The Acquisition Path of the Determiner Quantifier *Every*:
Two Kinds of Spreading

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1.0 The determiner quantifier.

According to Hale (1985) and Bach et al. (1995), adverbial quantification is universal in the world's languages, while determiner quantification is rare. The unusual status of *every* as a DP quantifier imposes a greater learnability burden for children and thus an opportunity for error as its complex syntax and semantics are analyzed and reanalyzed in the course of acquisition. It is an important step for the learner to see that *every,* unlike many other quantifiers, belongs inside the DP where certain meanings are excluded. This paper is about how the child takes that step.

1.1. The distinction between different types of spreading

In discussions of the acquisition of *every*, "quantifier spreading" has been reported by many researchers (Roeper & Matthei, 1974/75; Roeper & de Villiers, 1993; Crain et al., 1996; Philip, 1995, 2004; Drozd 1996, 2001, 2005 among others). The expression refers to the phenomenon, demonstrated in a variety of experiments, of children allowing a quantifier like *every* to apply to two separate noun phrases in a sentence rather than one. For instance, in a scenario like Figure 1, children are asked the following question:

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(Insert figure 1 – test item – around here.)

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(1)   *Is every girl riding a bike? => no, not this bike)*

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Children, in half a dozen languages, respond "not this bike" pointing to the extra bike. The *every* modifying *girl* seems to have "spread" to modify the mentioned object *, instead of "a bike," every bike*. Using a neutral, descriptive term, we will call it "mentioned object spreading" (MOS).

New research highlights a related phenomenon, another kind of spreading that contrasts with MOS. In the second kind of spreading there is an extra pair of objects – neither mentioned – but involved in a common activity. For the scenario in Figure 2, many children will say "no, not the dog" referring to the unmentioned eating activity in this scenario:

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Insert figure 2 – control-yes item – around here.

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(2)   *Is every rabbit eating a carrot => no, not the dog and/or bone)*

This kind of spreading, Un-Mentioned Object Spreading (UMOS), appears to involve a quantification over a set of events or situations, rather than over participants in events. (I.e. "Every event is an event of a rabbit eating a carrot.") It can be captured by an adverbial paraphrase:

(3)   It is always the case that a rabbit is eating a carrot.

Philip (1995) observed this kind of response among his subjects, and differentiated a group of "perfectionist" children from a larger group of spreaders of the MOS type (p. 161), but the perfectionist (or UMOS) response was not a focus of his analysis. More recently, Guerts (2001:2-3), calling UMOS his "Type-C" error, noted that "there is little in the way of systematic data on this category," but "such evidence as is available suggests that [these] errors are much rarer and less persistent than others." He calls for more empirical data, and exploration of "the influence of the collective/distributive distinction (*all* versus *every* and *each)*, and the longitudinal dimension of error patterns."

In a study designed to replicate Philip's experiment and explore developmental patterns with another and larger population, the perfectionist response emerged as more widespread than in Philip's work, and it was seen to persist until a later age than previously observed. It seems therefore that it is an important pattern to consider, and it merits an analysis of how it arises and what is required for the child to go beyond it.

To summarize, we distinguish Un-mentioned object spreading (UMOS) from Mentioned object spreading (MOS). In the latter, there is a mentioned extra object (a bike), but no overt event, while in the former, there is another event, but neither of the objects participating in the other event has been mentioned (dog/bone). Children who do UMOS generally do MOS as well, but MOS has been defined as occurring without UMOS. In this paper, we provide empirical evidence that bears on the longitudinal

dimension of the phenomena and as Guerts suggests, we explore the influence of the collective/distributive distinction on *every* and related quantifiers.

Our fundamental claims are that UMO-spreading is distinct from MO-spreading, and that there is an <u>acquisition path</u> involving both syntactic and semantic reanalysis to go from "UMOS+MOS" (where MOS is a subset of the semantic representation needed to capture the broader UMOS), to MOS-only, and to the adult grammar. Our basic question is what shift in representation would exclude UMOS and maintain MOS-only? Then, what further representational shift will exclude MOS as well and allow the child to arrive at the adult construal of the quantifier?

1.2 Overview of the literature

Spreading errors in general have been a topic of great interest since they were brought to our attention by Piaget several decades ago (Inhelder & Piaget, 1964). There has been little agreement, however, about the nature of the explanation best suited for them. Are they a cognitive phenomenon or more narrowly linguistic? Within linguistics, semantic, syntactic, and pragmatic explanations have been pursued.

Initially, children's apparent errors were thought to indicate a failure of their reasoning with conservation, a cognitive deficit (Inhelder and Piaget, 1964), a theme echoed by Donaldson (Donaldson & Lloyd, 1974). Then, Roeper and Matthei (1974/1975) proposed a syntactic analysis. They observed that the quantifiers *all*, *some*, and *every* behaved like adverbs and proposed that children allowed quantifiers to "spread" to two adverb positions in the syntactic tree. They argued that spreading errors arose because of the child's incomplete syntactic analysis. At the time, they had no mechanism within linguistic theory to account for such a proposal, so they did not pursue the argument until many years later (Roeper & de Villiers, 1993) when they included it in discussions of the acquisition of bound variables more generally.

Philip (1995) took up the discussion in a semantic framework. His pioneering empirical and theoretical study was the first to analyze classic quantifier spreading in terms of event semantics. Basically, his account focused on the child's interpretation of the domain of the quantifier with respect to the verb phrase of the sentence. His analysis has since been supported by work in six different languages (Philip, 1996, 1998, 2003, 2004) Guerts (2001, 2003) also seeks to explain the spreading facts within semantics, in his case with domain restrictions. There are yet other semantic analyses of *every* using situation or event semantic frameworks (e.g. von Fintel, 1994). These studies would seem to suggest that children could easily mistake a determiner quantifier for an adverbial one.

Both syntactic and semantic accounts were rejected by Crain and his colleagues as inadequate explanations of children's errors on these sentences. Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams (1996) claim children's quantifier interpretations are adult-like, but that the pragmatic conditions under which spreading is elicited are not felicitous. In several experiments, they showed that children who made spreading errors in truth-value judgment tasks like Philip's made almost no errors when the pragmatic conditions of the task were varied. They proposed, in particular that one needed to use

scenarios that presented the child with the scene in question and another that differed so the child could plausibly dissent.

There have been several methodological challenges to Crain's concept of Plausible Dissent (see Sugisaki & Isobe, 2001). More recently Brooks (in press) points out that Crain's protocol provides children with information that highlights the people and objects in the domain of the quantifier, so they have lessened the difficulty of determining its proper domain. In a series of experiments, Brooks and colleagues have specifically provided the conditions for plausible dissent and shown spreading effects with them nonetheless (1996, 200xx, in press), and Drozd's review shows internal consistencies of the approach (2003xx).

More recently Philip (2004) re-evaluated his event quantification account and found greater evidence for another pragmatic account, a modified version of the presuppositional accounts of Drozd and van Loosbroek (1999), which he calls the Relevance Account. While Philip specifically excludes the perfectionist response (UMOS) in this comparison (p. 5), he nonetheless leaves the door open for children's partial knowledge of adult grammatical constraints to explain at least some of the facts not captured by Relevance (p. 40).

The syntactic nature of spreading errors is highlighted in L2 acquisition studies with adults. Recent work by della Carpini (2003) shows extensively that second-language learners also go through a stage of spreading. This suggests that it is not a factor of child cognition (Inhelder and Piaget, 1964), nor of language-independent child pragmatics (Crain et al, 1996), that lies at the root of these phenomena, but rather the challenge of grammar construction which confronts L1 and L2 learners alike. Further support for a syntactic account comes from spontaneous production data which indicate that the quantifier may not be properly represented by children. In our searches of CHILDES, for example, children below the age of five years failed to produce forms like "every x" and produced only adverbial forms like "everyday" or misanalyzed forms like "every glasses." The relevance of specific syntax is highlighted by the fact mentioned by Brooks et al. (in press) that sentences like "Is a turtle carrying every boy?" elicits far less "backwards" spreading than when *every* is in the initial noun phrase. Thus the explanation for spreading must address the role of word order, i.e. what follows from the position of *every* at the beginning of the sentence.

For the argument we present here, we draw from syntax, semantics and pragmatics together to allow for an analysis of the proposed sequence of stages and also suggest the kind of input data that would motivate the child to reanalyze *every* at the different steps. This is the essential question of learnability—how does the child restrict an overgeneral grammar—an aspect of the question which we have not seen addressed by any purely semantic or pragmatic account.

1.3 The components of the analysis

Our claim, based in part on the experimental data presented in Section 2, is that the path to the acquisition of the determiner quantifier involves an added step than has not been taken into account or has been treated only tangentially in previous discussions (namely UMOS+MOS). In Section 3 we develop a confluence of argumentation about
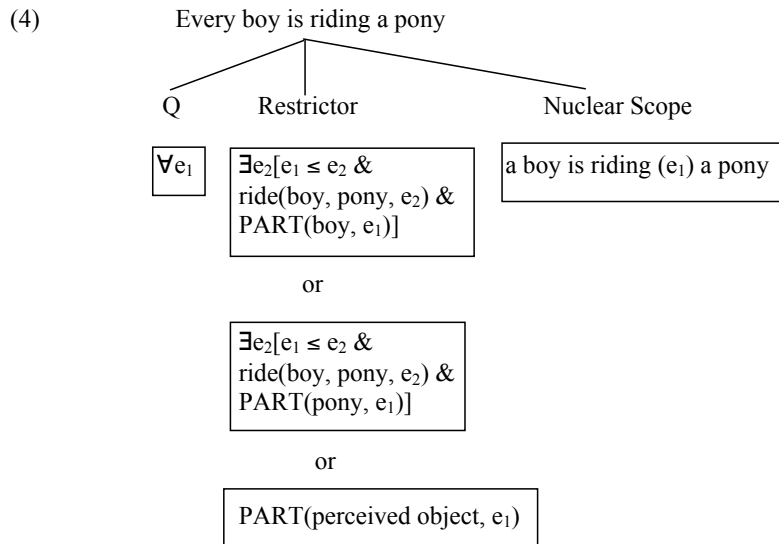
how adverbial quantification, floating quantifiers, focus, and distributivity/ collectivity interact under c-command and the theory of Feature Checking (Chomsky, 1995, 2004). Adverbial accounts, we will claim, account best for the UMOS+MOS stage, whereas at the MOS stage, the child uses the analogy of floated quantifiers like *all* and *each* and creates a link between the two positions where the quantifier can float. The syntactic mechanism relating the upper and lower positions is a Focus Phrase in the CP system from which the quantifier in the upper position can c-command the lower one. To move to the adult stage is based on a reanalysis of the distributivity in the *every* sentence as arising from the predicate and not the *every. Every* is not involved in feature checking and can be correctly positioned in the DP. From there, it no longer c-commands the lower NP and so the spreading interpretation is no longer available.

Adverbial quantification, floating quantifiers, focus, and distributivity/ collectivity all figure in previous discussions of quantification or acquisition, if not both together. We present them each in turn.

1.3.1 Adverbial quantification

Philip's (1995) account, which we use as a starting point, with its emphasis on the event, is essentially adverbial. According to Philip, structures involving adverbial quantifiers (in this case sentences) are tripartite: they can be divided into <u>quantifier (Q)</u>, <u>restrictor</u> and <u>nuclear scope</u>.

In Philip's analysis, the events forming the restrictor are the subevents of the contextually relevant event that meet a particular restriction. For MOS, the restriction is that either the subject or the object is a participant in the subevent. To cover UMOS, he introduces a third disjunct to the restrictor, the proposition that a perceived object participates in the subevent (shown in (4)).

(4)   Every boy is riding a pony

Q	Restrictor	Nuclear Scope
$\forall e_1$	$\exists e_2[e_1 \leq e_2 \ \& \ \text{ride(boy, pony, } e_2) \ \& \ \text{PART(boy, } e_1)]$	a boy is riding (e_1) a pony

                    or

$\exists e_2[e_1 \leq e_2 \ \& \ \text{ride(boy, pony, } e_2) \ \& \ \text{PART(pony, } e_1)]$

                    or

$\text{PART(perceived object, } e_1)$

In other words, for the UMOS (perfectionist spreading) child, *every boy is riding a pony* is true *iff* every subevent in the picture that involves any participant is a subevent in which a boy rides a pony. This appears to be the correct truth condition for UMOS.

Sauerland (2003) offers an interesting variant of a semantic account in which he argues that both the adult and child grammars have a silent *always* that appears in generic contexts. (5a) and (5c) have the paraphrases in (5b) and (5d).

(5)   a. *When one sleeps, the other wakes up*
       b. "it is always the case that when one sleeps, the other wakes up"
       c. *a guide insures that every tour is a success*
       d. "it is always the case that a guide insures that every tour is a success"
       (It does not mean that there is a single guide for all tours.)

He argues that children eliminate *every* as not understood and through the silent *always* they obtain a reading in which there is always a horse that the child is riding. (6a) is interpreted as in (6b).

(6)   a. *Every child is riding a horse*
       b. "There is always a horse that a child is riding"

Many of the predictions of Sauerland's account have not yet been tested. However his proposal that there can be a hidden *always*, even in the adult grammar, is another potential support for an adverbial stage.

The naturalistic facts also point in the direction of the child's *every* initially being interpreted as adverbial. If *every dog is eating a bone* were understood as "every (time) [a] dog is eating a bone," then we can see how a child's adverbial analysis could arise. Notably, outside of compounds like *everytime* or *everything, every* is not reported in children's early production. A search of five CHILDES corpora (MacWhinney, 2000) involving six children (from Brown [1973], Kuczaj [1976], and MacWhinney [2000]) revealed very few children using *every*, and we found virtually no cases before age four or five. Most often children used *every* only inside of compounds, and in general the children who used *every* + noun seemed to use these constructions only adverbially. That is, they used expressions like *every time* and *every day* in non-argument positions, rather than *every woman* or *every toy* in argument position. Of the six children surveyed, only two – Abe (Kuczaj) and Mark (MacWhinney)– had more than two clear instances of *every* + noun not used adverbially, and the total number of these cases in the five corpora did not exceed twenty-five. Moreover, about four of these uses (that is, about 17%) involve agreement errors: *every boys and girls, every cheese, every people*, and *every farm people,* suggesting that the representation of the quantificational position in DP is not yet well-formed.[1]

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[1] It would be ideal to know if those children who do not use "*every* + N" would give spreading answers and whether those who do use the construction would be those who did not give spreading answers.

1.3.2. Floated Quantifier

The floated quantifier (FQ) provides a framework for the child's application of *every* to more than one part of the sentence at a time. The adverbial properties of (FQ) have received a good deal of recent attention (Bobaljik, 1998; Brisson, 1999; Terada, 2003; Fitzpatrick, 2005).

It has been pointed out that quantifiers can move to all the adverb positions (Terada, 2003; Bobaljik, 1998).

(7)   the children (all) have (all) been (all) going home.

Furthermore, they note that the quantifier can appear even when it could not be a part of the DP:

(8)   a. Susan, Mary, and Sally were all here
        b. *All Susan, Mary, and Sally were here

In addition, one could expand the quantifier to work like an anaphor:

(9)   Susan, Mary, and Sally were <u>all of them</u> here.

French has particularly intricate examples of floated or long-distance quantification of this kind. Labelle & Valois (2001) examine the acquisition path of two of them that can occupy the same adverbial position in the verb phrase: *chacun* and *beaucoup*. The former, which they call an FQ, quantifies over the subject NP (and <u>not</u> the NP in the VP). The latter, which they distinguish from FQ as a "quantifier at a distance," (QAD) is restricted to the object and can<u>not</u> quantify over the subject.

(10)   Thus   QAD: Les enfants ont beaucoup recu de ballons
                          'the children have a-lot received of balloons'
                          (*beaucoup* quantifies over balloons)

But from the same position,

(11)   FQ: Les enfants ont chacun recu un ballon.
                          'the children have each received a balloon'
                          (*chacun* quantifies over the children).

In acquisition, these floated or floatable elements were difficult for the child to restrict properly. Labelle & Valois (2001) demonstrate a brief period of floating for *beaucoup* with three-year-olds accepting sentences with it quantifying over the subject, but by five, their subjects restricted it properly to the object. However, in their study the syntax of the

FQ *chacun* took longer for the children to acquire. Five-year-olds accepted it equally quantifying over object or subject, whereas only the latter is acceptable to adults.

Takahashi (1991) has also shown that children do not appear to distinguish the two sites of the quantifications. When confronted with a sentence with *every* in both subject and object position, children aged 3-6 answered "yes" to the sentence, *is every boy holding every balloon?*, when shown the following scenario:

(12)   balloon   balloon   balloon
        | | |

        boy   boy   boy

Similarly, in our diary data, we have a child who said, "each hand is in each glove" and another "both rabbits are on both sides of the fence" (with one rabbit on each side, B. Partee, p.c.). These interpretations appear to be a conjunction for the child of "every boy is holding a balloon" and "a boy is holding every balloon" (or "each hand has a glove" and "each glove has a hand"). For an adult speaker, it would not be a simple conjunction. One quantifier would have to be in the scope of the other. To the balloon question, the adult's answer would have to be "no," since there is no distribution of balloons over children, i.e. each boy holding (a string to) all three balloons.

Drozd (1999, 2001) and more recently Geurts (2001) have offered an analysis in terms of *every* being misanalyzed as a weak quantifier whose domain was elastic enough to include an extra element. In particular weak quantifiers on the subject can permit an appraisal of the set marked by the object as in the famous example:

(13)   Many Scandinavians have won the Nobel prize

where *many* refers to the set of Nobel prize winners, not Scandinavians.

This shifting of the domain of the quantifier is a very general phenomenon. Roeper and Matthei (1974/75) pointed out that "floatable" expressions like (14) are ambiguous in a similar way, indicating that lexically the class of FQ is potentially infinite:

(14)   the committee is 90% behind the proposal

We have confirmed with many adults that (14) can mean either 90% of the committee is completely behind the proposal, or 100% of the committee is 90% behind the proposal or behind 90% of the proposal, that is, quantifying over the object. The quantification over the object may be clearer with "The committee was completely behind the proposal" which can be falsified either by a member of the committee objecting or all of the committee objecting to one part of the proposal. Beyond that ambiguity, it can feel "vague" as if a combination of both readings were possible, i.e. that the quantifying expression is not restricted to one syntactic position or the other. Thus interpreting an

element modifying the subject of the sentence as if it were also in the predicate does not seem to be excluded in some contexts, even for adults.

1.3.3 C-commanding the Floated Quantifier from a Focus Phrase

There is also precedent for a syntactic connection created between the origin and landing site of floating quantification in the tree. Modern syntactic analyses have moved precisely toward the view that the FQ has a connection to both the subject and the content of the predicate.

Sportiche (1988) originally suggested that the FQ was left behind when the subject NP was raised to IP, but since then, analyses have pointed out that the FQ has a relation to the object as well as the subject, and so it is not just a question of moving the subject away.

Terada (2003) uses a Probe-Goal account to capture the dual properties of floated quantifiers. The essence of the account is that a word like <u>each</u> has two features:

(15)   each
            [+anaphoric]
            [+distributive]

The anaphoric feature moves to an NP with an uninterpretable number feature and the Distributive feature is an interpretable Feature that is satisfied by Local Agreement. Therefore it must be adjacent to what it modifies. Terada suggests that the anaphoric feature is an uninterpretable feature [-Num]. Whatever the connection, the critical point is that the adult language requires a dual role for floatable quantifiers.

(16)   anaphoric: NPi ……….each-i
            distributive: each-j X-j

If the FQ is in a Spec position of a predicate phrase, like a small clause, then it can satisfy both of these relations. The agreement relation is what requires that either the FQ position be occupied, as it is for adults, or c-commanded as we will argue that it is for children and possibly second language learners.

Terada's two-pronged analysis, which was developed independently for the syntax of quantifiers, has not been incorporated into an acquisition account. As we argue below, it provides a key transitional element –and also makes distributivity a key concept in explaining spreading and in eventually eliminating the child's spreading interpretations.

1.3.4. Distributive accounts

Drozd (1996, 2005) was one of the first to present a distributivity-based analysis of quantifier spreading. In his Distributivity Hypothesis, MO-spreading can be attributed to children's misidentification of the distributive key and distributive share, the two

categories that determine, in sentences with distributive semantics, which element is being distributed, and which is being distributed to. Given sentence (17a), an adult would label the key and share as in (17b), and determine that elephants are being distributed over boys. A child making an MO spreading error would make the determination in (17c), and derive a semantics in which boys are distributed over elephants (examples are Drozd's).

(17)   a. Every boy is riding an elephant
       b. [Every boy]$_{dist-key}$ is riding [an elephant]$_{dist-share}$
       c. [Every boy]$_{dist-share}$ is riding [an elephant]$_{dist-key}$

Brooks also addresses the role of distributivity in children's heuristics for understanding these quantifiers. Brooks & Braine (1996) showed that children performed better in tasks with collective universal quantifiers, and so in a current study (Brooks & Sekerina, in press) they directly pit distributive uses of the quantifier with collective ones. In fact, they found that children younger than 9 years made numerous errors, with poorer performance in distributive contexts than collective ones. In fact, native English-speaking adults, given a similar task with the distributive quantifier *every*, also made child-like errors. The persistence of quantifier-spreading errors that Brooks finds in adults presages our experimental results (in section 2).

Drozd ultimately rejects the Distributivity Hypothesis because it makes some predictions that are not born out by experimental results. For one, the hypothesis predicts that DPs which are not quantificational but are nonetheless distributive, such as definite plurals and conjoined names, should show MO spreading in a manner similar to DPs with universal quantification. For instance "the boys have a hat." Experiments in Dutch showed that this is not the case. For another, the experiments showed no difference between distributive universal quantifiers like Dutch *ieder*, and nondistributive ones like Dutch *alle*, suggesting no significant role for distributivity. In any case, neither account provides a syntax in which the distributivity follows naturally from the observed syntactic variation. A distributivity approach becomes more viable if distributivity is directly introduced through a new syntax where a floated quantifier imposes the relation directly via local co-indexing.

1.3.5 Summary

Previous work on quantifiers, as Guerts observes, has tended not to include an analysis of UMOS. Indeed, in most small-scale studies, it accounts for only a small proportion of the answers. Even when it has been commented on, it has not been seriously evaluated. We report, therefore, on a large-scale study which helps establish the importance of UMOS as a significant phenomenon which requires an interpretation independent from MOS. Then we integrate UMOS into the logic of the acquisition path

2.0 The Experiment

The experiment which brought UMO-spreading into a new perspective for us was conducted as part of a large-scale project investigating many aspects of children's

language development (Seymour, Roeper, & de Villiers, 2005; Seymour et al., 2002). Data collection involved testing over 1450 children ages 4 to 12, including 333 typically developing speakers of mainstream American English (MAE). The data are cross-sectional, so our proposal about a sequence of acquisition is necessarily inferential. Still, they provide empirical support for the move from no demonstrated appreciation of the quantifier to UMOS+MOS → MOS-only → "target" that generally takes place in middle childhood.

2.1   Methods

Design

Children were tested within the context of the *Dialect Sensitive Language Test (DSLT*, Seymour, Roeper, de Villiers, de Villiers & Pearson, 2002), which is comprised of 350 items divided into 14 subtests covering a range of language phenomena. Seven items of *DSLT* Subtest 11, Quantifiers, adopted the format of Philip's (1995) dissertation and tested children's application of the quantifying properties of the universal quantifier *every*. (See Seymour & Pearson, 2004, for more details of the project.) All children received the seven quantifier questions in the same order, although older children did the whole sequence in one sitting while about a third of the 4-6-year-olds were given two sittings to complete the test, with Quantifiers in the second sitting. The outcome measure tallied for each child her response pattern, i.e. whether she showed evidence of spreading interpretations, target (adult) understanding, or some other pattern.

The major independent variable was Age in years (4, 5, 6, 7-8, 9-10, 11-12), in order to see developmental patterns. Gender, Region, Parent Education, and Ethnicity were included as control variables so that their potential effects on the results could be evaluated.

Participants

Table 1 shows the ages of the 333 typically developing-learners of English who participated. The children in the study were identified in their schools as speakers of mainstream American English (MAE). Children were all performing at grade level, and none of the subjects had been identified for speech or language services. Their dialect was confirmed by the Language Variation Status section of the *Dialect Sensitive Language Test* (Seymour et al. 2002).[2]

The participants represent a nationwide U.S. sample with children from the four major regions of the U.S.: Northeast, South, Midwest, and West, with a preponderance (55%) from the South (to match the AAE groups). Three-quarters (72%) of the children

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[2] It appears from preliminary results that UMOS is even more prevalent among another dialect group that participated in the experiment, the African American English (AAE) learners, but we restrict our analysis to spreading construals in MAE, where there is more guidance from the literature on how to understand the basic syntax and semantics of quantifiers within the MAE dialect. There is no published discussion to our knowledge of the semantics of quantifiers in adult AAE, without which one cannot establish an acquisition sequence.

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were considered to be of "low socio-economic status," measured primarily by Parent Education (PED) Level. ("Low-SES" represented parents with high school diplomas or less.) There were 55% females and 45% males. Sixty-eight percent of the children were of Euro-American background, with higher percentages of Hispanics and Blacks among the MAE speakers at the older ages (>6). The effect of the differences by age was evaluated statistically.

Table 1. Subject Demographics

Age	4	5	6	7-8	9-10	11-12	All
N =	60	66	77	38	43	49	333
% Female	52	56	64	53	51	49	55%
% PED </= high school	68	82	80	61	67	61	72%
% from South	54	64	60	58	67	39	57%
% Euro- American	80	70	79	63	47	53	68%

Materials[3]
There were three **Test** questions of the form "Is every X V-ing a Y?" like the one in Figure 1. Following Philip, every X **was** V-ing a Y, so a correct answer was "yes" but there was an extra Y in the picture. Also following Philip, there were two kinds of control items: Control-yes items were like the one shown in Figure 2, where in addition to a number of X who were V-ing a Y, there was also an Z V-ing a B, an extra pair, not an X nor a Y, doing the same activity: e.g. *"Is every rabbit eating a carrot?"* The anticipated answer was "yes." A final item type, Control-no (see Figure 3) presented the child with a picture where there was an extra "X," so the answer to "Is every X V-ing a Y" was "no." There were two each of these control item types.

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[3] The actual stimuli were in the same style as Figure 1, but since they appear on the copyrighted test, the *DELV-NR* (Seymour, Roeper & de Villiers, 2005)*,* they cannot be reproduced here. The items here are illustrative of similar items used in other studies (Phillip, 1995, 2004). If one wants to replicate the actual experiment, the figures for the Control items are publicly available in the commercial test; the other Test items are available from the authors.

Insert Figure 3 – Control No – around here

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Thus there were 3 item types that children could demonstrate mastery of; mastery was defined as answering correctly two of two Control-yes trials, two of two Control-no trials, and two of three Test trials.

Procedure

Children were tested individually in their schools by speech language pathologists. They were shown the seven pictures for the "every" items in the following order: 1. Control-yes, 2. Test, 3. Control-no, 4. Test, 5. Control-no, 6. Control-yes, 7. Test. While looking at the pictures, they were asked the "Is X V-ing a Y?" question. Whenever a child answered "no," she or he was asked "Why?" and the answer was recorded on the answer sheet.

In Philip (1995) (and other studies), the Control items were used to establish a minimum level of knowledge for the child to be included in the statistical analyses and were not the subject of the inquiry. For this experiment, all responses were entered into the analyses and the analysis was done not just on the Test items, but on the pattern of the child's responses to all items, especially their answers to the follow-up *why*-question.

The seven yes or no answers were scored as correct or incorrect. The classification of the response types (UMOS, MOS, target etc.) was made from the verbatim answers recorded when a child answered "no" and was asked to explain why or when a child volunteered a "spreading reason" for their "yes" response, for example "Yes, but not the dog."

> 1. A special category was made for "Yes-men" (or perseverators) who said "yes" to all questions. They may have known some of the answers (whose answers were in fact "yes") but we determined that we had no way to distinguish true "yes" answers from those which were a set-response.
>
> 2. Children who specifically referred to the extra object in a test question ("no, not that bike") in at least one response were counted as "Mentioned-object spreaders" (MOS).
>
> 3. Children who referred to the extra participants in the Control-yes questions (i.e., "no, not the dog" and/or "no, because of the bone") were counted "unmentioned-object spreaders" (UMOS), whether or not they also exhibited MO-spreading as well.
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> 4. Those who demonstrated mastery of all the question types AND gave no spreading answers were called target children. (Note: children who answered the Control-yes and the Test questions correctly and only one of the Control-no questions incorrectly exhibited the same overall response pattern as the perseverators, but as they had answered "no" at least once they were not counted

as perseverators. They were counted as target children, as long as they did not volunteer any spreading responses.)

These four categories accounted for 90% of the answers. All other answer patterns were also tallied to determine if any of them occurred at levels different from what could be expected from random answering. Thus a matrix was made to tally all 8 possible combinations of mastery (=1) or non-mastery (=0) for the 3 item types. That is, "1-1-1" would stand for Control-no, Control-yes, and Test questions mastered; "1-1-0" would stand for Control-no and Control-yes mastered, but not the Test questions (which is consistent with MO-spreading). Note, though, that the pattern of zeroes and ones did not determine for us whether the child was counted as a spreader or not: that label was given if the child gave a spreading response to at least one test or Control-yes follow-up question.

2.2   Results

The proportions of the response types differed significantly by age. The graph in figure 4 shows the distribution of the UMOS (i.e. UMOS-only and UMOS+MOS), MOS-only, and target children from ages 4 to 12. (The older ages are aggregated to increase the cell sizes. Percents do not sum to 1 because for clarity, the perseverators and "other uninformative" are not shown in the figure, but are discussed below with Table 2.)

_____

Insert Figure 4 – TD children – around here

_____

The response patterns of interest were the most prevalent, but all eight of the logical possibilities mentioned above were observed, in the proportions indicated in Table 2.

Table 2. Occurrence of different response patterns

	CtlNo-CtlYes-Test	% of responses	Compatibility with Response Type
1	0-0-0	.03	
2	0-0-1	.039	
3	0-1-0	.015	
4	0-1-1*	.279*	perseveration/ yes-men
5	1-0-0	.174	UMOS + MOS
6	1-0-1	.02	UMOS-only
7	1-1-0	.12	MOS-only
8	1-1-1	.273	target
(4b):	*Some 0-1-1 who gave at least one "no" answer	.045	(target)

	were not counted as perseverators		

Clearly, some children may have been unreliable responders, but there would be very few among the target children or even the MOS-only children. Getting 7 of 7 items right, as most target children did, is a 1 in 128 (2^7) chance. Some target children got only 6 right but did not offer spreading reasons for their error. There is a 7 in 128 (5%) chance of getting 6 of 7 right with no knowledge of the quantifiers. This is not a high likelihood, but cannot be ignored. Similarly, the 1-1-0 pattern (compatible with MOS-only) would occur by chance 1/32 of the time (1/4 x 1/4 x 1/2), whereas the 1-0-0 (compatible with UMOS+MOS) would occur 1/4 x 3/4 x 1/2 or 3/32 (about 9%) of the time by chance. In fact both spreading types accounted for much larger portions of the response patterns, 12% and 19% respectively, with higher percentages at some ages. The overall occurrence of the three major response patterns (with the perseverators removed) was significant, chi-square (df 3, n= 244) = 190.04, $p < .0001$. The chance analysis was pursued to understand how much meaning to assign to the "other" categories (#2, 3, and 7), and the conclusion is that no explanation for them seems necessary because chance alone is sufficient to account for their occurrence. More importantly, we can have confidence that the majority of the other answers truly reflect the child's knowledge and were not just random answering.

Analysis of Variance:

   Perseveration declined over the age range, target responding increased, and the two types of spreading rose initially to a peak and then declined, UMOS peaking around 5, and MOS-only not until 7-10. Multivariate analysis of variance tested whether the developmental trends observed were statistically reliable. It also permitted the testing of the control variables: Gender, Region (southern or not), parent education level (PED, high school or less or not) and Ethnicity (non-Hispanic white or not; also tested for Hispanic and Black). Table 3 reports these results.

Table 3. Effects of Age and other demographic variables.

Age x	F	p
Target response pattern	2.915	.01
Perseveration pattern	2.555	.03
UMOS pattern	2.366	.04
MOS pattern	2.718	.02
Gender (and Region and PED) by		
Target response pattern	< 1	n.s.
Ethnicity by		
Target response pattern	< 1	n.s.
MOS-only response pattern	< 1	n.s.

The most important result was the significant age factor for all four response patterns of interest. By contrast, F-values for the control variables were all < 1 and non-significant, indicating that within this sample, they were no main effects for Gender, Region, Parent Education level or Ethnicity. Interactions with age for these factors were also not significant.

Pairwise comparisons

In order to investigate where the significant differences were, pairwise comparisons were run for each variable at adjacent ages and at longer intervals. Among the perseverators, the 4 and 5 year olds were not significantly different from each other, but they were different from the 6 year-old and older groups ($p < .05$). The target responders were not significantly different at any adjacent ages except ages 10 and 12, but there were significant differences between the pairs with two intervals (4 and 6, 6 and 9-10, etc.). The two spreading groups showed significant pairwise differences between 5 and 9-10 for the UMOS group and a trend 6 and 9-10 ($p = .059$) for the MOS group.

Another indication of the sequence of their acquisition is found in the mean age for the groups by Response Type, as follows (standard deviation in parentheses):

Perseverators:	4.7 (S.D. .8)
UMO spreaders	5.9 (S.D. 1.5)
MO spreaders	7.3 (S.D. 2.6)
target responders	8.4 (S.D. 2.7)

(Note that the 8 UMOS-only children averaged 5.9 years old as well, but with a larger S.D. 2.5.) Since all response types were found among the oldest children, it is not strictly speaking a "sequence," but clearly a developmental trend.

2.3   Discussion

These results do not conclusively demonstrate a sequence in the acquisition path: one would need longitudinal data for that. Even then, one would not expect all children to go through all stages. Some go right to the adult interpretation; others may never entertain the spreading interpretations, while others may never reach what we are calling the target response. Nonetheless, the overall timing of the patterns is compatible with the idea that UMOS and MOS-only are steps in a progression from the most general to the most restricted (and adult) interpretations of the quantifier.

This work was motivated initially by the desire to include knowledge of quantifiers as part of a standardized language test for children in the age range from 4 to 12. Items following Philip's (1995) protocol were included in the pilot version of the *Diagnostic Evaluation of Language Variation (DELV,* Seymour, Roeper, de Villiers, de Villiers, & Pearson, 2002). Beyond their utility for the development of the *DELV*, the large size of the sample and its careful stratification by age, gender and region provided a rich source of information about developmental patterns in the typical case. Unlike many of the research studies that take place in university communities, this study sampled children in a general population.

It is somewhat surprising to see that even among typically developing children, perseveration and other irrelevant response patterns accounted for about 30% of the 4- to 6-year-olds' responses. Other authors have reported earlier acquisition, but in many cases they did not test children who failed the control questions, so such children are not generally included in their analyses (cf. Philip, 1995; Guerts, 2001). Also, these data are from a lower socio-economic group than is typically sampled, and low SES is generally associated with slower language development (Hart and Riseley, 1995; Oller and Eilers, 2002). Still, there were about 11% of the 5-year-olds who answered correctly, so it is not completely beyond their ability. Nonetheless, it would appear that target performance on these questions is not the most common response among MAE-learners until after age 8 and it is not universal even at 12, the end point of our data collection.

3.0 Toward a formal account of UMO-spreading and MO-spreading

The outline of our argument is as follows:

Step 1. **Always.** At the initial stage, when UMOS and MOS appear together, they can both be captured by the notion of event quantification, a semantic account with relatively little language-specific knowledge of syntactic structure required. We call this the "always" stage.

Step 2. **Each.** To move from the initial adverbial interpretation to MOS-only, we propose the "each" stage, when the child assimilates *every* to NP-determiners *all* and especially, *each*. Both *all* and *each* can be either in the DP or not. Crucially, the strongly distributive *each* participates in anaphoric and agreement relations between the subject NP and the predicate, which it cannot satisfy from inside the DP. In the account we lay out below, it is the feature [+dist] that motivates the raising of *each* to a Focus Phrase, Spec-Foc P. We assume that the frequency with which *every* behaves distributively leads the child to classify it as distributive. It is the child's mis-analysis of *every* that puts it in the Spec-FocP and permits MOS spreading.

Step 3. **Every.** To get to the final, adult state, the "DP-every" state, children learn that *every* is in fact a mixed quantifier that is sometimes interpreted as distributive and sometimes as collective, depending on the properties of the predicate that selects it. Using this information, they reanalyze *every* as a quantifier lacking the feature [+dist], and as a consequence can allow it to be in the DP. They also need to realize that the two instances of the quantifier are different from the FQ, each applying independently to its own DP, but with one in the scope of the other. When *every* is in the DP, it will not be in a node of the tree from which it can quantify over the predicate, and spreading interpretations will no longer be available.

Thus, the child's grasping of a semantic concept, i.e. collectivity vs. distributivity, is a potential trigger for the syntactic advance that leads to DP-*every*. In its turn, the syntactic shift restricts the child's semantic interpretations, which depend on the quantifier's location in the syntactic tree.
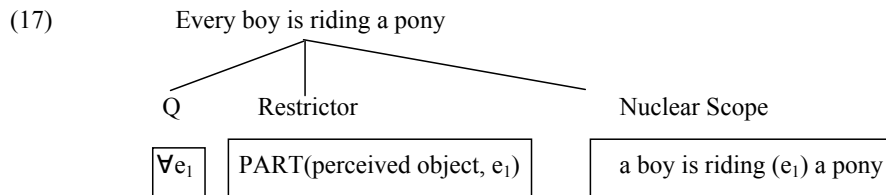
3.1 Step 1 ("Always")

We adopt an adverbial account for this stage, but we argue that it covers both UMOS and MOS, not MOS-only as in Philip (1995) and others.

   To account for children's performance in the stage that involves both UMOS and MOS errors, Philip introduced a third disjunct to the restrictor, the proposition that a perceived object participates in the subevent (Philip's diagram is shown in (4)). Adopting a suggestion by Ken Drozd (p.c.), we suggest that the triple disjunction is unnecessary to account for the judgements of the child in the UMOS stage. The third disjunct is so general that it subsumes the first two as subcases. The effect of the additional option is essentially to make first two disjuncts in the restrictor vacuous. Without them, the truth condition is as follows:

(18)   All events which are subevents of an event in which x verbs y, and in which x or y is a participant, or in which a perceived object is a participant, are events in which x verbs y.

3.1.1 The semantic structure

Thus we simplify Philip's proposal by removing reference to participants and by simply quantifying over all subevents, as follows:

(17)   Every boy is riding a pony

Q	Restrictor		Nuclear Scope

| $\forall e_1$ | PART(perceived object, e_1) | | a boy is riding (e_1) a pony |

This requires the assumption that the child is able to pragmatically fix the set of events appropriately, so that the individual situations depicted in the diagrams in (4) and (17) are considered to be the minimal events, and included in the domain of quantification. In our analysis, a child in the UMOS stage interprets "every x verbs y" as follows:
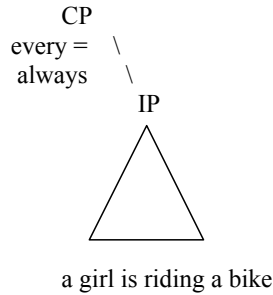
(20)   All events are events in which x verbs y.

This makes our analysis in the spirit of event quantificational analyses, as argued for by Philip, while also assuming that children in this stage fix the restrictor to the maximal domain possible, the set of all events, (perhaps because they are cannot use subtle contextual and focus cues to limit the restrictor as adults do [de Swart 1993]).

3.1.2 Syntactic representation of UMOS+MOS

Here we argue that the first stage is like a sentential adverb where it is attached to the CP.

(21)

```
            CP
     every =   \
      always     \
                  IP
                  /\
                 /  \
                /    \
               /_____\
          a girl is riding a bike
```

3.2 Step 2 MOS-only ("Each")

The challenge at this point is to find an interpretation that will rule out UMOS but allow MOS. It should also capture the two key properties of this stage, namely that the child's syntax restricts the domain of the quantifier to noun-phrases and that there is an active connection between the NPs in subject and object position. The mechanisms of c-command and Feature Checking (for anaphor and long-distance AGREE), each provide a different piece of the puzzle.

3.2.1 The syntactic argument

The point of departure for our analysis is floating quantifier where a quantifier is separated from the quantified material as in 22b.

(22)   a. Is <u>each</u> rabbit eating a carrot?
          b. Are the rabbits eating <u>each</u> a carrot?

As Labelle & Valois (2001) have shown, their subjects (age 5 was the oldest they tested) accepted quantification over the object for *chacun* ('each') as often as over the subject (which is grammatical).   For such a child, (22b) would be equivalent to (23), the spreading interpretation.

(23)   are the rabbits eating <u>each carrot?</u>

or even

(24)   Is each rabbit eating each carrot? (as with the child's "each hand is in each glove").

Thus, for MOS, the quantifier is mis-analyzed as quantifying over both the object and the subject (22b) and (23) (and we have argued above in 1.3.2 this is sometimes possible even for adults).

As Bobaljik (1998) has pointed out, there is no known reason why *every* should not float. If *every* floats like *each* for the child, then it too would project a semantic relation to the complement.

In the floated position, the quantifier has a relationship to local elements and in fact loses its potential for a collective interpretation. Bobaljik pointed out the subtle difference in interpretation between (25a) and (25b).

(25)   a. all the contestants can win
        b. the contestants can all win.

In (25a) the contestants could win as a group collectively, or they could win individually. In (25b) the implication is that they can only win separately, distributively, but not that they might collectively win.

Nor, as Terada (2003) points out can the moved quantifier appear by itself. Rather the FQ forms a small clause with the predicate, as in 26.

(26)   a. *the boys came both
        b. the boys came both alone.

He suggests that not only is a further predicated element present, but it must submit to a distributive reading. Consider cases like (27a) and (27b):

(27)   a. John left the two rooms both empty
        b.*John left the two rooms both angry.
        (putatively: he left the two rooms, feeling angry)

Consider also these facts which we have developed to underscore the point:

(28)   a. *the boys arrived each together.
        b. the boys arrived each together with his mother.

It is clear that the moved quantifier requires a distributable element (his mother) to be in a predication relation with it.

A bike (from Figure 1) can receive this distributive interpretation from the child's floated quantifier, but when distributivity is impossible because of the semantics of the word, as with *cold*, in (29b) it would not be allowed. In example (29b), *cold* does not distribute, though in (29c) distributivity is not required since *each* is not in the Spec of a small clause where it would impose an agreement relation.

(29)   a) the dogs are eating each alone
        b) ?*the dogs are eating each cold

c) each of the dogs is eating cold

Thus in a structure of this sort (from (26b)), we have these connections:
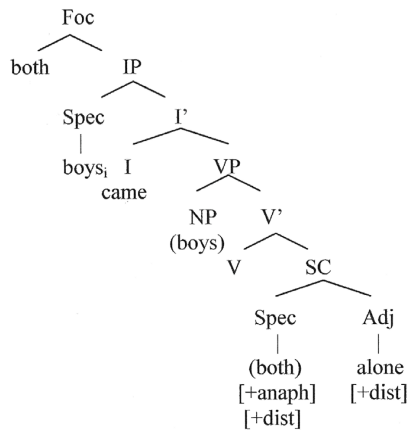
(30)
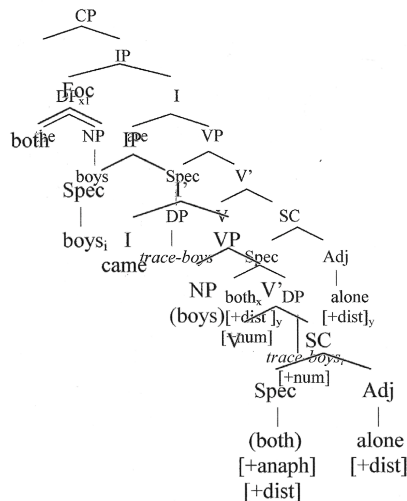
Both is in the Spec of the small clause (and a *trace* is in both possible origins under raising from a small clause or from the VP subject position). The distributive feature functions as a probe seeking an element to which distributivity can apply. Again, it can be linked to the subject (boys) by an anaphoric index, not a Spec-Complement agreement relation. The anaphoric index allows satisfaction of the [num] agreement and links a [+universal] interpretation to the subject. In effect we have long-distance AGREE.

For adults, the traditional FQ position is occupied next to the trace. The child can accomplish the same interpretation with less structure, as follows.
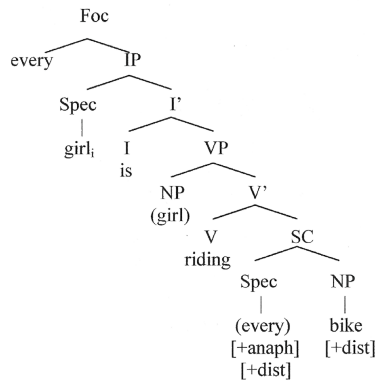
What the child needs syntactically, is to have the quantifier in a higher node, so that it can c-command. Kang (1999) presents an analysis of English child language which argues that *every* is inherently focused in children's speech due to its salience. (See also Hollebrandse, to appear, on Topichood.) Kang additionally assumes that *every* moves to a Focus Phrase (FocP), which immediately dominates the IP layer in the phrase structure. In support, Kang cites Brody's (1990) work on Hungarian, in which he argued that a FocP layer appears optionally, when needed as a target for focus movement. Kang argues that from its position in FocP, *every* has sentential scope. We have assumed movement to a Spec-FocP position dominating IP (following Kang/Brody) which is a general operation on quantifiers. The essential structure is in (31).

(31)

```
              Foc
            /    \
        both      IP
                /    \
            Spec      I'
             |       /  \
          boysᵢ  I      VP
                came   /   \
                     NP      V'
                   (boys)   /  \
                          V     SC
                              /    \
                          Spec      Adj
                           |         |
                         (both)    alone
                        [+anaph]   [+dist]
                         [+dist]
```

For the bike example (in Figure 1) the analogous structure would be:

(32)

```
              Foc
            /    \
       every      IP
                /    \
            Spec      I'
             |       /  \
          girlᵢ  I      VP
                 is   /    \
                    NP       V'
                  (girl)    /  \
                          V     SC
                        riding /   \
                            Spec     NP
                             |        |
                          (every)   bike
                         [+anaph]  [+dist]
                          [+dist]
```

We wish to maintain the part of the analysis that allows movement of the quantifier to FocP, but we argue that this is not the movement of a focused constituent, but rather movement driven by the quantifier's need to check its [+dist(ributive)] feature, which can be checked by the Focus head. The quantifier in the focal position c-commands the FQ in Spec of the Small Clause. Therefore, the invisible FQ behaves like the adult FQ which gives its distributivity to the object and is anaphorically related to the subject.

It is clear that the moved quantifier like *each* or *both* requires a distributable element to be in a predication relation with it.[4] In effect, then, even the initial quantifier can take a distributive modifier (Each boy has a glove.). In the FQ case, it is obligatory (a boy has each glove). It is not clear how to express this obligatoriness, but one could pursue the idea that the quantifier can be in the Spec of the small clause <u>only</u> if it is a licenser with its second feature. In effect the FQ has an agreement feature that must be checked by another feature in a Spec-Head relationship.

The child at this stage can satisfy these relationships if the quantifier is interpreted, not as an adverb applying to events, but as an NP quantifier raised to the FocusP position. The raised *every* now c-commands the VP as well as the subject NP; therefore it can c-command an empty FQ (*every*) position as well if we assume that it is an adverb position, a default interpretation in that position.

3.2.2 The semantic argument

We argue that, as in the floating quantification approach that we discussed in 3.2.1, the child associates a single quantifier with two arguments: both the subject and object. But whereas the floating quantifier associated different semantic properties with each argument, we propose that the child in the MOS stage associates the same semantic property - quantificational restriction – with both. What does this mean? We suggest that the way to associate quantificational restriction with two arguments is to make the truth condition **a conjunct**, with one of the verb's arguments constituting the restrictor in each case, as in (33).

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[4] Gualmini, Meroni, and Crain (2003) hint at intriguing evidence that looks consistent with our account. Like the imposition of distributivity on the Small Clause, they report on a way for distributivity to apply to an OR relation. For a sentence like:
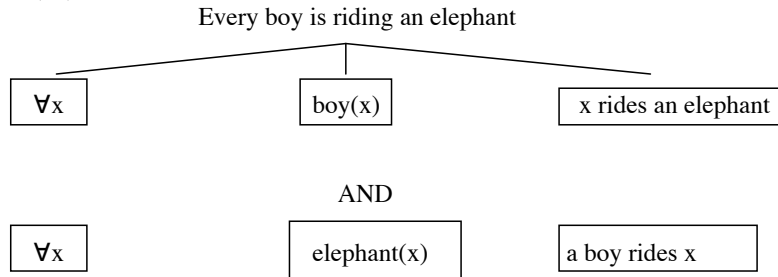
(i)   Every ghostbuster has a pig or a cat

children consistently add an "extra" restriction, much as they say the Drozd (2001) and Philip (1995) accounts do, where either every ghostbuster has the same (collective) or every one has a different (distributive) choice.

To really establish the distributive property we expect one might try:

(ii)   every ghostbuster has a pig or a cat or a dog.

(33)

Every boy is riding an elephant

| $\forall x$ | boy(x) | x rides an elephant |

AND

| $\forall x$ | elephant(x) | a boy rides x |

For example, in the sentence "every boy is riding an elephant," the truth condition is

(34)   "every boy is riding an elephant, <u>and</u>
          every elephant is being ridden by a boy".

This approach retains one of the strengths of the adverbial quantification approach - the fact that the quantifier's restriction can be determined beyond just a single NP. It also has one of the strengths of the NP quantifier approach - that restriction of the quantification is connected to the semantic content of specific NPs, not just any part of sentences. In our analysis, the child has advanced from the stage in which quantification ranges over events to the stage in which it ranges over the denotations of NPs, but with the qualification that it is not restricted to a single NP as in the adult grammar. At the MOS stage, the quantifier has elements of both an adverbial quantifier and a nominal quantifier. The adverbial property is that the quantifier takes scope over the entire sentence, enabling it to select the object as well as the subject as its restrictor. The nominal property is that the restrictors are actually determined by the NPs in the sentence, in contrast to adverbial quantification, where the restrictor is determined by other parts of the sentence or by information structure.

        To the best of our knowledge, the truth conditions in our approach are equivalent to the truth conditions in Philip (1995) and in Drozd (1996), although each analysis achieves the truth condition using a different semantic mechanism: conjunctive quantification in the case of our analysis, quantification of events coupled with reference to participants in those events in the case of Philip's analysis, and switching of distributive key and distributive share in the case of Drozd's analysis. We nonetheless feel that our solution is preferable. Our analysis relates the development of the child's syntax to the error patterns found with quantification and addresses the learnability problem. The child begins with the adverbial default option for quantification, treating *every* as an adverb. As the child develops, she learns that *every* is a determiner quantifier, but the lack of a DP analysis allows her to analyze *every* as being sentential in scope. Finally, with the development of DPs, the child reaches adult proficiency in the use of quantification, treating it as an NP quantifier, with only its sister NP as its restrictor.
        Our second argument applies specifically to Philip's analysis. As noted, we see no semantic difference between our analysis and his. We believe that the conceptual

superiority of our analysis is in terms of how the semantic content of the NPs figures into the truth conditions of the sentence. In our analysis, it is done directly: the semantic content of the NP forms the restrictor of the formula. But in Philip's analysis, it is incorporated only indirectly into the truth conditions, through reference to participants in events. Philip's apparatus is set up to capture quantificational statements in this stage as a case of adverbial quantification, when what it looks like is a case of nominal quantification.

3.3 Attaining Adult Competence with Quantifiers

In the MOS-only stage, the child has learned that English has determiner quantifiers, and that projection to the Spec-FocP is motivated by natural focus on the word *every* which now allows it to c-command elements in the VP. This is the stage where children begin to make finer-grained distinctions between quantifiers of different types. Each quantifier has distinct properties of syntactic distribution and there is also cross-linguistic variation in the constraints on sites that host quantifiers, like DP. The child must decide whether his grammar has bare N, NP, or DP, as well as many decisions about the position of quantifiers (and adjectives, possessives, and agreement) within DP, all of which require time and refined experience. In step 2, the child does not distinguish *each* from *every*. This conflation of *each* and *every* is not surprising in light of the mixed properties of *every*, which is highly marked crosslinguistically (Angelika Kratzer, p.c.).

Finally, it is learned that *every* is not inherently distributive and hence does not raise to Spec-FocP. Therefore we do not find the FP-FQ chain with *every* among adults and we do not find the spreading interpretations.

What kind of evidence drives the move to the adult state?

Triggering Collectivity

The restriction to internal DP-*every*---its inability to float—correlates with its having collective as well as distributive readings. Therefore we suggest that situations which force a collective reading are part of the trigger for reanalysis of every as DP-internal. In general elements that contain complex features, producing semantic alternatives, tend to be more local (as the complex reflexive *himself* is local, while mono-syllabic reflexives are often not). We can imagine a few different sources of evidence that *every* has a collective reading. One is the ability of *every* to occur under the scope of negation, in which case it necessarily receives the collective interpretation, as in the following sentences from Beghelli and Stowell (1997):

(35) a. John didn't read every book
      b. ??John didn't read each book

Another case would involve the use of *every* in an argument position that must have a collective interpretation, as in the following:

(36) The teacher gathered every student
      (compare: *the teacher gathered each student)

In other situations, the argument position is in principle available to both collective and distributive NPs, but the context makes it clear that a collective interpretation is appropriate ((37a) is from Tunstall 1998).

(37)   a. The waiter lifted every glass
        (where the glasses are all on the same tray and are lifted with one action)

        b. The boy ate every raisin
        (where he gulped them all down in one motion)

Acquiring the details of *every* in this way illustrates how the child's grasping of a semantic distinction can lead to a shift in syntactic representation that in turn causes a restriction of semantic readings.[5]

Triggering Independent Quantifications

Another triggering experience may be found in a situation with unambiguous pragmatics. We suggest that seeing *every* in a situation where there is an overt second *every* which cannot be equivalent to "*a*" may alert the child to the necessity to apply *every* to each DP independently. It must be a circumstance where the conjunctive truth condition we propose for Stage 2 is clearly counter to the facts of the situation. For example, one could imagine that the child is engaged in coloring American flags with his class, a task that requires three colors. He sees that his whole class is busily working, each child with a single crayon. The teacher says: "Oh, every child does not have every color." She may add: "Every child needs every color, but you each have only one color" and then she distributes more crayons so everyone has every color. A case of unambiguous pragmatics such as this one would also be a potential trigger to reanalyze the conjunctive truth conditions presented in (34), or at least to begin the reanalysis, and informs the child that one *every* must be insidet the scope of another.

4.0 Discussion and Conclusion

Semantic approaches to quantification have undertaken the important task of discovering exactly what range of interpretations children have for quantifiers, but they have not addressed the learnability question which becomes acute when the child must reject certain interpretations. We claim that the child initially chooses a representation that is closer to unmarked UG choices. We see the shift from a c-commanding position to the position inside a DP as a way to provide a possible route for the acquisition path. No semantic approaches seem to address the issue from the learnability perspective.

Pragmatics and processing accounts also play a valuable role. Previous research in this area has taught us that even the slightest manipulation of the contextual

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[5] Our trigger for DP-*every*, via recognizing collectivity, does not work for the analysis of *all*, but it does not need to since the child receives explicit evidence from expressions like "all the boys" that it can be external to DP.

information may affect children's performance. Great care must be exercised in choosing experimental procedures. Clearly context, hence pragmatics, can elicit different interpretations by children as it does for adults—but that does not negate the role of syntax. No matter what pragmatic environment one chooses, the child must have a grammar which allows it. A secure grammar operates with completely anti-pragmatic conclusions. For instance, if a mouse eats cheese and we ask "did the cheese eat the mouse" children will say "no," and we can safely assume that they would say "no" to "is every bone eating a dog." Whatever interpretation of "every dog is eating a bone" they have, it must somehow be compatible with one of the grammatical representations they carry.

There is also a logical "performance" account of child errors which would say that the child ignores the sentence and simply responds to what is salient in the picture. In this case, the "not this one" response should be found for sentences with no quantification at all (Did Johnny eat a hotdog? "not this tree"). There have been no reports of children, in other experiments, simply referring to an extra object in the picture as if it were neglected. It is clear that the presence of every has an effect, and therefore we must provide a grammar in which it is initially possible to say "not this one" and later reject it.

The goal of an acquisition theory is to explain movement from an initial state to a final grammar. The many subtleties of the syntax of *every*, like the surprising fact that it does not float and has no partitive (*every of the boys) suggest that it is not acquired at once, that there is an acquisition path. The naturalistic data reveals, as expected, that children resist the use of *every*, presumably because they are aware that their partial knowledge does not quite fit the final grammar.

We have argued that the review of the results of a large study suggests an acquisition path with two quite different forms of quantifier spreading in the stage before *every* enters productive use. One is an adverbial projection associated with less mature interpretations, while the other engages sophisticated aspects of syntax, Floated Quantifiers, and continues often until children are 9 years old or older. It is even seen occasionally in production in non-adult sentences like "each hand is in each glove" where both subject and object are marked for the distributive property.

While purely semantic shifts are possible, our model of acquisition growth may reflect a general property of the syntax/semantics interface: shifts in syntax force new limitations on semantics. It is only the syntactic account, where a quantifier is first allowed to be outside the DP, and then restricted to being inside the DP, which predicts the loss of spreading since spreading (or floating) requires c-command.   Psychological principles, like "discourse prominence," as advocated by Brooks et al. (in press), lack the precision to capture subject/object asymmetries unless they are expressed as a notion like Topic within a structure (c-command) that governs the floated quantifier position in the verbphrase.

Our conclusions remain tentative because we do not know enough about how all quantifiers behave. It is clearly the case that collective words like *all* are acquired years before *each* and *every*, which in turn are quite different. Other quantifiers like *both* (Sauerland and Yatsushiro (2003) also require a long time before both their syntax and semantics are exactly like those of an adult. Our approach reasserts that it is the subtle

properties of language particular variation –*every* cannot float in English but it can in German—that are the essence of the acquisition problem.

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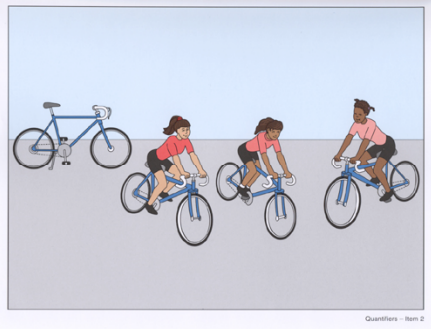
Figure 1. "Test" item: *Is every girl riding a bike?*

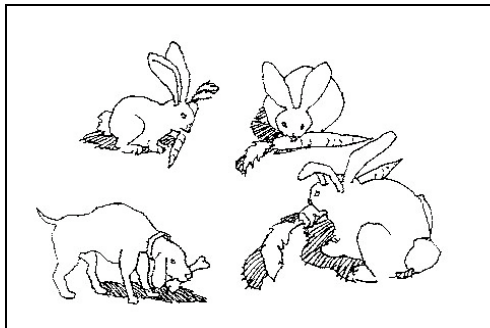Figure 2. Example Control-Yes item: *Is every bunny eating a carrot?*

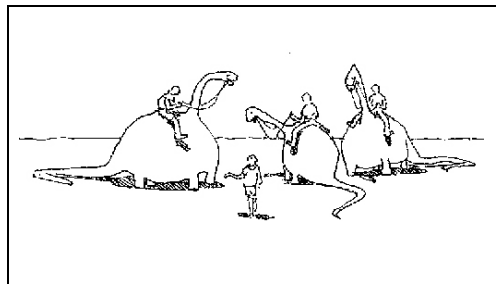Figure 3. Example Control-No item. *Is every boy riding a dinosaur?*

Figure 4. Comparison of Spreading Answer Types by Age.