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**Complex Predicates and Goal PP's:
Evidence for a Semantic Parameter**

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I. Introduction

The present paper investigates the goal-PP construction in (1) from both acquisitional and cross-linguistic perspectives.

(1) John walked to the summit.

By "goal-PP construction" we mean the combination of a simple activity verb (*walk*) with a prepositional phrase indicating the goal of the activity (*to the summit*). Our conclusion will be that the semantic interpretation of goal-PP constructions is a point of cross-linguistic variation. Despite the availability of a surface equivalent to (1) in most of the world's languages, the mode of its semantic interpretation varies substantially.

Specifically, we propose that the setting of the compounding/complex-predicate parameter (Snyder 1995, in press) strongly affects the mode of interpretation. In languages like English, which permit productive compounding and complex predicates such as resultatives, the goal-PP in (1) is interpreted as a result phrase. For this reason, in English the combination of an activity verb with a goal-PP yields an *accomplishment* predicate.

The cross-linguistic prediction of our account is that a language will permit a goal-PP to convert an activity to an accomplishment only if that language permits fully productive root compounding, and moreover permits the resultative construction. The acquisitional prediction for children learning English is that use of goal-PP constructions will never precede the acquisition of root compounding. Both predictions are tested, and supported, below.

2. Background

Snyder (1995, in press) has reported that certain "complex-predicate" constructions, notably verb-particle constructions and resultatives, are

dependent on the availability of productive root compounding. For example, the verb-particle construction (2a) and resultative construction (2b) are both possible in English, but their direct counterparts are ungrammatical in Spanish (2d,e). Correspondingly, English permits one to form novel root compounds (2c) at will, when the sense is clear from context, but Spanish does not (2f).

- (2) a. Chris lifted up the book. (English)
 b. Mary beat the metal flat.
 c. worm can = 'container for fishing worms'
- d. Chris levantó (*alto) el libro. (Spanish)
 e. María golpeó el metal (*liso).
 f. bote *(de) gusanos 'can (for) worms' / *gusano bote 'worm can'

Below, Table 1 (based on Snyder, in press) presents the results of a cross-linguistic survey of resultatives and nominal compounding. Languages were classified as permitting resultatives if they allowed the direct counterpart to one or both of the following: *Mary beat the metal flat*, or *John wiped the table clean*. Availability of productive compounding was tested by asking informants to imagine that they go on a fishing trip and use an old can to store worms for bait. The informants then judged the direct counterpart of *worm can*, as a (presumably novel) way of referring to this can.^{1,2}

Table 1. Cross-linguistic survey of resultatives and productive N-N compounding.

	<u>Resultatives</u>	<u>N-N Compounding</u>
American Sign Language	YES	YES
Austroasiatic (Khmer)	YES	YES
Finno-Ugric (Hungarian)	YES	YES
Germanic (English, German)	YES	YES
Japanese-Korean (Jpn., Kor.)	YES	YES
Sino-Tibetan (Mandarin)	YES	YES
Tai (Thai)	YES	YES
Basque	NO	YES
Afroasiatic (Egyptian Ar., Hebrew)	NO	NO
Austronesian (Javanese)	NO	NO
Eskimo-Aleut (Inuttut)	NO	NO
Bantu (Lingala)	NO	NO
Romance (French, Spanish)	NO	NO
Slavic (Russian, Serbo-Croatian)	NO	NO

Languages permitting the resultative consistently permitted root compounding as a fully productive process. Crucially, however, the example of Basque shows that root compounding is not by itself sufficient. The resultative apparently depends both on compounding and on a second factor, absent from Basque.

The English resultative is low in frequency of use, for both children and adults, and therefore its first clear use in spontaneous speech is a poor diagnostic of when it becomes grammatically available to the child. In contrast, the verb-particle construction occurs with high frequency in both children's and adults' speech. A study reported in (Snyder, in press), based on the longitudinal corpora of spontaneous speech samples from ten children learning English, revealed that verb-particle constructions enter a child's speech at almost exactly the same point as novel Noun-Noun compounds ($r=.98$, $t(8)=12.9$, $p<.001$).

3. Goal PP's in Language Variation and Language Acquisition

Following (Roeper, Snyder, & Hiramatsu, in press), we assume that root compounding is fully productive in a given language (i.e., that novel compounds are formed automatically, whenever the need arises) if and only if it can occur during the syntactic derivation. When root compounding is available as a mechanism of syntactic combination, syntactic sisters can freely be treated as forming a complex word, for purposes of semantic interpretation.

Crucially, we propose that certain modes of semantic composition are available only within a complex word. At least one such mode of word-internal semantic composition ("Principle R," in 3) is subject to parametric variation in its availability. We thus propose that Basque has productive root compounding, but lacks Principle R.

- (3) Principle R: If $\alpha=[V \ \gamma \ SC \ \beta]$ and β' is of type $\langle s, \langle \tau, t \rangle \rangle$ and γ' is of type $\langle e, \dots \langle e, \langle s, \langle \tau, t \rangle \rangle \rangle \rangle$ (i.e., γ' is an n-place predicate), then $\alpha' = \lambda x_1 \dots \lambda x_n \lambda w \lambda t. CAUSE_{w,t}(\lambda w' \lambda t'. \gamma'_{w',t'}(x_1) \dots (x_n), \lambda w'' \lambda t''. BECOME_{w'',t''}(\beta'))$.

Principle R is based on proposals of (Stechow 1995) for the interpretation of resultative constructions. The operation of Principle R in a resultative is illustrated in (4) and (5). Following Stechow, we treat the resultative as involving controlled PRO within a small clause.

- (4) [beat [PRO_i flat]] →
 $\lambda x \lambda y \lambda w \lambda t. CAUSE_{w,t}(\lambda w' \lambda t'. beat_{w',t'}(x)(y),$
 $\lambda w'' \lambda t''. BECOME_{w'',t''}(\lambda w^* \lambda t^*. flat_{w^*,t^*}(x_1))$

- (5) Mary beat the metal flat. →
 $\lambda w \lambda t. CAUSE_{w,t}(\lambda w' \lambda t'. beat_{w',t'}(Mary)(the\ metal),$

$\lambda w''\lambda t''$. BECOME_{w'', t''}($\lambda w^*\lambda t^*$.flat_{w^*, t^*}(the metal))

In more intuitive terms, one can think of the material in (4-5) as follows. After application of Principle R, the interpretation of the VP in (4) is essentially a function from individuals, x and y , to truth values. The function returns the value 'true' exactly when x beats y , and that beating causes y to become flat.

Our proposal for goal PP's is that in a language like English, the goal-PP construction is interpreted as a type of resultative. The interpretation of example (1) is illustrated in (6).

(6) [John [1 [t₁ [walked [PP PRO₁ to the summit]]]]] →
 $\lambda w\lambda t$. CAUSE_{w, t}($\lambda w'\lambda t'$.walk_{w', t'}(John),
 $\lambda w''\lambda t''$. BECOME_{w'', t''}($\lambda w^*\lambda t^*$.at_{w^*, t^*}(the summit)(John))

In (6) we interpret the preposition *to* as meaning 'at'. Thus, the interpretation of the sentence can be (roughly) paraphrased as 'John's walking caused him to become at the summit.'

Note that in English, the presence of the goal PP in (1) effectively converts the activity verb *walk* into an accomplishment predicate. Following (Dowty 1979), we take an accomplishment to involve two key components, CAUSE and BECOME. In (6) these components result from application of Principle R to combine the verb with the goal PP.

The accomplishment status of the predicate is demonstrated by its compatibility with the durational modifier *in an hour* (7a). This modifier specifies the time elapsing between the onset and the "culmination" of an event. Accomplishment predicates, by definition, have a natural culmination point, while simple activities do not. (Hence the oddity of the sentence, *John walked in an hour*.)

- (7) a. John walked to the summit (in an hour).
 b. Juan caminó hasta la cima (*en una hora). (Spanish, Aske 1989)

In contrast, Aske (1989) has observed that the Spanish goal-PP construction in (7b), a word-by-word equivalent to (7a), is incompatible with the durational modifier *en una hora* 'in an hour'. We will leave open the question of exactly how Spanish goal-PP constructions are interpreted. Nonetheless, we expect that the combination of an activity verb and a goal PP will yield an accomplishment predicate only in those languages that permit resultatives -- hence, only in languages with both productive compounding and Principle R.

To test this prediction we conducted a new cross-linguistic survey, this time comparing the availability of resultatives (as in Table 1) to the possibility of a temporal *in*-phrase with goal-PP constructions. Importantly, the goal-PP constructions involved a main verb expressing a simple activity, rather than an

accomplishment, as determined by the *in*-phrase test. The results are shown in Table 2.

A first observation is that Aske's English-Spanish contrast generalized to other languages directly, as expected if the contrast reflects an underlying parameter of cross-linguistic variation. Moreover, as predicted, languages that clearly disallowed the resultative never permitted a goal-phrase to convert an activity into an accomplishment, and languages that clearly permitted the resultative always allowed the goal-PP construction to be interpreted as an accomplishment.

Table 2. Cross-linguistic survey of Principle R (availability of resultatives) and compatibility of goal-PP construction with temporal *in*-phrase.

Language	Principle R (Resultatives)	goal-PP + <i>in</i> -PP
English	Yes	Yes
German	Yes	Yes
Japanese	(Yes)	Yes
Korean	Yes	Yes
Mandarin	Yes	Yes
French	No	No
Hebrew	No	No
Hindi-Urdu	No	No
Russian	No	No
Spanish	No	No

The one problematic language in this survey was Japanese. The informants disagreed somewhat on the acceptability of our resultative items ('John wiped the table clean', 'Mary beat the metal flat'). (Variability in the judgements on Japanese resultatives has also been noted by Washio 1997.)³ Nonetheless, most (though not all) of our informants accepted the durational modifier ('in an hour') with the goal-PP construction.

An acquisitional prediction is that children learning English will begin to use goal-PP's (e.g., *John ran to the store*) at approximately the same age as productive compounding. This prediction follows if children are relatively conservative learners, and determine the nature of the goal-PP construction in adult English before they begin to produce goal PP's.

On such a model, the child would first determine whether English permits productive compounding. One way to determine this would be by checking a sample of the adult input for the presence or absence of recursive compounds. As discussed in (Roeper et al., in press), the presence of recursive compounds, such as [[*Christmas tree*] *cookie*], is a good indication that root compounding is

fully productive in the language; and recursive compounds are found with reasonable frequency (at least) in the child-directed English of North American adults. Once the child knows that compounding is productive, the availability of Principle R would become a logical possibility. The trigger for Principle R in English is uncertain, at present, but could perhaps be the verb-particle construction, which is used frequently in child-directed speech. Finally, we assume that a language interprets goal PP's with Principle R whenever Principle R is available.

According to this model, some children might acquire the goal-PP construction later than compounding, if they are slow to recognize the trigger for Principle R, or if they are slow to learn the lexical entries for goal-marking prepositions such as *to*. Yet, no child should acquire the goal-PP construction substantially earlier than compounding, because the adult-English form of the goal-PP construction depends on the availability of compounding. Moreover, in the usual case the goal-PP construction should appear quickly after productive root compounding, if we are correct in our hypothesis that the trigger for Principle R in English is a high-frequency phenomenon, such as the verb-particle construction, and if goal-marking prepositions likewise occur with reasonably high frequency in the input.

Table 3. Ages of first clear use, in years, for novel N-N compound and for goal-PP with *to*.

Child	novel N-N compound	goal-PP	with <i>to</i>
Adam	2.26	2.25	
Allison	2.33	2.35	
April	2.08	2.80	*
Eve	1.83	1.94	
Naomi	1.92	1.94	
Nath	2.47	2.47	
Nina	1.99	1.98	
Peter	1.87	2.02	
Sarah	2.59	3.11	*
Shem	2.25	2.21	

To test our predictions we compared the ages of first clear use, in ten children from CHILDES (MacWhinney & Snow 1985, 1990; MacWhinney 2000), for the goal-PP construction with *to* (ages drawn from Snyder & Stromswold 1997) and for novel N-N compounding (ages drawn from Snyder 1995). The results are shown in Table 3.⁴

As expected, eight of the children acquired the two constructions at about the same time. The remaining two children (April and Sarah) both showed a

difference in the expected direction, with compounding appearing earlier than the goal-PP construction. Overall, the ages of acquisition for the two constructions were significantly correlated: $r=.756$, $t(8)=3.26$, $p=.0115$.

4. Conclusions

In this paper we have extended Aske's (1989) observations concerning Spanish and English to a much larger range of languages. To our knowledge, the semantics literature has not previously recognized the existence of cross-linguistic variation in the interpretation of goal-PP constructions. Here we have demonstrated not only the existence of such variation, but also a systematic relationship to the availability of resultatives.

Cross-linguistically, goal PP's can usually appear with activity verbs, but the combination is interpreted as an accomplishment only in languages with resultatives, and (hence) with productive root compounding. Acquisitionally, goal PP's appear in children's English at approximately the same age as (or occasionally, later than) the first novel compounds. Thus, we have extended the class of "complex-predicate constructions" from (Snyder 1995) to include accomplishment predicates constructed out of an activity verb and a goal PP. The English type of goal-PP construction, like the resultative, appears to depend both on productive compounding, and on the availability of Principle R (a principle of semantic composition for elements of a complex word). Hence, we believe we have evidence for the existence of a semantic parameter.

Endnotes

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1. In the case of Japanese the test for compounding had to be modified slightly, because the word the informants preferred for 'can' had too strong an association with foodstuffs. For discussion of this point, see (Miyoshi 1999).

2. Several details of Table 1 warrant comment. First, because of the tendency for closely related languages to pattern similarly, on compounding as well as resultatives, languages belonging to the same immediate genetic grouping (e.g. Russian and Serbo-Croatian, within Slavic) have been treated as a single data point. Second, languages have been treated as permitting a resultative as long as their equivalent to the resultative is monoclausal, even if it employs morphology absent from English. In particular, ASL and Thai require an extra morpheme corresponding to 'become', as in 'Mary hammered the-metal become flat.' Japanese requires a special tenseless form of the adjective, and Hungarian requires the adjective to be marked for "translative" case. Finally, languages have been coded as non-compounding if they require a connector morpheme to combine two nouns, such as a preposition (*bote de gusanos* 'can for worms') in

Spanish, or genitive morphology ('can of-worms') in Russian. The construct-state construction in Afro-Asiatic languages has been treated as involving extra morphology, in this sense, and therefore as not being an instance of true root compounding.

3. On Japanese children's elicited production of resultatives, see (Sugisaki & Isobe, in press).

4. The findings reported in Table 3 resulted from analysis of longitudinal corpora for the following children: Adam, Eve, and Sarah (Brown 1973); April (Higginson 1985); Allison (Bloom 1970); Naomi (Sachs 1983); Nathaniel (MacWhinney & Snow 1985, 1990; MacWhinney 2000); Nina (Suppes 1974); Peter (Bloom 1973); and Shem (Clark 1978).

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