Published (1996) in Andy Stringfellow, Dalia Cahana-Amitay, Elizabeth Hughes and Andrea Zukowski (eds.) *Proceedings of the 20th Annual Boston University Conference on Language Development, Volume 2*, 728-735. Somerville, MA: Cascadilla Press.

# The Acquisitional Role of the Syntax-Morphology Interface: Morphological Compounds and Syntactic Complex Predicates

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The principal claim of this paper is that a single parameter determines both whether a language permits productive root compounding, and whether the language permits syntactic complex predicates. The relevant parameter meets the classical (Chomsky 1981) criterion of having consequences across a sizable range of superficially disparate grammatical constructions, but is not reducible to the information in the lexical entry for any independently motivated functional head, or other closed-class lexical item. Evidence for the parameter comes from investigation of both child language acquisition and cross-linguistic variation.

## I. Complex Predicates.

English permits a main verb to combine with a secondary predicate and form a new, "complex predicate" that semantically resembles a single, complex verb. Examples of complex predicate constructions are given in (1). The paradigm cases are the resultative (1a), in which the main verb combines with an adjective phrase (AP); and the verb-particle construction (1b), in which the main verb combines with a post-verbal particle.

(1) a. John painted the house red. (Resultative)
b. Mary picked the book up / picked up the book (Verb-Particle)
c. Fred made Jeff leave. (*Make*-causative)
d. Fred saw Jeff leave. (Perceptual report)
e. Bob put the book on the table. (*Put*-locative)
f. Alice sent the letter to Sue. (*To*-Dative)
g. Alice sent Sue the letter. (Double Object Dative)

A number of recent syntactic analyses treat the main verb and secondary predicate of the complex predicate construction as forming a syntactic, as well as semantic, predicate. Syntactic complex-predicate analyses of this type can be found in (Larson 1988a,b; 1990), (Hale & Keyser 1993), (Chomsky 1993), and (Marantz 1993), among others, though some of these authors do not extend the analysis to the full range of constructions in (1).

An illustration of the distinctive semantic properties of English complex predicates is provided in (2). The simple transitive sentence in (2a) describes a pure process or activity, and is therefore more fully compatible with the aspectual modifier *for an hour*, than it is with the modifier *in an hour*.

(2) a. John hammered the metal (for an hour)/(?? in an hour).
b. John hammered the flat metal (for an hour)/(?? in an hour).
c. John hammered the metal until flat (?for an hour)/(?? in an hour).
d. John hammered the metal flat (?for an hour)/(in an hour).

Addition of the attributive adjective *flat* in (2b), or even the adverbial modifier *until flat* in (2c), does not substatially alter the acceptability of the aspectual modifier *in an hour*. Yet, creation of the complex predicate (resultative) in (2d) profoundly alters the aspectual properties of the sentence, as indicated by the full acceptability of *in an hour* .

The availability of complex predicate constructions is not universal, but rather appears to vary across languages. The resultative construction, in fact, provides perhaps the most reliable diagnostic for the availability of the complex predicate family, because it does not involve any idiosyncratic, closed-class lexical items (in contrast to the verb-particle construction), and because it displays the characteristic semantics of the complex-predicate class in an especially clear-cut form. The Romance languages have long been noted to contrast with English and other Germanic languages in that they categorically exclude resultative constructions (cf. Green 1973, Kayne 1984, Carter 1984, Levin & Rapoport 1988, among others). Furthermore, the Romance languages systematically lack direct counterparts to the English verb-particle, make-causative, and double-object dative constructions. Thus, Romance appears to be a strong candidate for a language group in which complex predicates of the English type are systematically excluded.[1]

Evidence from child language acquisition provides independent support for the view that English complex-predicate constructions are interrelated by shared dependence on a single, parametric property of English.
Stromswold & Snyder (1995) and Snyder & Stromswold (in press) have employed longitudinal transcript data from the CHILDES database (MacWhinney & Snow 1985, 1990) in a study of the spontaneous speech of twelve children learning English. Age of first clear use served as a measure of acquisition for each of the sentence-types in (1b-g), all of which are used with high frequency in the speech of adults and older children. The major result, supported by a variety of statistical measures, was that every child acquired the sentence-types in (1b-g) as a group. A considerable variety of possible non-grammatical explanations for this pattern have been tested and ruled out; details are reported in (Snyder & Stromswold, in press) and (Snyder 1995).

Thus, evidence from child language acquisition supports the view that the complex-predicate constructions of English depend on a single, parametric property of the grammar. As soon as a child acquires any one of these constructions, the others quickly follow. Yet, a major question remains: What, precisely, is the parametric property that the children are acquiring? In particular, can the property be represented within the lexical entry for some

single, abstract functional head, or is it a more "global" characteristic of the grammar that cannot be reduced to the properties of any single lexical item?

A possible answer to these questions was suggested by recent work on the syntax of Dutch and Afrikaans. In Dutch (Neeleman & Weerman 1993, Neeleman 1994), the word order possibilities for resultatives and verb-particle combinations are unusually restrictive (3a,b).

(Neeleman & Weerman, p.436, ex.6-7)

(3) a. ... dat Jan de deur (vaak) groen (*vaak) verfde.
that John the door (often) green (*often) painted
'...that John often painted the door green.'

b. ...dat Jan het meisje (vaak) op (*vaak) merkte.
that John the girl (often) up (*often) noticed
'...that John noticed the girl.'

Despite the usual flexibility of word-order in the Dutch Mittelfeld, an adverb cannot intervene between a verb and its associated particle in the examples of (3).

Similarly, Afrikaans verb-particle combinations behave as a unit in a variety of syntactic contexts, as for example when V-raising applies to an embedded clause (4a,b).

(Le Roux, p.241, ex.9a)

(4) a. Hy sal nie [die antwoorde by my e] kan af + kyk nie.
he will not the answers from me can off look not
'He will not be able to crib from me.'

b. *Hy sal nie [die antwoorde by my af e] kan kyk nie.
he will not the answers from me can off look not
'He will not be able to crib from me.'

Both Neeleman and Le Roux analyse the Dutch/Afrikaans facts as follows: Complex predicates are morphological compounds. In other words, complex predicates not only have the semantic properties of a single, complex word in Dutch and Afrikaans, but moreover have the morphological properties of a single, complex word.

## II. Complex Predicates and Morphological Compounds

The present research is chiefly a test of the following hypotheses, discussed in detail in (Snyder 1995): First, English complex predicates necessarily form a

morphological compound at some abstract level of grammatical representation, even though they do not exhibit the morphological characteristics of a compound in the surface form of a sentence. Second, the point of grammar that children are acquiring when they suddenly begin producing English complex predicate constructions, is the knowledge that the type of *compounding* required for complex predicates is available in English. Third, the relevant type of compounding is productive root compounding, or perhaps a particular subtype of root compounding.

Two empirical predictions follow immediately from this set of hypotheses. First, across languages, the availability of complex predicates (as found in English) should pattern closely with availability of productive root compounding (e.g. N-N compounding). Second, in children acquiring English, the age at which complex predicates are first used productively should correspond very closely to the age at which novel root compounds are first produced.

The first prediction was evaluated by a cross-linguistic survey, the major results of which are summarized in (5). The survey was limited to languages for which native informants were readily available, but nonetheless included a substantial range of language groups: Indo-European (Germanic, Romance, Slavic), Sino-Tibetan, Finno-Ugric, Japanese-Korean, and American Sign Language. A language was judged to have productive N-N compounding only if it permitted truly novel (non-lexical) N-N compounds, and did not require any overt morphological or syntactic connective (cf. French *de*, Japanese *no*) to combine the nouns. As can be seen in (5), complex predicates (as diagnosed by resultatives of the English type) patterned quite closely with productive root compounding (as diagnosed by grammaticality of novel N-N compounds). Details of methodology are provided in (Snyder 1995).

(5) Results of a Cross-linguistic Survey:

| | Resultatives | Productive N-N Compounding |
|---|---|---|
| English | YES | YES |
| Dutch | YES | YES |
| German | YES | YES |
| Hungarian | YES | YES |
| Khmer | YES | YES |
| Arabic (Palestinian) | NO | NO |
| French | NO | NO |
| Hebrew (Modern) | NO | NO |
| Japanese | NO | NO |
| Mandarin | NO | NO |
| Russian | NO | NO |
| Serbo-Croatian | NO | NO |

| | | |
|---|---|---|
| Spanish | NO | NO |
| ASL | NO | NO? |
| Korean | n.a. | YES |

The second prediction, namely that any child learning English should acquire complex predicates and productive root compounding at approximately the same age, was tested in a study of spontaneous production data for ten children from the CHILDES database. The ten children were a subset of those studied in (Snyder & Stromswold, in press). The age of acquisition for a given grammatical construction was taken as age of first clear use; later transcripts were checked in all cases to confirm that the "first clear use" was followed soon afterward by regular, productive use.

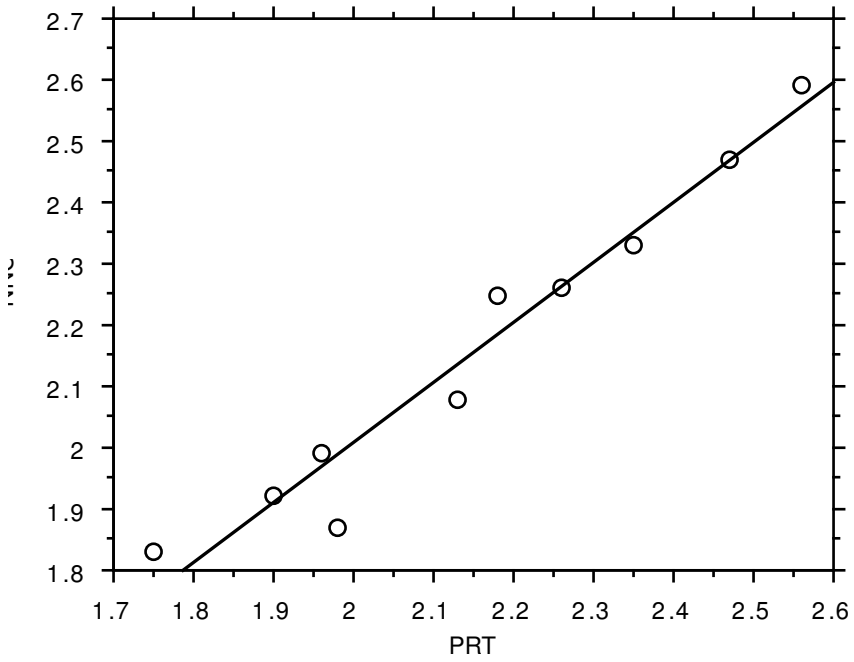
The diagnostic for productive root compounding was novel N-N compounding; at least on the surface, N-N compounding is the most productive and frequently employed form of root compounding in English. To count as novel, a child's N-N compound could not be a lexicalized form (e.g. *toothbrush, apple juice*), and the context of the child's utterance had to support the interpretation that the compound was invented "on the spot." Indeed, the latter criterion was surprisingly easy to satisfy, as children were often found "teaching" new compounds to the adults in the transcripts.

The age of acquisition of a variety of complex predicate constructions had already been determined for each child in (Snyder & Stromswold, in press). In addition to the age of acquisition of productive N-N compounding, a number of control measures were determined for each child: the age at which the child's mean length of utterance (MLU) first reached or exceeded 2.5 morphemes; the age of first clear use of a lexical N-N compound, such as *toothbrush*; and the age of first clear use of an Adjective-Noun combination, such as *big dog*. The MLU measure was a control for the possibility that complex predicates and productive compounding might be acquired together simply because both form a part of the "grammar explosion" that occurs at the transition between Brown's (1973) Stages II and III; more generally, MLU=2.5 serves as a proximate developmental milestone, allowing one to assess the contribution of general developmental factors to the timecourse of acquisition for compounding and complex predicates. Lexical N-N compounds and Adjective-Noun combinations serve as closely matched controls for the conceptual complexity and length of utterance of novel N-N compounds.

The results, in brief, were as follows. Ages of first clear use of a novel N-N compound were exceptionally well correlated with the ages of acquisition reported in (Snyder & Stromswold, in press) for verb-particle constructions (1b) ($r = .98$, $t\ (8) = 12.9$, $p < .00005$); these ages are graphed in Figure 1. The ages for novel N-N compounding were also robustly correlated with the ages of acquisition for causative-perceptual constructions (1c,d) ($r = .91$, $t\ (8) = 6.27$, $p$

= .0002), *put*-locatives (1e) ($r$ = .95, $t$ (8) = 9.09, $p$ < .00005),*to*-datives (1f) ($r$ = .88, $t$ (8) = 5.18, $p$ = .0008), and double object datives (1g) ($r$ = .77, $t$ (8) = 3.45, $p$ = .0086).

Figure 1: First Verb-particle Combination vs. First N-N Compound (Ages in years).




When the contribution of each of the control measures is subtracted out, through a partial regression procedure, all of the above correlations remain statistically significant, except for the correlation between compounding and double object datives. The double object construction thus appears to be something of an outlyer among the complex predicate constructions, when viewed in relation to morphological compounding. After partialing out the contribution of the ages at which MLU first reaches or exceeds 2.5 morphemes, a statistically significant portion of the remaining variance in the ages of acquisition for novel N-N compounding can still be accounted for by the ages of acquisition for verb-particle constructions ($r$ = .94, $t$ (7) = 7.41, $p$ = .0001), causative/perceptual constructions ($r$ = .77, $t$ (7) = 3.14, $p$ = .0164), *put*-locatives ($r$ = .88, $t$ (7) = 4.87, $p$ = .0018), or *to*-datives ($r$ = .80, $t$ (7) = 3.41, $p$ = .0133), but not double object datives ($r$ = .59, $t$ (7) = 1.95, $p$ = .0919, marginally significant).

Similarly, when ages of first clear use of a *lexical* N-N compound are partialed out, a significant portion of the remaining variance in ages of acquisition for novel N-N compounding can still be accounted for by verb-particle combinations ($r$ = .95, $t$ (7) = 7.72, $p$ = .0001), causative/perceptual constructions ($r$ = .79, $t$ (7) = 3.34, $p$ = .0124), *put*-locatives ($r$ = .90, $t$ (7) = 5.54, $p$ = .0009), or *to*-datives ($r$ = .86, $t$ (7) = 4.55, $p$ = .0026), but not double object datives ($r$ = .37, $t$ (7) = 1.06, $p$ = .3259, NS). Finally, when ages of first clear use of an Adjective-Noun combination are partialed out, a significant portion of the remaining variance in ages of acquisition for novel N-N compounding can once again be accounted for by verb-particle combinations ($r$ = .95, $t$ (7) = 8.45, $p$ = .0001), causative/perceptual constructions ($r$ = .82, $t$ (7) = 3.77, $p$ = .0070), *put*-locatives ($r$ = .91, $t$ (7) = 5.87, $p$ = .0006), or *to*-datives ($r$ = .88, $t$ (7) = 4.99, $p$ = .0016), but not double object datives ($r$ = .48, $t$ (7) = 1.43, $p$ = .1954, NS).

## III. Conclusions

Language acquisition and comparative syntax provide converging evidence in support of a single parameter that determines both the availability of productive root compounding, and the availability of a range of syntactic complex predicate constructions. The relevant parameter resists reduction to the lexical entry for a functional head or other closed-class lexical item, however, because no such closed-class lexical item has been independently motivated in root compounds. The results indicate a potentially important role for the syntax-morphology interface, both in the representation of language-particular grammatical knowledge, and in children's acquisition of this knowledge.

## Endnotes

* The author is grateful to audiences at the BU Conference and at UMass-Amherst for numerous comments and helpful suggestions. Responsibility for all errors remains with the author. This project has been supported in part by an NSF Research and Training Grant to MIT in the areas of Language Acquisition and Computation, and by the MacDonnell-Pew Center for Cognitive Neuroscience at MIT.

1. Two caveats are in order here. First, it should be noted that Romance does provide at least superficial counterparts to some of the other English constructions that have received complex-predicate analyses. This may simply indicate that some of the surface forms in (1) are ambiguous between complex-predicate and non-complex-predicate structures. Also, it should be noted that certain of the constructions in (1), notably the double object dative, lack counterparts even in many of the Germanic languages. Hence, even languages that allow complex predicates in general, may disallow specific complex-predicate constructions for independent reasons.

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