

**The Syntactic Representation of Degree and Number  
in Children's English: Evidence for  
Delayed Parametric Learning**

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**1. Introduction**

In this paper we present evidence for a parametric property of adult English that is acquired remarkably late, in general around the age of four to five years. The parameter in question governs the syntactic representation of degree and quantity in noun phrases (NPs) and adjective phrases (APs). Greenberg (1972) has argued that the possibility of bare numeral modifiers (as in *three people*) correlates closely, across languages, with obligatoriness of plural-marking in semantically plural NPs. In languages such as Japanese, where numeral modifiers must be accompanied by a classifier, plural-marking is strictly optional.

Snyder, Wexler, & Das (in press) have argued that Greenberg's observation reflects a parameter with much wider consequences. The availability of bare numeral modifiers in English is related to the availability of degree modifiers in APs (*two feet high*), the availability of subcomparatives ("The door is taller than it is wide"), and the existence of the Left Branch Constraint on *wh*-questions of degree or quantity ("\* How is the house (t) big?").

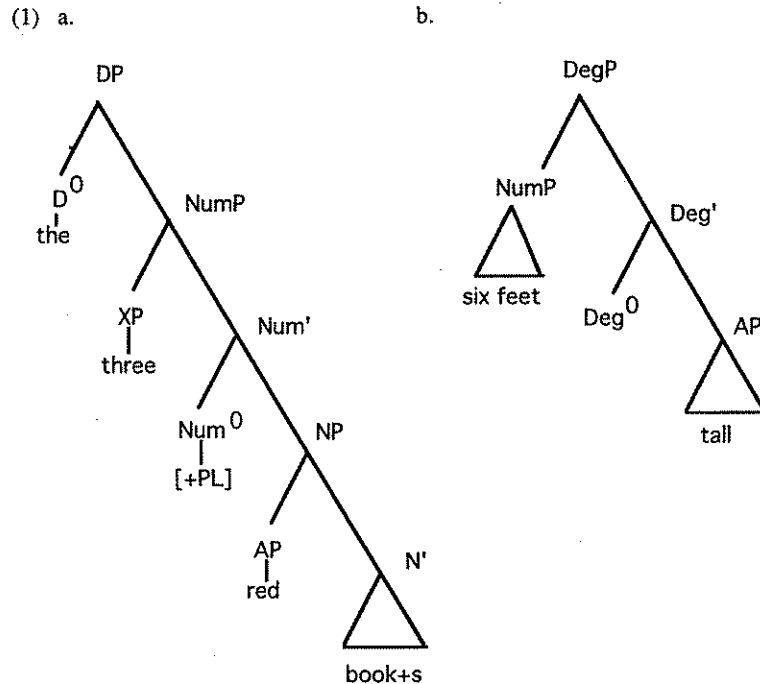
Snyder et al. have presented acquisitional evidence from their own work and from previous studies to show that a majority of English-speaking children up to the age of about five years systematically pattern with adult Japanese-speakers, rather than adult English-speakers, in their syntactic representation of degree and number. Specifically, children were at or worse than chance in the comprehension of subcomparatives in a (Crain & McKee 1985) truth-value judgement task, but near ceiling on several other types of complex comparatives (cf. also Townsend 1974, Townsend & Erb 1975). According to earlier research by Hoekstra, Koster, & Roeper (1992), English- (and Dutch-) speaking children as old as four-to-six years allow sentences such as, "How did Mary paint the cup yellow?" to have both the adult interpretation and also the following non-adult interpretation: "How yellow did Mary paint the cup?" (in violation of the Left Branch Constraint).

While children do use bare numeral modifiers in NPs, the findings of (Cazden 1968) strongly suggest that the children still do not represent number as in adult English. In her study of the three Brown (1973) corpora, plural-marking was reliably present on plural nouns immediately preceded by a numeral or "plural" quantifier (e.g. *many*) beginning fairly early in the transcripts, but other nouns that were clearly semantically plural in context did not reliably bear plural-marking even in the later transcripts. In what follows we motivate and

test a further prediction of the Snyder et al. analysis, namely that degree modifiers in APs will be acquired late by English-speaking children.

## 2. The Representation of Degree and Number in Adult English

Following Abney (1987), we assume that noun and adjective phrases are accompanied by a counterpart to the VP's inflectional phrase: the determiner phrase (DP) in the case of nouns, and the degree phrase (DegP) in the case of adjectives. Following Valois (1991) and Picallo (1991) among others, we also assume the presence of a substantival number phrase intermediate between DP and NP. The resulting structures are depicted in (1).



The crucial point for present purposes is that both number and degree expressions are licensed as the specifier of a functional category in adult English, at least on the analysis depicted in (1). All of the non-adult characteristics of children's English can be accounted for, if for the children, Num<sup>0</sup> and Deg<sup>0</sup> are incapable of licensing a specifier. Subcomparatives, for example, would be blocked because they depend on movement of a null operator out of a degree- or quantity-denoting specifier position (cf. Chomsky 1977, Heim 1985, Ishii 1991, Moltman 1993, among others).

Presumably, children's sporadic use of plural morphology on semantically plural nouns would follow from a misanalysis of "plural" numbers and quantifiers as Num<sup>0</sup> rather than SPEC NumP. Unlike the adult, the child would not project an abstract plural morpheme as the head of a plural NumP, and thus in the absence of an overtly plural element nothing would force plural morphology on a semantically plural noun. Left-Branch Constraint violations with questions of degree presumably follow from a misanalysis of *how* as an adverbial rather than as SPEC DegP (cf. "To what extent /degree did Mary paint the cup yellow?").

## 3. Degree-phrases with Adjectives

A direct prediction of this analysis is that overt expressions of degree in APs should be impossible both in Japanese and in children's English (for a majority of children under the age of four-to-six years). For example, pre-adjectival degree modifiers as in "two meters tall" should be ungrammatical. The prediction is clearly confirmed for Japanese, where our informants categorically reject (2a), requiring instead a circumlocution such as (2b).

- (2) a. \* John-wa (sei-ga) ni meeturu takai  
 John-top (height-nom) two meters tall-is  
 'John is two meters tall.'
- b. John-wa sei-ga ni meeturu da  
 John-top height-nom two meters is  
 'John's height is two meters'

To test the prediction for children's English, we examined the CHILDES (Child Language Data Exchange System) transcripts of spontaneous speech for 14 English-speaking children (MacWhinney & Snow 1985, 1990), described in Table 1. We began by extracting all child utterances containing a singular or plural form of any of some forty-five commonly used measure terms (year, month, day, foot, inch, story, block, mile, etc.). We then hand-searched all resulting lines for phrases of the form, "Degree Unit Adjective" (e.g. "five feet tall").

CHILD	CORPUS	AGES	LINES
Abe	Kuczaj 1976	2;5-6;0	22,485
Adam	Brown 1973	2;3-5;2	46,720
Allison	Bloom 1973	1;4-2;10	2,528
April	Higginson 1985	1;10-2;11	2,459
Eve	Brown 1973	1;6-2;3	12,909
June	Higginson 1985	1;3-1;9	3,259
Mark	MacWhinney & Snow 1990	1;5-6;0	19,996
Naomi	Sachs 1983	1;2-4;9	17,709
Nathaniel	MacWhinney & Snow 1990	2;6-3;9	13,665
Nina	Suppes 1973	2;0-3;3	33,195
Peter	Bloom 1970	1;10-3;2	33,195
Ross	MacWhinney & Snow 1990	2;6-7;10	30,294
Sarah	Brown 1973	2;3-5;1	39,034
Shem	Clark 1978	2;3-3;2	18,110
<b>TOTAL</b>			<b>295,558</b>

Table 1. Longitudinal corpora used in study.

### Results:

Only three of the fourteen children (Abe, Ross, Sarah) used degree-modifiers in APs productively by the end of their corpora. For these three children, the first clear uses are given in (3a-c):

- (3) a. (Abe 3;2) I'm almost four [//] I'm almost seventeen year old  
 (Abe 3;2) it was a dangerous fox and it was so long and it was this feet tall
- b. (Ross 3;9) you'll be four years old?  
 (Ross 3;9) I'm four years old  
 (Ross 5;11) my teacher yesterday # she said that the snow might be two inches tall today
- c. (Sarah 4;5) she's ten feet tall  
 (Sarah 4;7) no # she's seven+year+old now

Three of the remaining eleven children had one (Allison, Shem) or two (Mark) uses of the phrase "N years old," possibly as a frozen expression. Of the six children studied whose corpora extend beyond the fourth birthday (Abe, Adam, Naomi, Mark, Ross, Sarah), only three were using degree phrases productively by the last transcript. Thus, the results were consistent with the hypothesis that a substantial proportion of four-year-olds learning English have a grammar that disallows degree phrases with Adjectives.

### 7. Conclusions

Combined with the earlier results reported in (Snyder et al., *in press*), our findings support the hypothesis that children do not set the degree-number parameter to its adult English value until late in the course of acquisition. Following a suggestion from Tom Roeper (*p.c.*), we propose that the degree-number parameter is closely tied to parametric variation in the morphosyntactic properties of functional categories associated with noun and adjective phrases. In terms of the structures assumed in (1a,b), Num<sup>0</sup> and Deg<sup>0</sup> appear to be "impoverished" in adult Japanese (cf. Fukui 1986) and in children's English, in the sense that they do not license a specifier. Our findings are thus compatible with Hyams' (1994) claim that children have an impoverished system of functional categories until a relatively late age, and also with Borer's (1984) proposal that parametric variation in syntax is closely tied to the properties of functional categories.

### Notes

\* The present note comprises an update to the research reported in (Snyder, Wexler, & Das, *in press*), and contains new experimental results. The earlier paper contains other experimental findings and a more detailed discussion than is presented here. We thank T. Aikawa, S. Crain, K. Drozd, I. Heim, H. Hoji, N. Hyams, D. Lillo-Martin, S. Miyagawa, D. Pesetsky, T. Sano, T. Roeper, R. Thornton, K. Wexler, and the audience at the BU CLD for comments and helpful suggestions. Snyder was supported by an NSF Graduate Fellowship in Linguistics, an NSF Research and Training Grant in Linguistics and Cognitive Science at MIT, and the McDonnell-Pew Center for Cognitive Neuroscience at MIT.

### References

- Abney, Steven Paul. 1987. *The English noun phrase in its sentential aspect*. Doctoral dissertation, MIT.
- Borer, Hagit. 1984. *Parametric syntax: Case studies in Semitic and Romance languages*. Dordrecht: Foris.

- Brown, Roger. 1973. *A First Language: The Early Stages*. Cambridge, MA: Harvard University Press.
- Cazden, Courtney. 1968. The acquisition of noun and verb inflections. *Child Development* 39.433-448.
- Chomsky, Noam. 1977. On *wh*-movement. *Formal Syntax*, ed. by Peter Culicover, Thomas Wasow, and Adrian Akmajian. New York: Academic Press.
- Crain, Stephen, and Cecile McKee. 1985. Acquisition of structural restrictions on anaphora. *Proceedings of NELS 16*. Amherst, MA: GLSA.
- Fukui, Naoki. 1986. *A theory of category projection and its applications*. Doctoral dissertation, MIT.
- Greenberg, Joseph. 1972. Numeral classifiers and substantival number: Problems in the genesis of a linguistic type. *Working Papers on Language Universals* 9.1-39.
- Heim, Irene. 1985. Notes on comparatives and related matters. UT-Austin ms.
- Hoekstra, Teun, Charlotte Koster, and Tom Roeper. 1992. Left-branch violations in child grammar. Paper presented at the 17th Annual Boston University Conference on Language Development.
- Hyams, Nina. 1994. The underspecification of functional categories in early grammar. Paper presented at the Great Britain Child Language Seminar, Bangor, Wales, 27-29 March 1994.
- Ishii, Yasuo. 1991. *Operators and empty categories in Japanese*. Doctoral dissertation, University of Connecticut.
- MacWhinney, Brian & Snow, Catherine. 1985. The Child Language Data Exchange System. *Journal of Child Language* 12: 271-296.
- MacWhinney, Brian & Snow, Catherine. 1990. The Child Language Data Exchange System: An update. *Journal of Child Language* 17: 457-472.
- Moltmann, Friederike. 1993. *Coordination and comparatives*. Doctoral dissertation, MIT.
- Picallo, M.C. 1991. Nominals and nominalizations in Catalan. *Probus* 3: 279-316.
- Snyder, William, Wexler, Kenneth, & Das, Dolon. In press. The syntactic representation of degree and quantity: Perspectives from Japanese and Child English. In *Proceedings of WCCFL 13*. CSLI.
- Townsend, David J. 1974. Children's comprehension of comparative forms. *Journal of Experimental Child Psychology* 18.293-303.
- Townsend, David J. and M. Erb. 1975. Children's strategies for interpreting complex comparative questions. *Journal of Child Language* 2.271-277.
- Valois, Daniel. 1991. The internal syntax of DP and adjective placement in French and English. *Proceedings of NELS 21*. Amherst, MA: GLSA, 367-382.