 (b-d): **5** children in grade two show this trend

Table 2b. Type two responses

Subjects	Picture A (extra same agent condition) Correct response: No	Picture B (extra same object condition) Correct response: Yes	Picture C (extra different agent condition) Correct response: Yes	Picture D (extra different object condition) Correct response: Yes
S19	No	Yes	Yes	Yes
S20	No	Yes	Yes	Yes
S23	No	Yes	Yes	Yes
S26	No	Yes	Yes	Yes
S30	No	Yes	Yes	Yes

Type two response type is most adult like and these learners, 17% of the learners and they are all enrolled in grade two exhibit complete learning of the readings of *every*.

Type three responses: rejected all the four frames in four conditions: **4** children (three from grade one and one from grade two) show this pattern;

Table 2c. Type three responses

Subjects	Picture A (extra same agent condition)	Picture B (extra same object condition)	Picture C (extra different agent condition)	Picture D (extra different object condition)
S4	No	No	No	No
S10	No	No	No	No
S13	No	No	No	No
S18	No	No	No	No

The four learners or 13% of the learners who show the type three responses do so because they assign scope reading to *every* in an indefinite manner and when the task conditions disambiguate the event reading, they are not able to accept the frames as correct.

Type four responses:accepted all the four frames in four conditions. **4** children (two from grade one and two from grade two) show this pattern.

Table 2d. Type four responses

Subjects	Picture A (extra same agent condition) Correct response: No	Picture B (extra same object condition) Correct response: Yes	Picture C (extra different agent condition) Correct response: Yes	Picture D (extra different object condition) Correct response: Yes
S7	Yes	Yes	Yes	Yes
S8	Yes	Yes	Yes	Yes
S17	Yes	Yes	Yes	Yes
S21	Yes	Yes	Yes	Yes

The four learners or 13% of the learners who show the type four responses do so because maybe they only see the presence of causative events across the four conditions and ignore the extra picture that depict non-causative event and therefore the erroneously accept all the four conditions.

Type five responses: erroneously accepted the two frames with extra same agent and extra different agent and rejected the two frames with extra same object and extra different object conditions: **2** learners from grade one show this trend

Table 2e. Type five responses

Subjects	Picture A (extra same agent condition) Correct response: No	Picture B (extra same object condition) Correct response: Yes	Picture C (extra different agent condition) Correct response: Yes	Picture D (extra different object condition) Correct response: Yes
S1	Yes	No	Yes	No
S5	Yes	No	Yes	No

Type five responses are indicative of total lack of learning of the readings of *every*.

Type four and type five responses of learners, who comprise 20% of the participants, would require more time and exposure to acquire the complex properties of universal quantification like *every*.

Note that the type two responses or adult like responses are observed only in the case of 4 grade two learners or 17% of the total number of learners. What could be the reason for this preference at a higher grade? We look for an understanding of this preference in the section below.

Is ESL learners' knowledge of scope of 'every' dependent on task conditions?

Children who have chosen type one responses are yet at a developmental stage and show symmetrical bias in ambiguous picture context (extra same object condition) whereas children who have chosen type two responses are adult like in their responses. So the task conditions have made the task itself more felicitous whereby it can clearly distinguish between children who prefer a scope reading on the event versus the ones who show a symmetrical bias. The fact that 50% of the learners can access the universal scope reading when the task conditions guide them to do so, proves the research question to be true that: *ESL learners' knowledge of scope of 'every' is dependent on task conditions.* But this vacillation between wide scope and event scope due to task conditions is yet not like the adult responses and is an intermediate stage of development of multiple interpretations of the quantifier 'every' in a combination of an existential quantifier 'a'.

Previous research also provides evidence that children do not show adult-like knowledge of quantification of extending the scope to the event (Philip 1995; Brooks and Brain 1996 & Crain et al. 1996). This Philips argues could be because of a symmetrical bias guiding children's choice and is a developmental stage. What we have achieved through our study corroborates with Crain et al. (1996) and DelliCarpini's (2003) studies that when the context (picture cues) disambiguates, children and ESL learners choose event-based scope reading, but not otherwise. Just as DelliCarpini's study shows that adult ESL learners, with high proficiency in the language, are able to acquire the adult-like interpretation, our study shows evidence that even some 6-year-old ESL children seem to show this knowledge.

We have a further proposal for explaining children's symmetrical bias as follows. Recall in the previous section we have discussed the non-linear scope assignment of existential quantifier 'a/an' over 'every' in a sentence like:

(7) *Every boy loves a woman*.

In this the non-isomorphic reading is yielded by the scope (*a*>*every*). It may be a similar abstract operation that children use when they go by the symmetrical bias that the scope of 'every' though is on 'the farmer' and precedes it, can also be extended to 'the donkey' in a non-liner reading that: (every donkey>every farmer). But in the adult interpretation in picture contexts that support the isomorphic (distributive) reading, only (every farmer>every donkey) is permissible.

In sum, we find evidence for the research questi*on: Is ESL learners' knowledge of scope of 'every' dependent on task conditions?* to be true through the response patterns of sixty seven percent of the children who participated in our study. A half of the group continues to show the symmetrical bias reading preference but access the adult like reading under guided task conditions, though this cannot be equated with adult-like responses. Only a fifth of the older learners in grade two clearly show complete learning irrespective of the task conditions. A third of the children seem to be either guided by indefinite scope reading or erroneous acceptance or rejection of the conditions showing a total lack of understanding of the meaning of grammatical-semantic meaning of *every* and it in their case that task conditions fail to disambiguate the event reading of *every.* But this is also an example of developmental error and the readings would be acquired over time and more exposure.

Are ESL learners' interpretations UG governed?

What we can deduce at this point is that: the symmetrical bias is a UG governed constraint and works like the choice of subset condition prior to the acquisition of the superset universal scope reading is acquired. However, we need to test this proposal with respect to ESL children's L1 background and if L1-L2 create a subset-superset learnability issue and give evidence full transfer/full access model in a cross-longitudinal study.

CONCLUSION & PEDAGOGICAL IMPLICATIONS

At this point we derive from the findings of our study that child ESL learners also show sensitivity to scope knowledge of multiple interpretations of quantifications in a way that is systematic and UG governed. We would use the task of this study as a diagnostic cum screening task to examine further advanced knowledge of universal and existential quantifications across L1 and L2. The finding of this study is a preliminary investigation for us to test more properties of multiple quantifications such (i-iii) below:

(i) isomorphic versus non-isomorphic interpretation

(ii) causative versus dative event verbs

(iii) negative polarity sentences

We would thus get further evidence of children's knowledge of quantification in L1 and L2 as cognitive and linguistic concepts.

In conclusion, the findings of our study seem to suggest that children's knowledge of *every* runs deep and shows the positive impact of task conditions on generating appropriate interpretation. In other words, the findings reveal that even at the earliest stages of second language acquisition, as long as the sentences are presented in felicitous contexts with picture support, children's interpretation of universal quantification *every* appears to be complete in multiple quantifications contexts. A pedagogical implication of this study would be that if young ESL/EFL learners show knowledge of interpretation of quantifiers in English in sentential contexts, then their ability to mathematize or compute numerical figures would be easy to achieve in word problems.

Since previous research on quantifier acquisition in L1 and L2 show that children differ from adults in identifying multiple interpretations of quantifiers and the variables they bind (Crain et al 2002; DelliCarpini 2003; Hollebrandse 2006), this is an area of teachability and noticing that ESL and mathematics teachers in English medium instructional contexts can take up. Our research shows that acquiring knowledge of quantification is a matter of children's competence in vocabulary and grammar in an intrinsic manner and not only a matter of morpho-syntactic knowledge (Katsos et al., 2012). Therefore, if teachers use contextually rich tasks to help learners notice and arrive at multiple interpretations of quantifiers in different syntactic combinations, then the learnability issue of multiple interpretations of quantifiers would be well addressed. Alongside this, children's mathematical ability for solving word problems, which require higher-level reading, logical and cognitive skills, can also be attended. Most importantly, their performance on knowledge of multiple quantification interpretations as an assessment in math and ESL lessons, can therefore predict their success in school skills, especially language and mathematics. In addition to this assessment of meaning of quantification can be used as a novel form of assessment of intrinsic knowledge of vocabulary and grammar of ESL/EFL learners (Katsos et al, 2011) and the efficacy of such assessment in ESL and cross-linguistic contexts of bilingual education may be further explored in future empirical research.

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