A developmental route: learning about the form and use of complex nominals in Hebrew*

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Abstract

The route taken by Hebrew-speaking children in acquiring compounds and related genitive constructions serves to motivate certain general claims about the relation between lexical and grammatical knowledge, and how language learning interacts with linguistic structure and language use. The constructions analyzed belong to the category known as smixut *'adjacency' in Hebrew grammar, corresponding to English genitives like* a child's dream *or* a group of children, *and compounds like* child welfare, child prodigy. *Use of these constructions in Hebrew is described for early preschool through grade-school age, in contexts which include adult–child conversations, picture-book narratives, and experimental designs testing comprehension and production of innovative noun compounds.*

Acquisition starts out as lexical knowledge of individual rote-learned items, and this repertoire increases with age as a function of general vocabulary expansion. Syntactic command of phrasal combinations relies initially on use of the genitive particle shel *'of' to express possession, with subsequent extension of the lexical means for encoding a wide range of semantic relations between two nouns. Late-preschool-age children show growing command of the morphosyntax of noun compounding both as rule-bound grammatical knowledge and as a means for innovative word formation. Mature endstate knowledge entails the ability to alternate these various formal devices in accordance with discourse requirements and stylistic register. We conclude that 'knowing' a given structure cannot be characterized in an atomistic fashion. Rather, compounds and genitives, like other superficially distinct constructions, form part of an integrated set of linguistic subsystems. As in other areas of language acquisition, full endstate knowledge may only be achieved in adolescence or beyond.*

The study concerns children's acquisition of compounds and related genitive constructions in Hebrew. The term 'genitive' refers here to

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relations expressed between two or more nominals in combinations such as the English examples in (1) below.[1]

(1) a. (the) child's bicycle, child's play, (a) child's dream
b. child tormentor, child prodigy, child bride
c. child of one's dreams, child of the times

A sketch of structural properties of such complex nominals and how they function in current Hebrew usage (section 1) is the background to description of the path taken by Hebrew-speaking children in acquiring these constructions (sections 3 and 4). One aim of this presentation is to attempt a more integrated picture of how children acquire different facets of an overall linguistic system en route to endstate mastery, and so add to what is known about these constructions developmentally and in linguistic description.[2] Another aim is to underscore more general features of the relation between language acquisition, language structure, and language use. For instance, lexical and grammatical knowledge interact in children's learning of such constructions. The relative productivity of particular forms also plays a role in their acquisition, not only in terms of structural constraints, but especially in how prevalent they are in colloquial usage and in the speech accessible to children. And the route to overall mastery is a long-drawn-out process: children manifest knowledge of parts of this system early on, as young preschoolers; but it can take them until school age or even puberty before they acquire full command of this, as of other linguistic subsystems or sets of constructions.

1. Structure and use of Hebrew genitives

There are three main kinds of genitive constructions covered by the term *smixut* 'adjacency' in Hebrew. The *head* element is always initial, in contrast to the mixed order illustrated for English in (1) above. The three expressions in (2) are roughly synonymous versions of 'Jacob's dream' or 'the dream of Jacob'.

(2) a. bound genitive: xalom^ya'akov
dream^Jacob[3]
b. free genitive: ha-xalom shel ya'akov
the-dream of Jacob
c. double genitive: xalom-o shel ya'akov
dream-his of Jacob

The present study focuses on compound nouns in the form of a bound genitive as in (2a) and their periphrastic options like the *shel* 'of' phrase in (2b) as well as other prepositional constructions.[4] The phrasal options in (3b)–(3e) below contrast with the compound, bound-genitive form in (3a), although ALL the expressions in (3) mean something like 'a striped dress'.

(3) a. simlat^pasim
'dress-Gen^stripes'
b. simla shel pasim
'dress of stripes'
c. simla im pasim
'dress with stripes'
d. simla mi pasim
'dress from (=out-of) stripes'
e. simla me-fuspeset
'dress stripe-d=striped dress'

The initial, head noun in a bound-genitive compound may have a different morphological shape when it occurs in isolation or as head of a phrase: compare the bound head noun *simlat-* in (3a) with the free form *simla* 'dress' of the same noun in (3b)–(3e). The genitive particle *shel* 'of' is structurally distinct from other prepositionals, since it is never governed by a verb or adjective.[5] Yet *shel* may alternate with other prepositions in postnominal {N Pr N} constructions, as shown in (3c) and (3d).

A bound genitive like *xalom^ya'akov* in (2a) or *simlat^pasim* in (3a) can be compared with its free or unattached counterpart with *shel* as located at two extremes of a continuum — from fully lexicalized, wordlike elements to highly transparent and phraselike combinations. The former are part of the well-established conventional vocabulary, on a par with English *birthday*, *penknife*; the latter are derived by productive rules of syntax, as innovative or occasional expressions like *day of rejoicing*, *knife of steel*. All bound, construct-state genitives are subject to highly specific morphosyntactic constraints on how they are inflected and how they pattern in agreement. But some bound genitives are more wordlike, less transparent semantically and less phraselike syntactically, than others. For instance, ones that are fully lexicalized as compound nouns cannot be paraphrased by an analytic counterpart with the particle *shel* or some other preposition. And although many Hebrew scholars follow the tradition of treating all three types of genitives as a single coherent set of structural alternatives, there is no guarantee that children will construe them in this way.[6]

Mature knowledge of genitives involves several dimensions. This includes LEXICAL competence, such as recognizing established noun compounds as part of the shared wordstock of their speech community (Berman and Ravid 1986). And it entails the ability to deploy

compounding for new-word formation: in loan translations — for example, the Hebrew equivalents of *swimmingpool*, *sunglasses*, *surface structure*; in spontaneous innovative coinages as well as under experimental conditions (Clark and Berman 1987; Olshtain i.p.); for creating taxonomic paradigms as in the terms for *washing machine*, *sewing machine*, *typing machine* (= *typewriter*), *shaving machine* (= *razor*), and other types of semantic contrast and subcategorizing (Berman and Clark forthcoming; Clark et al. 1985); and, under appropriate pragmatic conditions, to label previously unnamed associations of entities (Downing 1977; Petruck 1979).

Speakers must also master the *morphosyntax* of these constructions. This includes specialized knowledge of the *morphological alternations* required by certain classes of head nouns in the bound, construct state (Clark and Berman i.p.). And it involves command of the *syntactic rules and constraints* governing these different constructions, since bound genitives differ radically from analytical noun-phrase constructions with respect to gender, number, and definiteness assignment, and processes of agreement, pronominalization, modification, etc. (Berman 1978, 1986a; Borer 1983; Ritter 1987).

Moreover, knowledge of genitive constructions interacts with speakers' recourse to OTHER MEANS OF NOMINAL MODIFICATION. For instance a bound genitive like *sakey^bananot* 'sacks^bananas' = 'banana sacks' has *periphrastic alternatives* in the form of {N Prep N} expressions, such as *sakim shel bananot* 'sacks of bananas' = 'bananas' sacks', *sakim le-bananot*, 'sacks to = for bananas', *sakim im bananot* 'sacks with bananas', *sakim mi bananot* 'sacks from (= made out of) bananas', and other more explicit constructions like *sakim mle'im bananot* 'sacks full-Pl (of) bananas', *sakim te'unim bananot* 'sacks loaded-Pl (with) bananas'.[7] Another option is by means of denominal adjectives in noun–adjective phrases which correspond to Noun^Noun bound genitives, such as *sak-im plast-iy-im* 'sack-s plast-ic Pl' = 'plastic(ky) sacks' vs. *sakey^plastik* 'plastic sacks', *sixa telefon-it* 'talk-Fem telephon-y-Fem' = 'telephon-y conversation' vs. *sixat^telefon* 'phone conversation',[8] while in some contexts, bound genitives are generally preferred, as in classifying partitives equivalent to English *piece of cake*, *end of the journey*, *top of the class*.[9] Mature speakers are thus free to choose between various such morphosyntactic and lexical options in modifying a head noun.

Finally, knowledge of CONVENTIONS OF STYLE AND USAGE also plays a role in the mature development of genitive options. For instance, in more formal expository style and in most written Hebrew, nominals are typically combined as bound or double genitives. This is in marked contrast to speakers' preference for more analytic, periphrastic

constructions in everyday colloquial usage.[10] This is characteristic of a special diglossia in current Hebrew: educated speakers prefer more classical, morphologically bound forms (of genitives as well as other constructions) in formal or official contexts but rely on periphrastic expression in their conversational usage — among themselves as well as in their speech to children. Less literate speakers will not have recourse to these stylistic options and register distinctions, whether they are uneducated adults or as yet untutored children.

2. General developmental observations

The Hebrew-learning child thus needs to master several different kinds of knowledge in acquiring genitives: *lexical* — a conventional repertoire of labels for referents; *morpho-syntactic* — rules for inflecting bound head nouns in compound expressions both as a means for new-word formation and for stringing nominals together; *semantic-syntactic* — different ways of modifying classes of head nouns and of specifying relations between two nominals; and *stylistic* — differential deployment of these options according to level and context of usage. Findings available for certain of these dimensions reveal that acquisition proceeds along a multifaceted developmental route.

(4) Developmental steps in acquiring Hebrew genitives:
- I. word learning, vocabulary items: 1;6–2;0 years
- II. phrase learning, free genitives: 2;4–3;0 years
- III. compounding, form and function of bound genitives: 4–7 years
- IV. stylistic alternation of forms: later school age

This acquisitional route can be related to a general view of language development which I have proposed for other aspects of Hebrew morphology and syntax (Berman 1985d, 1986b). Initial acquisition takes the form of item-bound, structurally unanalyzed connections between form and meaning; in the case in point, this means that children acquire lexicalized compounds like other elements of their vocabulary, as set forms with no morphosyntactic alternations. Subsequently, in the period when the bulk of the rich inflectional system and other facets of Hebrew morphosyntax are acquired, children learn to combine nominals by means of the genitive particle *shel* and other prepositionals, which are deployed with an expanding repertoire of functors in more, and different, syntactic environments. The relatively later development of the grammar of innovative, nonlexicalized compounding is due largely to the restricted productivity of such constructions: they are infrequent in the colloquial

speech that is the major input to young preschoolers; they are not highly favored for new-word formation by speakers whose language affords rich affixal options for this purpose; and as a syntactic means for combining nominals, bound compound genitives are typical of a formal register not commanded prior to the establishment of literacy. Finally, endstate knowledge as sketched above requires a mature ability to flexibly deploy a broad range of structural options and to take account of different discourse contexts and levels of usage. This would seem beyond the capacities of children below school age.

The findings described below are thus motivated by a more general developmental model in which learners proceed from rote to rule, from item-based to structure-dependent learning, and on to felicitous alternations within and across construction types. At the same time, certain facets of their task are specific to Hebrew: the language retains a rich inflectional morphology, yet speakers have recourse to analytic devices alongside more classical bound forms; and this is reflected in a diglossia between untutored and literate usage and between everyday conversation and more formal modes of expression.

3. Description of data base

Findings are based on the following sources: (1) longitudinal analysis of 20 recorded sessions of a Hebrew-speaking sister and brother between the ages of 1;8–6;10 and 1;4–5;9, kindly made available by Dorit Ravid; 17 transcripts of the speech of a girl between age 1;7–2;7 recorded by Dafna Kaplan; and handwritten notes of the speech of an Israeli boy between one and six years of age recorded by his grandfather (Berman and Sagi 1981); (2) some 150 interview-type transcripts of adult–child conversations analyzing the output of over 100 children recorded once or more between the ages of 1;0–5;6 years (Berman 1985c; Bilev 1985; Dromi and Berman 1986; Kaplan 1983); (3) analysis of a corpus of over 100 Hebrew narratives told by children aged 3, 4, 5 and 7, 9, and 12 as well as by adults — on the basis of a picture-book story about a boy and his dog searching for a pet frog which has run away (Berman 1985b; Berman and Slobin 1987); and (4) results of two elicitation studies of the ability of Hebrew-speaking children aged between 2 and 9 years to identify, produce, and paraphrase innovative compounds (Berman and Clark forthcoming; Clark and Berman 1987). The data are thus based on different elicitation procedures and contexts of use, to address the issue of how children gain mastery of distinct yet interrelated facets of a linguistic system. Below, we refer to sources (1) and (2) together, under the heading

of 'conversational' usage, source (3) as 'narrative', and source (4) as 'structured elicitation' — specifying the type of material used for any given analysis in square brackets in the text below. Note, finally, that focus is on production of the relevant constructions rather than on when and how children learn to comprehend them.

4. Facets of genitive acquisition

Findings are described below according to types of knowledge acquired, rather than along chronological lines or in relation to a particular context of use represented in the data base. The material is divided into acquisition of well-established compounds as part of general vocabulary expansion (section 4.1); noun modification by means of genitive and other prepositional phrases (section 4.2); bound-compound morphology as a means of new-word formation and for labeling subcategories (section 4.3); and other facets of complex nominal formation such as assignment of definite marking to genitives and use of denominal adjectives (section 4.4).

4.1. *Vocabulary learning* [*conversations, narratives*]

Initial use of lexically established compound nouns occurs as early as age 1;6–2;0 years [conversational materials] and continues through adolescence, as a function of vocabulary increase [narratives]. The compound nouns used by young children at the one- and two-word phase are typically very common everyday items, such as *yom^huledet* 'day^birth' = 'birthday', *bet^yeladim* 'house^children' = 'children's home' (on a kibbutz), *gan^xayot* 'garden^animals' = 'zoo'. From the third year, around age 2;6, the repertoire of such expressions increases to include other everyday terms (such as *aruxat^boker* 'meal^morning' = 'breakfast'; *bet^sefer* 'house^book' = 'school'; *na'aley^bayit* 'shoes^house' = 'slippers'), all familiar from the children's immediate environment and common in preschool speech, both input and output (Berman 1981, 1985a). These and other such items are clearly part of the shared wordstock of Israeli children, much as all English-speaking children from similar middle-class backgrounds will know the words for *birthday*, *bathing suit*, *grapefruit*, or *lunchbox*. In fact, the content of the specific compounds used by preschool children [conversational materials] proves to be largely shared across children — for instance, the terms for 'birthday' and for 'zoo' were particularly common (although this might

have been biased by investigators tending to focus on certain events in interviewing their subjects). To some extent, of course, the child's own experience is reflected in this as in other facets of vocabulary development. For example, in conversation with a young woman member of the kibbutz where he was born, Or (aged 4;11) used the following conventional compounds: *pinat^sixa* 'corner^talk' — the show and tell section of a schoolhouse; *bet^tinokot* 'house^babies', the place where infants are housed on a kibbutz; *bet^yeladim* 'house^children' — where older children live; *bet^tarbut^* 'house^culture' = 'recreation room'; *shmurat^teva* 'reserve^nature' = 'nature reserve'; *gan^xayot* 'garden^animals' = 'zoo'; *aruxat^tsohorayim* 'meal^noontime' = 'lunch'; *aruxat^eser* 'meal^ten (o'clock)' = 'juice time'; *ben^zona* 'son^whore' = 'sonofabitch'.

Initially, when children are still at a presyntactic or 'pregrammatical' phase (Berman 1986b, 1986c), bound N^N forms are acquired as structurally unanalyzed lexical items. That is, to start with, children construe them the same as other, monolexemic words they know: compare *mitbax* 'kitchen'/*bet^shimush* 'house^use' = 'lavatory', *magafayim* 'boots'/*na'aley^bayit* 'shoes^house' = 'slippers'. Evidence that these early compound nouns (or bound genitives) are learned as unpackaged amalgams and treated just like one-word items is shown by how children form their plurals. In Hebrew, masculine plurals add *-im* (as in *mitbax-im* 'kitchen-s') and feminine nouns end in *-ot* (as in *mita/mit-ot* 'bed/bed-s'). However, compound nouns form their plurals in a distinctive way: the plural suffix *-im* of the head noun is replaced by a special bound form *-ey* (compare *mitbax-im* 'kitchen-s' with the bound form *mitbax-ey* in compounds, such as *mitbaxey^ets* 'kitchens^wood' = 'wood(en) kitchens'). Young children typically treat the compound nouns in their repertoire as single lexemes: they add the masculine *-im* or feminine *-ot* plural ending at the end of the whole compound, not to the initial head noun, as shown in (6) [conversational data base].

(6) Regularization of compound-noun plurals:

a. yom^huledet
day^birth
'birthday'
plural: yem-ey^huledet
juvenile: *yomuladet-ot

b. bet^shimush
place^use
'lavatory'
plural: bat-ey^shimush
juvenile: *betshimush-im

c. beged^yam
garment^sea
'swimsuit'
plural: bigd-ey^yam
juvenile: *begedyam-im

These errors are not confined to a few children, or to only one or two items. Correct plural forms of compounds are found among two- to three-year-olds only in cases where a lexicalized compound is most typically used with a plural head noun (for example, *naal-ey^bayit* 'shoes-house' = 'slippers' occurs in early child speech, but not the singular *naal^bayit* 'shoe^house' = 'slipper').[11]

Initial learning of compounds thus involves no more nor less than learning of other vocabulary items. And such forms constitute a small proportion of the nouns used by children in general. Samples of adult–child interactions [selected from the 'conversational' materials] with children aged 2;6, 3;6, and 4;6 contained only between two and six compound nouns per 100 noun terms.[12] Subsequent increases in the number of compound nouns in children's speech reflect general vocabulary expansion. Analysis of the nonlongitudinal'conversational' data samples reveals the following figures: children aged under two years produced almost no compounds at all (nine out of a total of nearly 4000 output clauses); 2;0–2;11 years used 65 compounds (tokens, not types) in the total of 9249 clauses they produced (0.7%); those aged 3;0–3;11 produced 83 compound nouns out of their 7716 clauses (1.1%); those aged 4;0–5;6 produced 87 compound nouns in their 5105 output clauses (1.6%). And even a child with a highly developed vocabulary, such as the boy Or noted earlier (aged 4;11), used only nine compound nouns in an interview where he produced over 450 output utterances. Across well over 150 transcripts of conversational data from preschool children, then, only a small part of their lexicon consists of compound nouns, and these rise proportionately with age, as do other kinds of lexical categories, such as adjectives for instance.

Increased use of compound nouns with age also reflects reliance on a more literate mode of expression among older speakers. Analysis of stories based on a picture book about the adventures of a boy and his dog in search of their missing frog reveals little use of compound nouns in preschool narratives compared with schoolage children and adults (Bilev 1985). Overall, the numbers of bound-genitive compounds were as follows:

(7) Distribution of N^N combinations in Hebrew narratives:

			N^N	
Age	N	# Clauses	Tokens	Types
3, 4, 5	43	2095	14	9
7, 9, 11	51	2963	80	35
Adults	12	930	75	36

The stories of the preschoolers, including 19 kindergarten children aged five to six, contained very few compounds. These were all highly lexicalized items, so might have been known by rote — for example, *gan^xayot* 'garden^animals' = 'zoo', *kaveret^dvorim* 'hive^bees' = 'beehive', *geza^ets* 'log^wood/tree' = 'log of wood', 'tree trunk'. The school-age stories contained more noun compounds, both overall and per story, with roughly the same number of compounds across seven-year-old second-graders, nine-year-old fourth-graders, and 11–12-year-old sixth-graders (24, 27, and 29 compounds respectively). In each of these age groups, at least three-quarters of the children used one or more compounds in their stories (38/51 of the schoolage stories contained between one and four compounds). As in the conversational materials, so also in these narratives: the older children's use of conventional compounds reflects recourse to more specialized vocabulary — for example, two children — one aged 7;9, another aged 9;7 — talked about the protagonists having reached 'the end of the road', Hebrew *sof^ha-derex* 'end^the-way'; another child aged 9;5 referred to a log of wood lying in the water as *bul^ets* 'block^wood', in preference to the commoner *geza^ets* 'tree trunk'; and another 9-year-old described the dog as slipping off the windowsill — *eden^ha-xalon* 'edge^the-window'.

In their narratives, school-age children also used several less frozen, nonlexicalized compounds, such as *sof^ha-sipur* 'end^the-story' = 'the story's end' (age 7;0), *mexilat^axbar* 'burrow^mouse' 'a mouse-burrow' (7;5), *anfey^ha-ets* 'branches^the-tree' = 'the branches of the tree' (9;2), *nexil^dvorim* 'flock^bees' = 'a swarm of bees' (9;8). This indicates that these children have acquired compounding as a productive device (see section 4.3 below), even though they use it only sparingly in their narratives. Adults make far wider use of compounds, both well-established and nonlexicalized, than do even 4th- and 6th-grade children telling the same story. While the school-age children average one to two compounds each, most of the adults use six or seven compounds each in their stories. And the particular compounds used differed from one adult to the next. For instance, different adults referred to the jar in which the boy kept his frog as *tsintsenet^zxuxit* 'jar-glass', as *kli zxuxit* 'utensil^glass', and as *mexal^zxuxit* 'container^glass'; and they specified the spot where a deer dislodges the boy from the edge of a cliff as, variously, *sfat^ha-mayim* 'edge^the-water', *gedat^ha-nehar* 'bank^the-river', and *ktse^habrexa* 'end^the-pool'. Wider, more varied use of compounds by the adults reflects mature command of an increased repertoire of vocabulary items and a more literate deployment of the lexicon.

4.2. *Phrasal learning: acquisition of 'free' genitives* [*conversational*]

Another facet of genitive acquisition is gaining command of phrasal, syntactic means for expressing semantic relations between two nouns. The developmental steps to this process are as follows:

(8) Steps in acquisition of 'free' genitive phrases:
1. initial immature juxtaposing of N N: around age 2
2. free {N *shel* N} phrases acquired along with some common prepositions in {N Prep N} phrases: around 2;4 to 2;6
3. genitive particle *shel* extended to nonpossessive uses, and a wider range of prepositions used in {N—N} contexts

Up to around the middle of their third year, children show little evidence of having acquired the syntax of noun combination. Hebrew-learning children start out by merely juxtaposing nouns, much as has been recorded for other languages (Bloom 1970; Bowerman 1973; Slama-Cazacu 1973). The following are typical examples from conversational data of Hebrew-speaking children, at ages given in brackets.

(9) a. [1;11] *buba ayalda — doll the-girl — 'the girl's doll' — vs. ha-buba shel ha-yalda — the-doll of the girl

b. [2;1] *bayit a-kele — house the-dog — 'the dog's house' — cf. bet^ha-kelev — 'the dog('s) home' — vs. ha-bayit shel ha-kelev — the-house of the-dog

c. [2;3] *balon letsan — balloon clown — 'clown's balloon' — vs. balon shel letsan — balloon of (a) clown

d. [2;4] *uga shabat — cake Sabbath — cf. ugat^shabbat — 'Sabbath-cake' — vs. uga shel/le- shabat — cake of/for the Sabbath

Such strings contain no morphological or other cues to specify the semantics or syntax of the relationship between the two items and need to be interpreted by reference to the context in which they are used. The large bulk occur in the appropriate Head–Modifier order, although occasionally children invert them. For instance, Nimrod, aged 2;3, looking at pictures of a circus, first said *ine balon!* 'here's (a) balloon', followed by the ill-formed sequence **od balon letsan* of (8c), literally 'another balloon clown' (compare *balon^letsan*, *balon shel letsan* 'clown's

balloon'), and then later rephrased this as **ha-letsan balon* 'the-clown balloon' when pointing to a clown with a balloon — possibly intending the normative *la-letsan yesh balon* 'the clown has (a) balloon'. This clearly manifests presyntactic stringing of items typical of early word combinations across different languages (Slobin 1979). Moreover, such Noun–Noun combinations constitute a relatively small proportion of the two-word utterances typical of Hebrew-speaking children [conversational data base]. Analysis of the two-word strings contained in 50 output utterances of 36 boy-children aged 22 to 28 months (Rabinowitch 1974) shows the following: out of an average of 16 two-word utterances per child (ranging from 9 to 23 across the sample), fewer than half the children produced between one and three Noun–Noun strings, the rest no such combinations at all. But when they occur in the usage of children whose productions are as yet pregrammatical, with no morphosyntactic marking of the relation between the two nouns, they are very similar to what has been observed for other languages.

During their third year, children learn to combine nouns with *shel*, as in the examples in (9).

(10) a. [2;3] ima shel tali
Mommy of Tally
'Tallie's mommy'

b. [2;4] oto shel yeled
car of boy
'(the) boy's car'

c. [2;5] ha-mita shel ima
the-bed of Mommy
'Mommy's bed'

d. [2;7] bakbuk shel ha-tinok
bottle of the-baby
'the baby's bottle'

Early genitive phrases with *shel* nearly always have animate (mainly human) terms as the second, possessor nouns, and the possessee typically refers to family members, or to body parts, clothing, and other salient elements in the child's surroundings. That is, they are confined to possessive phrases and constitute a typical means of identifying something as belonging to someone. From around age three, *shel* is extended to other contexts and is used with nonanimates to express nonpossessive relations such as purpose, part–whole, and location. Expressions like the following occurred in the speech of most of the Hebrew preschoolers recorded in conversation with adults or with each other in a wide range of longitudinal and sampling contexts (section 3 above): (age 3;4) *ha-tsyurim shel ha-televizya* 'the pictures of=on television'; (3;7) *sikot shel ha-mehadek* 'pins of the stapler'; (3;9) *xultsa shel betsefer* 'shirt of school' = 'shirt for (wearing to) school', 'school shirt'; (3;11) *xelek shel ha-ets* 'part of the-tree'; (4;2) *ha-tipot shel ha-geshem* 'the-drops of (the) rain'; (4;4) *xultsa shel xoref* 'shirt of winter' = 'winter shirt'; (4;5) *tsura shel parpar* 'shape of (a) butterfly'; (4;8) *ha-atsitsim shel ha-gan* 'the plants of the (=our) kindergarten'; (4;11) *anaf shel arava* 'branch of (a) willow'. Nonetheless, across children aged two to five years, animate possession accounts for the bulk of *shel* phrases (148 out of 187 {N *shel* n} in the interview data).

This preschool data base [conversational] does not provide much evidence of further syntactic development in the internal construction of {N Prep N} expressions, beyond the fact that older children will string together two or more genitives. For instance, Sivan, aged 3;5 [longitudinal], describes the person she is talking about as *ha-metapelet shel ha-ax sheli* 'the-babysitter of the-brother of-me' = 'my brother's babysitter'; and Guy, aged 3;11 [interview data], comments that someone has forgotten to bring *ha-kli shel ha-salat shel ha-xasa* 'the dish of the salad of the lettuce' = 'the dish for the lettuce salad'. Similarly, in the children's stories [narrative data base], three-year-olds used only simple {N *shel* N} constructions, such as 3;2 *harosh shel hayeled* 'the-head of the-boy', 3;7 *magafayim shel ima* 'boots of Mommy', whereas four-year-olds already had a few more complex phrases with the second nominal expanded, such as 4;2 *ha'ima shel hatsfardea hakatan* 'the-Mommy of the-frog the-little' = 'the little frog's Mommy', 4;11 *mishpaxa shel tsfarde'im ve tsfarde'ot* '(a) family of he-frogs and she-frogs'.

Later in the third year children also start to make wider use of prepositions besides the genitive particle *shel* in N—N contexts, particularly *im* 'with'.[13] At first this is used mainly in an extended sense of accompaniment, as in (3;2) *doda im mastikim* '(a) lady with (bags of) gum'; (3;4) *ish im balonim* 'a man with balloons'; (3;7) *kabay im sus* 'a fireman with (a) horse'. But it also expresses other relations such as partitive and possessive, as in (3;4) *pijama im mixnasayim* 'pyjamas with pants', (3;6) *agartal im perax* '(a) vase with (a) flower'; and (3;11) *pil im af arox* '(an) elephant with (a) long nose' [interview, longitudinal = conversational data]. Children learn to use these flexibly, as when a child aged 3;11 describes a picture of an elephant being led by a boy holding on to its reins as *yeled maxzik xut im pil* '(a) boy is-holding (a) rope with (an) elephant', then rephrases this as *hine xut shel pil* 'here's rope of (an) elephant' = 'an elephant's rope'.

Earlier favoring of *shel* and *im* is supplemented with age by an increasing range of other prepositions used to link two nominals: for

example, purposives such as (3;9) *kova bishvil ha-geshem* '(a) hat for the rain'; benefactives like (4;3) *hafta'ot le-aba* 'surprises for Daddy'; substances like (4;9) *kadur mi bad* '(a) ball from = out of cloth'; and comparatives: for example, (5;1) *partsuf kmo letsan* 'a face like (a) clown'. These findings are characteristic of different children in different situations [longitudinal and interview conversational data, and responses to structured elicitations].[14] At this later phase of genitive acquisition, semantic and lexical development go hand in hand. Children specify a broader range of semantic relations, and they are able to do so by lexical recourse to more, and more different, prepositions.

4.3. *Acquiring the form and function of bound genitives* [*structured elicitation, longitudinal*]

Knowing how to construct and how to use bound genitives (the 'construct-state' forms of traditional Hebrew grammar) means that children can make use of compounds as a labeling device for purposes of new-word formation and for expressing semantic contrast between subcategories — compare well-established *na'aley^bayit* 'shoes^house' = 'slippers', *na'aley^akev* 'shoes^heel' = 'high-heeled shoes' with more recently lexicalized *na'aley^sport* 'shoes^sport' = 'sneakers', or with nonconventional *na'aley^pank* 'punk shoes'. They must also learn the structural properties of compounding, for example that the head noun may undergo morphological alternation when in the construct state of a compound — and that N^N combinations follow special patterns of gender and number agreement and definiteness marking compared with other Noun + Modifier strings. These tasks take children a long time to master, as indicated in (11) below.

(11) Steps in acquisition of bound genitives = noun compounding:
1. innovative compound formation combining two nouns as N^N, with errors where morphological change is required: age 4–5
2. command of compound morphological inflections: age 5–7
3. mastery of morphosyntax of compounding: age 7–up

Information on these developmental patterns was derived from two experimental studies supplemented by naturalistic data. The first study focused on labeling contrasting subcategories: Hebrew-speaking children aged two to seven years and a group of adults were asked to identify novel compounds by selecting the appropriate picture out of a set of four, and they were then required to produce other novel compounds as labels for

contrasting pictures in the same set (full details of design and findings are given in Berman and Clark forthcoming).[15] For instance, to test comprehension, the experimenter would ask subjects to choose the picture that showed *sal^klavim* 'basket^dogs' — a nonestablished compound referring to a picture of a basket with dogs inside; she would then show them a picture of a basket with books and ask them to name it — in order to elicit the innovative contrasting compound *sal^sfarim* 'basket^books' = 'book basket'.[16]

Results of this first structured-elicitation study showed that by age 3;0, children were overwhelmingly able to identify the head noun of an unfamiliar compound, just as was found for a similar task in English (Clark et al. 1985). That is, Hebrew-speaking two- to three-year-olds are able to comprehend compounds, at least in the limited sense of identifying which of the elements is the head, hence represents a category label, and which is the modifier, hence serves to subcategorize the head-noun referent. However, as shown by the figures in (12) below, production of compounds was a much later achievement.

(12) Percentage of appropriate compound nouns and other contrasting labels produced [N = 72]

Age	Compounds	Other N modifiers	Total
2;0–2;10 = 2s:	3	3	6
3;0–3;11 = 3s:	13	6	19
4;0–4;11 = 4s:	48	12	60
5;0–5;11 = 5s:	63	14	77
6;6–7;4 = 7s:	93	0	93
22–35 = Adults:	93	4	97

The younger children were in general not able to give appropriate labels for directly contrasting subcategories equivalent to English *book basket* compared with *dog-basket*, or *bike truck* as against *horse truck* for a truck carrying a bicycle compared with one carrying a horse. Two- and three-year-old children produced hardly any compound nouns at all, while four- and five-year-olds did so in half to two-thirds of their responses. In contrast, seven-year-olds (at the end of first grade) responded like the adults by giving compound nouns nearly all the time. This avoidance of compounding among preschool-age children is surprising, as they had heard compound nouns as models for their own answers in the immediately preceding comprehension question. It cannot be explained by structural difficulty with the FORMS they were required to produce, since (a) in Hebrew, compounding does not require any change in the stress assignment of the two nouns (unlike English, where compounds have a distinctive stress pattern); (b) this study used only nouns that do not

require any change in morphological form when occurring as the bound head of a compound compared with their free form when used in isolation or before an adjective; and (c) the syntax was straightforward, since the same Head–Modifier order occurs in compounds and in other constructions: compare the N^N compound *sal^klavim* 'basket^dogs' = 'dog-basket', the N+Adj phrase *sal gadol* 'basket big' = 'big basket', and the N+Pro possessive *sal sheli* 'basket of-me' = 'my basket'. The younger children's failure to produce compounds is, rather, due to two factors: the difficulty they have in providing suitable labels for subcategories in general, and a general lack of reliance on noun compounding as a labeling device among Hebrew-speaking children.

These findings are strongly supported by results of a second experimental study taking into account the morphology of compounding in Hebrew (Clark and Berman i.p.; Bilev 1985). Children aged 3 to 9 and a group of adults were required to produce novel compounds in response to a set of paraphrases based on different semantic relations between two nouns: for example, LOCATIVE 'a table that is in the yard' to elicit the equivalent of 'yard table'; MATERIAL 'a doll that is made of plaster' to elicit 'plaster doll'; or CONTAINER 'a can that has buttons in it' for 'button can'.[17] The head nouns in the 40 innovative compounds on this test were selected by the following morphological criteria: (1) nouns that incur no change in their surface form when bound in a compound, both masculine and feminine, (like masculine *sal* 'basket' and feminine *masa'it* 'truck' in the previous study); (2) feminine nouns ending in stressed *-a* which becomes *-at* when bound; (3) masculine plural nouns whose free-stem ending *-im* changes to *-ey* in the bound form; and (4) various stem changes. These are illustrated in (13) below by items used in the test, the free form given with a prepositional paraphrase in (a), and the bound form as head of a compound in (b).

(13) 1. No change:

a.	kise shel/le- tinokot	chair of/for babies
b.	kise^tinokot	baby (babies') chair
a.	karit mi tsemer	pillow from = of wool
b.	karit^tsemer	wool/woollen pillow

2. Feminine stressed -a ~ -at:

a.	kufsa im kaftorim	box with buttons
b.	kufsat^kaftorim	button(s') box
a.	simla shel rakdanit	dress of (a) ballerina
b.	simlat^rakdanit	ballerina('s) dress

3. Masculine plural -im ~ -ey:

a.	tsiporim ba-ya'ar	birds in-the-forest
b.	tsipor-ey^ya'ar	forest birds

4. Plural+stem change:

a.	bgad-im shel letsan	clothes of (a) clown
b.	bigd-ey^letsan	clown('s) clothes

Stem-vowel reduction:

a.	sade shel/im avanim	field of/with stones
b.	sde^avanim	stone(s') field
a.	shafan la-bayit	rabbit for house/home
b.	shfan^bayit	house/home rabbit

Other stem change:

a.	layla ba-xoref	night in-the-winter
b.	leyl^xoref	winter night
a.	xeder le-misxakim	room for-games
b.	xadar^misxakim	games room

The chart in (14) shows the overall number of compounds produced and the percentage of these which were correctly formed where some morphological change was required in the head noun [second structured elicitation study].

(14) Percentage of innovative compounds produced overall, and with correct morphological adjustments [N = 72]

Age group	Change	% correct change	% Correct change by type		
			-t	*-im* to *-ey*	stem
3s	11	31	62	62	0
4s	65	48	85	56	4
5s	74	60	90	94	10
7s	88	86	100	94	10
9s	92	90	100	100	74
Adults	86	98	100	100	95

Despite the different focus of the two studies [structured elicitation], their results are consistent. In both, production of novel compounds increased significantly as a function of age, and children under age four produced very few compound nouns. Four-to five-year-olds produced compounds in up to two-thirds of their responses, compared with over 85% from seven-year-olds (second-graders), nine-year-olds (fourth-graders), and adults. This study further reveals the importance of morphological factors in determining the correctness of the compounds produced. Between 30% and 40% of all the compounds given by children under age seven did not have the correct inflectional form of the bound head noun. The development pattern in acquiring this kind of noun morphology reflects an interaction between the acquisitional principles of formal simplicity and productivity (Clark 1982; Clark and Berman 1984; MacWhinney 1978; Slobin 1973, 1985). Four-year-olds were able to

provide a final *-t* in feminine nouns most of the time — that is, they correctly changed free-form *simla* 'dress' to bound *simlat-*. This relatively early acquisition could be because all that it requires is adding a perceptually salient consonant to the end of the word; besides, final *-t* is familiar as a marker of feminine gender on verbs and adjectives as well as nouns and is common in girls' names. But four-year-olds made errors in changing masculine plural *-im* to bound *-ey* nearly half the time: this modification replaces one suffix by another one, which occurs only in the context of bound genitives. By age five, kindergarten children show command of this alternation, but not of stem changes. As a word-internal type of modification, these are less perceptually salient than external affixes; and they are generally confined to specific morphological subclasses. For instance, stem changes affect only some nouns with an initial unstressed *-a* syllable (for example, *shafan* 'rabbit' alternates with *shfan-*, but *tavas* 'peacock' is the same in its free and bound form), and only some nouns with penultimate main stress (compare *xeder* 'room'/*xadar-* with *sefer* 'book' which remains unchanged in its bound form). Such superficially unmotivated or arbitrary alternations are a burden for the language-learner (Berman 1981), and they are not always mastered even by adults (two of whom failed to make the necessary stem change by vowel reduction on one item in this study).

The two structured-elicitation studies showed that Hebrew-speaking children will innovate compounds freely only from about age four — whether to express direct contrast in the picture-labeling task, or when required to provide labels for verbal descriptions of subcategories. The fact that this is a late acquisition is also revealed by analysis of naturalistic usage, which reveals virtually no innovative compounding on the part of younger children [conversational data base, mainly longitudinal]. The following instances of coinages showed up occasionally in the conversations of children aged over four years old: (4;2) *pijamat^sport* 'sports pyjamas' to describe pyjamas with a pattern of football players; (4;5) *ohaley^tsava* 'tents^army' = 'army tents' when a child passed a military camp; (5;3) *televizyat^iparon* 'pencil television' to refer to black-and-white television (compare well-established *televizyat^tseva* 'color television'); and (5;5) *kova^yabasha* 'hat^dry-land' = 'land cap' to contrast with conventional *kova^yam* 'hat-sea' meaning 'bathing cap'. Evidence of the late emergence of such coinages is provided by children for whom longitudinal data are available (section 3). No innovative compounds at all occur in almost 20 recordings from a very verbally advanced girl between ages 1;7 and 2;7; errors in form are found in transcripts from the interview data base made by children who have fully mastered other aspects of Hebrew inflection marking (for example, Merav aged 3;8 refers to a picture of a butterfly as **tmunat shel parpar* instead of

the required compound *tmunat^parpar* or its analytic counterpart *tmuna shel parpar*); while the child named Sivan, for whom rich diary data are available, and who is particularly given to language play, proceeded as follows: at age 4;5 she made a morphological error in referring to **madafim sfarim* 'shelves books' to refer to bookshelves (*madafey^sfarim*), but she also innovatively referred to a man who gives a Sabbath sermon on television as *dod^ha-shabbat* 'man^the-Sabbath' = 'the Sabbath man'; at age 4;8 she described an easy chair with a wooden seat attached as *kursat^safsal* 'armchair^bench' = 'bench-chair' with the appropriate *-t* ending; and at 4;9 she told her mother she was sitting with *atsimut^eyaneyim* 'closure^eyes' to refer to her having her eyes shut.[18]

The above observations from naturalistic data support the results of structured elicitation tasks, to show that not only do Hebrew-speaking children take a long time to master the morphology of noun compounding, they also seem to coin fewer innovative compounds in both spontaneous and elicited speech output than do their peers in English and other languages noted for this (Clark i.p.). For instance, in a structured-elicitation study which preceded the two discussed in this section, fewer compounds were produced, and at a later age, by Hebrew- compared with English-speaking children in a task requiring them to produce innovative labels for agents and instruments (Clark and Berman 1984; Clark and Hecht 1982).

4.4. *Other facets of complex-nominal acquisition*

Two further questions are implied by the sketch of genitive structure and use outlined in section 1: how do children master the syntax of bound genitives, and how do they learn to deploy and alternate the structural options available to them? Little is known about how and when children learn the syntax of compounding in Hebrew, beyond the special issue of definiteness marking. We had anticipated that this would be a source of some difficulty, since it takes a very different form than in ordinary noun-phrase agreement and is known to be the source of numerous performance errors in adult Hebrew, too. The reason is that the *ha-* definite marker typically attaches both to the initial head noun and to its associated postnominal modifiers (as in *HA-sakim HA-gdolim HA-ele* 'the-bags the-big-Pl the-those' = 'those big bags'); but in compounds and in them alone, the definite marker is attached to the second, modifying noun, and to it alone (compare *sak-ey^HA-bananot* [*HA-gdolot*] 'bag-s^THE-bananas-Fem THE-big-Fem' = 'the bags of big bananas').

A study of definite acquisition in Hebrew which combined observation

of naturalistic picture-book descriptions with a wide range of structured elicitations showed that correct use of the definite marker in genitive expressions is learned far later than in other contexts (Zur 1983). In the corpus analyzed for this study, late preschoolers typically marked *ha-* 'the' as preceding the entire compound, rather than before the modifier alone. That is, they produced *ha*-N^N strings instead of normative N^*ha*-N, as in [naturalistic] (3;11) *hu mesaxek kaduregel im *ha-na'al^bayit* 'he's playing football with the-shoe^house' = 'in his slipper'; (4;3) **ha-mexabey^esh nosea lexabot et ha-esh* 'the-extinguishers^fire' = 'the fire-brigade are-going to-put-out the-fire'; (4;6) *hine kol ha-mexoniyot ba'arets, kol *ha-mexoniyot^meruts she mekulkalot* 'here's all the-cars in-the-world, all the-race^cars that are-broken'; (5;3) *ve *ha-mexoniyot^mishtara ba'u, ve az mexonit^mishtara atsra sham* 'and the-police^cars came, and then (a) police^car stopped there'. These utterances are fully grammatical in agreement and other inflectional markings, but not in use of definite marking on compounds. A similar difficulty was manifested in a highly expressive composition of a second-grader (aged 7;5) writing about animals (and not listed as part of our otherwise entirely oral data base, as described in section 3). The child used several compounds correctly, for example *gurey^xatulim* 'cubs^cats' = 'baby cats, kittens', and described a cat as *xayat^bayit ve gam xayat^sha'ashu'im tova me'od* '(a) house^animal and also a games^animal' (='plaything, pet') 'very good', with the proper bound form of *xaya* 'animal' and feminine agreement on the adjective *tova* 'good'; but she also used ungrammatical overmarking of *ha-* 'the' in the sentence *ha-xatul hu xaya mi *ha-mishpaxat ha-torfim* 'the-cat is (an) animal from the-family^the-predators' (compare well-formed *ha-mishpaxa* 'the-family' and *mishpaxat^ha-torfim* 'family^the-predators' = 'the predator family'). Finally, in the picture-book stories [narrative data base], children aged five and seven years used almost no definite compounds; but 9 out of the 12 definite compounds occurring in stories of nine-year-olds took the incorrect form of *ha*-N^N, and so did a few of the 38 definite compounds used by adults. This suggests that children's language mirrors a tendency on the part of less careful usage in general, perhaps presaging an area of potential language change.

A second question was that of options used by children in subcategorizing and modifying head nouns. The naturalistic data reviewed in section 4.2 showed that postnominal preposition phrases form an increasingly varied option in preschool usage. This is confirmed by the contrastive picture-labeling task described in section 4.3, where some of the children's noncompound responses took this form: for example, (3;3) *yeled im telefon* '(a) boy with telephone' for a boy wearing a shirt with a telephone drawn on it; (4;7) *tsalaxat im beitsim* '(a) dish with eggs'; (5;2) *ashan shel bayit*; and (7;4) *argaz bli klum* '(a) box without anything' for an empty box (Berman and Clark forthcoming).

Other studies have revealed Hebrew children's ability to specify classes of nouns by innovative affixation, most particularly from age four (Berman and Sagi 1981; Clark and Berman 1984; Walden 1982). Occasionally, when asked to paraphrase innovative compounds in the second elicitation task described in section 4.3, children used affixation, too; for example, for *ganenet^dardas-im* 'teacher-Fem^smerf-s = smerf teacher', one child (aged 5;8) coined the term *dardas-it* 'smerf-ess'; for *smixat^buba* 'blanket^doll' a child (7;3) coined *smix* + *on-et* 'blanket-ie + Fem'; while for *ben^pilim* 'son^elephants' = 'elephant child', an older child (9;1) used a conventional diminutive suffix in the form *pil-on* 'elephant-ie'.

Another affixal means we had anticipated was by use of denominal adjectives as noted in section 1 above. However, in the second of the two structured-elicitation studies described (section 4.3), when asked to provide names for subcategory descriptions, only a few out of 60 children aged three to nine years gave such responses; and seven of the eight such responses — all from children aged five and up — used a well-established adjective in the phrase *xatsa'it keyts-it* 'skirt summery'. In contrast, most of the 12 adults in the study gave at least one such response, including the Hebrew equivalents of 'educational games', 'military flags', 'wintry night', and 'domestic rabbit' alongside of the related compounds (play-games, army-flags, winter-night, and house-rabbit respectively). This is consistent with the very few such instances found in the naturalistic data examined, the earliest innovative example being from a child aged 3;9 — *rove barzel-i* 'gun iron-y' for 'an ironlike gun'. And it contrasts with the occurrence of several such innovations in the speech of an English-speaking child aged 2;0 to 2;7: for example *trucky*, *cracky*, *nighty* (from unpublished data kindly made available by Eve V. Clark). Yet suffixal affixation is a straightforward and widespread derivational process in Hebrew, common in both spontaneous and elicited usage by around age four (Berman and Sagi 1981; Clark and Berman 1984). I assume that Hebrew-speaking children do not coin many denominal adjectives as a means of noun specification because such forms, while very productive from a structural point of view, are confined to a more specialized, high-level vocabulary not generally familiar to young children.

5. Discussion

Not much is known about the development of syntactic processes like conjoining, modification, and different types of expansions within com-

plex nominals, beyond the difficulty encountered by children in assigning a definite marker to bound genitives. The fact that the naturalistic data base used above failed to provide clear evidence on the syntax of genitives suggests that specially devised elicitation and comprehension studies are needed for this purpose. There is reason to assume that this might be an area of relatively delayed acquisition. It has been noted that school-age children and even adults may violate the rules for assigning a definite marker to bound genitives in casual spoken usage (section 4.4), although more carefully designed study is needed in this respect. Conjoining of two or more head nouns bound to a single adjunct is another area where normative syntax is often violated, which could be experimentally studied in children's language (Ravid et al. 1985). Finally, NP-internal modification seems to represent a rather late linguistic development in Hebrew, and to be a good indicator of general verbal ability (Berman 1985a; Biran i.p.). Further investigation of related constructions might reveal that this is the case in other types of complex nominals and in the acquisition of genitives in other languages as well.

The developmental pattern of compounding morphology outlined in section 4.3 was attributed to language-internal factors of formal simplicity interacting with the general applicability of certain structural alternations. Yet this alone does not explain the relatively late age at which these modifications are mastered by Hebrew-speaking children, in contrast to their generally rapid and error-free acquisition of other inflectional systems (Berman 1985a, 1986b). By age four, they have typically gained command of plural marking, gender agreement, verb-tense systems, and case-marked pronouns — paradigms characterized by similar morphophonological operations as in compound nouns. The relative lag in acquisition of compounding is due, rather, to its limited productivity in current Hebrew, where productivity refers to actual usage, rather than to formal criteria of structural potential. Structurally, noun compounding is productive and a well-established device in contemporary as in classical Hebrew, for lexical purposes of labeling subcategories and for word formation as well as for syntactic stringing of related nominals. And noun compounds can be derived in Hebrew under broadly the same semantic and pragmatic conditions as in a Germanic language. But they are put to relatively restricted use today.

First, as means for new-word formation, speakers prefer the more typically Semitic devices of affixation to root consonants, along with more contemporary affixation to a word stem and even blending (Berman i.p.a, i.p.b). And children, too, will coin new names for objects by bound, affixal means far sooner, and more often, than by means of compound nouns (Berman and Sagi 1981; Clark and Berman 1984). A typological bias

explains their relative lack of reliance on compounding as a means for creating coinages. That they do so only from around age four is connected to the fact that Hebrew-speaking children in general make productive use of word-formation devices at an age beyond that at which they have gained mastery of a rich range of inflectional markings in their language.

It could be argued that the bound form of initial nouns in compounds and before stressed suffixes belongs with the inflectional system of Hebrew morphology. But the possessive pronoun suffixes used in this context are largely literary and restricted to a highly formal register unfamiliar to young children. Everyday usage prefers the periphrastic genitive with *shel*. (Compare bound *bet-i* 'house-my' versus spoken *ha-bayit shel-i* 'the-house of-my', both used to mean 'my house'). And where even older children make errors in the use of bound forms, it is often because they are confined to subclasses of nouns, and need to be learned as such, rather than by general rule. Where historically well-motivated morphophonological processes are not transparent in contemporary usage and appear arbitrarily confined to certain items and classes of items, even school-age children will violate normative requirements in their construals of less familiar forms (Berman 1981; Ravid 1985; Shwarzwald 1981).

As a means for syntactic stringing of nominals in different semantic relations, compounding is typical of more formal registers, including newspapers and other written usage. Speakers rely on phrasal options for combining nouns, such as the genitive particle *shel* and other prepositionals in their everyday colloquial usage. And since it is this type of speech that constitutes the base of preschool language input and output, compounding as a constructional device is not especially functional for young children. Bound-genitive constructions are among the constructions that come into use along with school-age mastery of a more literate style and more formal contexts of language use, like the abstract nominals corresponding to English *destruction* compared with *breaking* or *arrival* compared with *coming* (Meroz, in progress).

General applicability of a construction type in colloquial registers also explains why Hebrew-speaking preschoolers make only restricted use of denominal adjective formation. These do not occur much in everyday Hebrew vocabulary, compared with words like English *dirty*, *soapy*, *sandy*, but are part of a more highly specialized vocabulary (like English *historical*, *cooperative*, *neighborly*, or *western*). The impact of frequency of use on child language has recently been reevaluated by Slobin (1987) in relation to different linguistic subsystems. The present study also shows that for a particular construction to be functional for young children, it must be productive within the registers and across the levels of language operative for them at the appropriate phase of their development.

Compound constructions have been used to address central issues in current linguistic theory, since they represent a peculiar intersection between the lexicon and syntax (Borer 1983; Kiparsky 1982). Lexicon and syntax may constitute separate systems or distinct ends of a continuum in linguistic analysis, but they certainly serve one another and interact in language acquisition and in language use. With maturation, knowledge of language becomes more grammaticized and structure-dependent, and so less context-bound. But at the same time, language use also becomes lexically more autonomous. Analysis of syntactic structures used by Hebrew-speaking preschoolers showed that growth in formal command of grammatical structures is bound up with the overall augmentation of verbal expressiveness (Dromi and Berman 1986). Thus, overt lexical marking of referents, of predicates, and of interclausal connections renders the child's discourse increasingly more explicit. Syntactic development proceeds hand in hand with more specific predicates manifested by a decrease in the number of verbless clauses and more use of aspectual verbs like *start*; with greater reliance on lexically specified NPs instead of pronoun subjects; and with use of more different coordinating conjunctions marking sequential relations between clauses and a wider range of subordinating conjunctions to mark adverbial clauses. This is exactly analogous to what was revealed by analysis of the acquisition of genitives in the present context. Increased reliance on a wider range of lexical prepositionals signals growing command of the syntactic construction {N Prep N} as a kind of genitive — an instance of the lexicon at the service of syntax; while improved knowledge of the morphological forms of grammatical inflections enables children to produce and understand more lexicalized compounds; that is — as syntax develops, the learner can do more with more items — and so syntax is at the service of the lexicon.

Finally, the analysis proposed here has relevance for the issue of 'use' versus 'grammar'. I have argued that knowing a language means knowing both its grammar and its use (Berman 1985d). Learning the grammar of compound nouns, as of free genitives and other prepositional constructions, is an indispensable part of this. But for this to evolve into felicitous endstate command of the system, grammatical knowledge must be activated and deployed contrastively with other partly synonymous and functionally related structures.

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Notes

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1. In the Greek and Latin tradition, the term 'genitive' is used mainly for possessive relations, such as *a child's dream, children's clothes* as well as *the dream of a child, the psychology of children*. These are generally treated as distinct from constructions termed 'compound nouns' — *child prodigy, child torturer*. In the Hebrew tradition, however, a single term *smixut*, literally 'adjoining', 'adjacency', is used for both possessive phrases and compound nouns. The reason is mainly historical: in Biblical Hebrew, the bound 'construct-state' form was the primary means of expressing such relations (Gesenius 1910). Use of the genitive particle *shel* 'of' in 'free' or 'unattached' forms of *smixut* became widespread only in later, Mishnaic, language.
2. This view of linguistic analysis is compatible with one which assigns a central place to the notion of 'grammatical construction', as in the current work of Charles J. Fillmore and his associates (Fillmore 1985; Fillmore et al. forthcoming; Lambrecht 1984).
3. The caret mark ^ indicates a compound, that is, an initial, head noun followed by a modifying noun to which the head is 'bound', in the construct-state relation. The morphological bias of Hebrew scholarship determines the traditional terminology for construct-state nominals. The initial noun is termed *nismax*, literally 'adjoined, supportee, dependent' in contrast to the following, adjunct noun — *somex* 'adjoiner, supporter'. This is because the first noun is morphologically bound or dependent, even though semantically and syntactically it has the properties of a head nominal.
4. The so-called 'double-genitive' construction in (2c) is not considered here. Little is known about the syntax and semantics of such expressions, for example (i) *xalom-o shel ya'akov* 'dream-his of Jacob' = 'Jacob's dream', (ii) *xalom-a shel rina* 'dream-her of Rina' = 'Rina's dream', and (iii) *xalom-am shel ya'akov ve rina* 'dream-their of Jacob and Rina' = 'Jacob and Rina's dream'. They have been noted in newspaper usage (Azar 1976; Shlesinger 1985) but are almost never found in children's Hebrew, including school-age narratives like those analyzed here.
5. That is, *shel* does not assign case roles, and it differs from English *of* which can occur in environments such as 'beware of', 'complain of', or 'be fond of', 'be frightened of', 'be proud of'. Hebrew *shel* is semantically closer to English apostrophe *'s* functioning as a possessive marker, and rendering *shel* by 'of' is thus rather misleading. For instance, a productive use of English *of* is in partitives: for example, *piece of chalk, slice of cake, box of matches, sheet of paper*, where Hebrew prefers bound genitives for this purpose.
6. It would seem easy to test whether nonexpert adult speakers of Hebrew also treat different instances of what grammarians term *smixut* as quite separate constructs. However, the bulk of native speakers are exposed to formal language studies at school and so have been consciously introduced to these three constructions as forming a single grammatical category termed *smixut*.

7. Formation of analytic expressions with *shel* or other prepositions is far less restricted, syntactically and lexically, than is bound compounding. Shlesinger (1985) lists ten conditions which disallow or disfavor use of compound constructions, as against only two situations where a bound compound form is obligatory (see also Berman 1978).
8. Denominal adjective formation is morphologically productive and is widespread in newspaper and expository usage, though frowned upon by puristic preference for the classical device of bound compounding (Attias 1980; Ravid and Shlesinger i.p.). Hebrew thus contrasts with English, where denominal adjectives are typical of a more Latinate, higher style than the corresponding compounds — compare *aquatic insect* vs. *water bug* (Levi 1976).
9. Hebrew does not make an obligatory distinction in compounds with container head nouns, however, between the purpose sense of English *wine-glass*, *orange crate*, *matchbox* and the containment interpretation of the corresponding *of* phrases *glass of wine*, etc.
10. In his survey of a large corpus of contemporary newspaper articles, Shlesinger found that bound genitives accounted for nearly 60% of the total genitives, compared with only some 25% in the form {N *shel* N}, even though *shel* genitives are far less structurally constrained (1985: 173–206). The remaining 15% of genitive constructions were double genitives, as in (2c) of the text and in note 3, although these are very uncommon in everyday speech. Analysis of a comparative corpus of news reports showed them to contain a converse proportion of fewer bound genitives and more *shel* phrases, reflecting their less formal register.
11. Such nonanalysis may persist with a few very highly lexicalized items. This is shown by a first-grader's spelling of the compound noun *bet^sefer* 'place^book' = 'school' as a single word instead of two words, one ending with the letter for /t/, the other beginning with the letter for /s/, thus: conventional spelling — BYT SPR, child's — BYCPR.
12. This could reflect a generally sparse distribution of compounds in Hebrew conversational usage, since the adults in the sample used a similarly low number of compounds in talking to the children.
13. The forms *shel* and *im* are acquired early in general (Dromi 1979; Kaplan 1983). Other prepositions which are used even sooner — the locative *be-* 'in, at', dative *le-* 'to, for' — are not common postnominally. In a task requiring adults and children aged three to nine years to paraphrase innovative compounds [structured elicitation], temporal and locative descriptions rarely elicited {N be- N} forms like English 'elves on Saturday' for 'Sabbath elves' or 'birds in-the forest' for 'forest birds' (Bilev 1985; Clark and Berman 1987).
14. In the narrative data base, {N prep N} constructions with prepositions other than *shel* occurred in none of the preschool stories (12 each at ages three, four, and five years), and only once in the school-age stories (12 each at ages seven, nine, and eleven), while 12 adult stories in total included only four such occurrences — all with the preposition *im* 'with', such as *tsintsenet im tsfardea* '(a) jar with (a) frog'. We interpret this as due to the nature of the task, which elicited far more references to events and states than description or specification of objects.
15. I am indebted to Eve Clark of Stanford University, who initiated the study and cooperated fully in the analysis. Thanks are due to Ziva Wijler of Tel-Aviv University Department of Linguistics who conducted the fieldwork.
16. The design included another contrastive task, in which respondents were required to label a third picture in the set containing the head reference alone — for example, in the case in point, a picture of a basket with nothing in it (for details, see Berman and Clark forthcoming).

17. Subjects were also asked to paraphrase a set of innovative, nonestablished compounds, such as *rofe^parparim* 'doctor^butterflies = butterfly doctor', *kadurey^bad* 'balls^cloth = cloth balls', *gamadey^shabat* 'elves^Sabbath' = 'Sabbath elves'. Results are described in Clark and Berman (1987).
18. Thanks are due to Dorit Ravid, who recorded these examples, and also the following exchange from a brother and sister in grades I and II. The children innovate compounds freely as a means of contrastive subcategorizing, on the basis of a single conventional term — well-established *shkedey^marak* 'almonds^soup' = 'soup-almonds', 'croutons' from singular *shaked* 'almond' (compare bound *shked-* as in *shked-im* 'almonds', *shked-iya* 'almond-blossom').

Girl (7;2): *balata shaked^marak.*
You swallowed (a) soup almond.

Boy (6;1): *lo, ze haya boten^marak. halevay she yamtsi'u botney^marak.*
No, it was (a) soup peanut. I wish they'd invent soup peanuts.

G: *lo, ze haya orez^marak. halevay she yamtsi'u marmeladat^marak*
No, it was soup rice. I wish they'd invent soup marmelade
o shfan^marak, ve ani rotsa gam glidat^marak ve sukariyot^marak
or soup rabbit, and I also want soup ice cream, and soup candies, and soup
ve kolat^marak.
(coca)cola.

B: *halevay she yamtsi'u kasata^marak.*
I wish they'd invent soup 'cassata' [Italian ice cream].

These contrastive coinages for different kinds of *marak* 'soup' demonstrate command of the different morphological alternations of the head noun illustrated in (13) of the text. The only error is initially, where *shaked* should have the bound form *shked-* and in the last expression, where the loanword head noun *kasata* should end with *-t* to mark a feminine noun.

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A developmental route: learning about the form and use of complex nominals in Hebrew*

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Abstract

The route taken by Hebrew-speaking children in acquiring compounds and related genitive constructions serves to motivate certain general claims about the relation between lexical and grammatical knowledge, and how language learning interacts with linguistic structure and language use. The constructions analyzed belong to the category known as smixut *'adjacency' in Hebrew grammar, corresponding to English genitives like* a child's dream *or* a group of children, *and compounds like* child welfare, child prodigy. *Use of these constructions in Hebrew is described for early preschool through grade-school age, in contexts which include adult–child conversations, picture-book narratives, and experimental designs testing comprehension and production of innovative noun compounds.*

Acquisition starts out as lexical knowledge of individual rote-learned items, and this repertoire increases with age as a function of general vocabulary expansion. Syntactic command of phrasal combinations relies initially on use of the genitive particle shel *'of' to express possession, with subsequent extension of the lexical means for encoding a wide range of semantic relations between two nouns. Late-preschool-age children show growing command of the morphosyntax of noun compounding both as rule-bound grammatical knowledge and as a means for innovative word formation. Mature endstate knowledge entails the ability to alternate these various formal devices in accordance with discourse requirements and stylistic register. We conclude that 'knowing' a given structure cannot be characterized in an atomistic fashion. Rather, compounds and genitives, like other superficially distinct constructions, form part of an integrated set of linguistic subsystems. As in other areas of language acquisition, full endstate knowledge may only be achieved in adolescence or beyond.*

The study concerns children's acquisition of compounds and related genitive constructions in Hebrew. The term 'genitive' refers here to

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relations expressed between two or more nominals in combinations such as the English examples in (1) below.[1]

(1) a. (the) child's bicycle, child's play, (a) child's dream
b. child tormentor, child prodigy, child bride
c. child of one's dreams, child of the times

A sketch of structural properties of such complex nominals and how they function in current Hebrew usage (section 1) is the background to description of the path taken by Hebrew-speaking children in acquiring these constructions (sections 3 and 4). One aim of this presentation is to attempt a more integrated picture of how children acquire different facets of an overall linguistic system en route to endstate mastery, and so add to what is known about these constructions developmentally and in linguistic description.[2] Another aim is to underscore more general features of the relation between language acquisition, language structure, and language use. For instance, lexical and grammatical knowledge interact in children's learning of such constructions. The relative productivity of particular forms also plays a role in their acquisition, not only in terms of structural constraints, but especially in how prevalent they are in colloquial usage and in the speech accessible to children. And the route to overall mastery is a long-drawn-out process: children manifest knowledge of parts of this system early on, as young preschoolers; but it can take them until school age or even puberty before they acquire full command of this, as of other linguistic subsystems or sets of constructions.

1. Structure and use of Hebrew genitives

There are three main kinds of genitive constructions covered by the term *smixut* 'adjacency' in Hebrew. The *head* element is always initial, in contrast to the mixed order illustrated for English in (1) above. The three expressions in (2) are roughly synonymous versions of 'Jacob's dream' or 'the dream of Jacob'.

(2) a. bound genitive: xalom ^ ya'akov
dream ^ Jacob[3]
b. free genitive: ha-xalom shel ya'akov
the-dream of Jacob
c. double genitive: xalom-o shel ya'akov
dream-his of Jacob

The present study focuses on compound nouns in the form of a bound genitive as in (2a) and their periphrastic options like the *shel* 'of' phrase in (2b) as well as other prepositional constructions.[4] The phrasal options in (3b)–(3e) below contrast with the compound, bound-genitive form in (3a), although ALL the expressions in (3) mean something like 'a striped dress'.

(3) a. simlat ^ pasim
'dress-Gen ^ stripes'
b. simla shel pasim
'dress of stripes'
c. simla im pasim
'dress with stripes'
d. simla mi pasim
'dress from (= out-of) stripes'
e. simla me-fuspeset
'dress stripe-d = striped dress'

The initial, head noun in a bound-genitive compound may have a different morphological shape when it occurs in isolation or as head of a phrase: compare the bound head noun *simlat-* in (3a) with the free form *simla* 'dress' of the same noun in (3b)–(3e). The genitive particle *shel* 'of' is structurally distinct from other prepositionals, since it is never governed by a verb or adjective.[5] Yet *shel* may alternate with other prepositions in postnominal {N Pr N} constructions, as shown in (3c) and (3d).

A bound genitive like *xalom ^ ya'akov* in (2a) or *simlat ^ pasim* in (3a) can be compared with its free or unattached counterpart with *shel* as located at two extremes of a continuum — from fully lexicalized, wordlike elements to highly transparent and phraselike combinations. The former are part of the well-established conventional vocabulary, on a par with English *birthday*, *penknife*; the latter are derived by productive rules of syntax, as innovative or occasional expressions like *day of rejoicing*, *knife of steel*. All bound, construct-state genitives are subject to highly specific morphosyntactic constraints on how they are inflected and how they pattern in agreement. But some bound genitives are more wordlike, less transparent semantically and less phraselike syntactically, than others. For instance, ones that are fully lexicalized as compound nouns cannot be paraphrased by an analytic counterpart with the particle *shel* or some other preposition. And although many Hebrew scholars follow the tradition of treating all three types of genitives as a single coherent set of structural alternatives, there is no guarantee that children will construe them in this way.[6]

Mature knowledge of genitives involves several dimensions. This includes LEXICAL competence, such as recognizing established noun compounds as part of the shared wordstock of their speech community (Berman and Ravid 1986). And it entails the ability to deploy

compounding for new-word formation: in loan translations — for example, the Hebrew equivalents of *swimmingpool*, *sunglasses*, *surface structure*; in spontaneous innovative coinages as well as under experimental conditions (Clark and Berman 1987; Olshtain i.p.); for creating taxonomic paradigms as in the terms for *washing machine*, *sewing machine*, *typing machine* (= *typewriter*), *shaving machine* (= *razor*), and other types of semantic contrast and subcategorizing (Berman and Clark forthcoming; Clark et al. 1985); and, under appropriate pragmatic conditions, to label previously unnamed associations of entities (Downing 1977; Petruck 1979).

Speakers must also master the *morphosyntax* of these constructions. This includes specialized knowledge of the *morphological alternations* required by certain classes of head nouns in the bound, construct state (Clark and Berman i.p.). And it involves command of the *syntactic rules and constraints* governing these different constructions, since bound genitives differ radically from analytical noun-phrase constructions with respect to gender, number, and definiteness assignment, and processes of agreement, pronominalization, modification, etc. (Berman 1978, 1986a; Borer 1983; Ritter 1987).

Moreover, knowledge of genitive constructions interacts with speakers' recourse to OTHER MEANS OF NOMINAL MODIFICATION. For instance a bound genitive like *sakey^bananot* 'sacks^bananas' = 'banana sacks' has *periphrastic alternatives* in the form of {N Prep N} expressions, such as *sakim shel bananot* 'sacks of bananas' = 'bananas' sacks', *sakim le-bananot*, 'sacks to = for bananas', *sakim im bananot* 'sacks with bananas', *sakim mi bananot* 'sacks from (= made out of) bananas', and other more explicit constructions like *sakim mle'im bananot* 'sacks full-Pl (of) bananas', *sakim te'unim bananot* 'sacks loaded-Pl (with) bananas'.[7] Another option is by means of denominal adjectives in noun–adjective phrases which correspond to Noun^Noun bound genitives, such as *sak-im plast-iy-im* 'sack-s plast-ic Pl' = 'plastic(ky) sacks' vs. *sakey^plastik* 'plastic sacks', *sixa telefon-it* 'talk-Fem telephon-y-Fem' = 'telephon-y conversation' vs. *sixat^telefon* 'phone conversation',[8] while in some contexts, bound genitives are generally preferred, as in classifying partitives equivalent to English *piece of cake*, *end of the journey*, *top of the class*.[9] Mature speakers are thus free to choose between various such morphosyntactic and lexical options in modifying a head noun.

Finally, knowledge of CONVENTIONS OF STYLE AND USAGE also plays a role in the mature development of genitive options. For instance, in more formal expository style and in most written Hebrew, nominals are typically combined as bound or double genitives. This is in marked contrast to speakers' preference for more analytic, periphrastic

constructions in everyday colloquial usage.[10] This is characteristic of a special diglossia in current Hebrew: educated speakers prefer more classical, morphologically bound forms (of genitives as well as other constructions) in formal or official contexts but rely on periphrastic expression in their conversational usage — among themselves as well as in their speech to children. Less literate speakers will not have recourse to these stylistic options and register distinctions, whether they are uneducated adults or as yet untutored children.

2. General developmental observations

The Hebrew-learning child thus needs to master several different kinds of knowledge in acquiring genitives: *lexical* — a conventional repertoire of labels for referents; *morpho-syntactic* — rules for inflecting bound head nouns in compound expressions both as a means for new-word formation and for stringing nominals together; *semantic-syntactic* — different ways of modifying classes of head nouns and of specifying relations between two nominals; and *stylistic* — differential deployment of these options according to level and context of usage. Findings available for certain of these dimensions reveal that acquisition proceeds along a multifaceted developmental route.

(4) Developmental steps in acquiring Hebrew genitives:
- I. word learning, vocabulary items: 1;6–2;0 years
- II. phrase learning, free genitives: 2;4–3;0 years
- III. compounding, form and function of bound genitives: 4–7 years
- IV. stylistic alternation of forms: later school age

This acquisitional route can be related to a general view of language development which I have proposed for other aspects of Hebrew morphology and syntax (Berman 1985d, 1986b). Initial acquisition takes the form of item-bound, structurally unanalyzed connections between form and meaning; in the case in point, this means that children acquire lexicalized compounds like other elements of their vocabulary, as set forms with no morphosyntactic alternations. Subsequently, in the period when the bulk of the rich inflectional system and other facets of Hebrew morphosyntax are acquired, children learn to combine nominals by means of the genitive particle *shel* and other prepositionals, which are deployed with an expanding repertoire of functors in more, and different, syntactic environments. The relatively later development of the grammar of innovative, nonlexicalized compounding is due largely to the restricted productivity of such constructions: they are infrequent in the colloquial

speech that is the major input to young preschoolers; they are not highly favored for new-word formation by speakers whose language affords rich affixal options for this purpose; and as a syntactic means for combining nominals, bound compound genitives are typical of a formal register not commanded prior to the establishment of literacy. Finally, endstate knowledge as sketched above requires a mature ability to flexibly deploy a broad range of structural options and to take account of different discourse contexts and levels of usage. This would seem beyond the capacities of children below school age.

The findings described below are thus motivated by a more general developmental model in which learners proceed from rote to rule, from item-based to structure-dependent learning, and on to felicitous alternations within and across construction types. At the same time, certain facets of their task are specific to Hebrew: the language retains a rich inflectional morphology, yet speakers have recourse to analytic devices alongside more classical bound forms; and this is reflected in a diglossia between untutored and literate usage and between everyday conversation and more formal modes of expression.

3. Description of data base

Findings are based on the following sources: (1) longitudinal analysis of 20 recorded sessions of a Hebrew-speaking sister and brother between the ages of 1;8–6;10 and 1;4–5;9, kindly made available by Dorit Ravid; 17 transcripts of the speech of a girl between age 1;7–2;7 recorded by Dafna Kaplan; and handwritten notes of the speech of an Israeli boy between one and six years of age recorded by his grandfather (Berman and Sagi 1981); (2) some 150 interview-type transcripts of adult–child conversations analyzing the output of over 100 children recorded once or more between the ages of 1;0–5;6 years (Berman 1985c; Bilev 1985; Dromi and Berman 1986; Kaplan 1983); (3) analysis of a corpus of over 100 Hebrew narratives told by children aged 3, 4, 5 and 7, 9, and 12 as well as by adults — on the basis of a picture-book story about a boy and his dog searching for a pet frog which has run away (Berman 1985b; Berman and Slobin 1987); and (4) results of two elicitation studies of the ability of Hebrew-speaking children aged between 2 and 9 years to identify, produce, and paraphrase innovative compounds (Berman and Clark forthcoming; Clark and Berman 1987). The data are thus based on different elicitation procedures and contexts of use, to address the issue of how children gain mastery of distinct yet interrelated facets of a linguistic system. Below, we refer to sources (1) and (2) together, under the heading of 'conversational' usage, source (3) as 'narrative', and source (4) as 'structured elicitation' — specifying the type of material used for any given analysis in square brackets in the text below. Note, finally, that focus is on production of the relevant constructions rather than on when and how children learn to comprehend them.

4. Facets of genitive acquisition

Findings are described below according to types of knowledge acquired, rather than along chronological lines or in relation to a particular context of use represented in the data base. The material is divided into acquisition of well-established compounds as part of general vocabulary expansion (section 4.1); noun modification by means of genitive and other prepositional phrases (section 4.2); bound-compound morphology as a means of new-word formation and for labeling subcategories (section 4.3); and other facets of complex nominal formation such as assignment of definite marking to genitives and use of denominal adjectives (section 4.4).

4.1. *Vocabulary learning* [*conversations, narratives*]

Initial use of lexically established compound nouns occurs as early as age 1;6–2;0 years [conversational materials] and continues through adolescence, as a function of vocabulary increase [narratives]. The compound nouns used by young children at the one- and two-word phase are typically very common everyday items, such as *yom^huledet* 'day^birth' = 'birthday', *bet^yeladim* 'house^children' = 'children's home' (on a kibbutz), *gan^xayot* 'garden^animals' = 'zoo'. From the third year, around age 2;6, the repertoire of such expressions increases to include other everyday terms (such as *aruxat^boker* 'meal^morning' = 'breakfast'; *bet^sefer* 'house^book' = 'school'; *na'aley^bayit* 'shoes^house' = 'slippers'), all familiar from the children's immediate environment and common in preschool speech, both input and output (Berman 1981, 1985a). These and other such items are clearly part of the shared wordstock of Israeli children, much as all English-speaking children from similar middle-class backgrounds will know the words for *birthday*, *bathing suit*, *grapefruit*, or *lunchbox*. In fact, the content of the specific compounds used by preschool children [conversational materials] proves to be largely shared across children — for instance, the terms for 'birthday' and for 'zoo' were particularly common (although this might

have been biased by investigators tending to focus on certain events in interviewing their subjects). To some extent, of course, the child's own experience is reflected in this as in other facets of vocabulary development. For example, in conversation with a young woman member of the kibbutz where he was born, Or (aged 4;11) used the following conventional compounds: *pinat^sixa* 'corner^talk' — the show and tell section of a schoolhouse; *bet^tinokot* 'house^babies', the place where infants are housed on a kibbutz; *bet^yeladim* 'house^children' — where older children live; *bet^tarbut^* 'house^culture' = 'recreation room'; *shmurat^teva* 'reserve^nature' = 'nature reserve'; *gan^xayot* 'garden^animals' = 'zoo'; *aruxat^tsohorayim* 'meal^noontime' = 'lunch'; *aruxat^eser* 'meal^ten (o'clock)' = 'juice time'; *ben^zona* 'son^whore' = 'sonofabitch'.

Initially, when children are still at a presyntactic or 'pregrammatical' phase (Berman 1986b, 1986c), bound N^N forms are acquired as structurally unanalyzed lexical items. That is, to start with, children construe them the same as other, monolexemic words they know: compare *mitbax* 'kitchen'/*bet^shimush* 'house^use' = 'lavatory', *magafayim* 'boots'/*na'aley^bayit* 'shoes^house' = 'slippers'. Evidence that these early compound nouns (or bound genitives) are learned as unpackaged amalgams and treated just like one-word items is shown by how children form their plurals. In Hebrew, masculine plurals add *-im* (as in *mitbax-im* 'kitchen-s') and feminine nouns end in *-ot* (as in *mita/mit-ot* 'bed/bed-s'). However, compound nouns form their plurals in a distinctive way: the plural suffix *-im* of the head noun is replaced by a special bound form *-ey* (compare *mitbax-im* 'kitchen-s' with the bound form *mitbax-ey* in compounds, such as *mitbaxey^ets* 'kitchens^wood' = 'wood(en) kitchens'). Young children typically treat the compound nouns in their repertoire as single lexemes: they add the masculine *-im* or feminine *-ot* plural ending at the end of the whole compound, not to the initial head noun, as shown in (6) [conversational data base].

(6) Regularization of compound-noun plurals:

a. yom^huledet
day^birth
'birthday'
plural: yem-ey^huledet
juvenile: *yomuladet-ot

b. bet^shimush
place^use
'lavatory'
plural: bat-ey^shimush
juvenile: *betshimush-im

c. beged^yam
garment^sea
'swimsuit'
plural: bigd-ey^yam
juvenile: *begedyam-im

These errors are not confined to a few children, or to only one or two items. Correct plural forms of compounds are found among two- to three-year-olds only in cases where a lexicalized compound is most typically used with a plural head noun (for example, *naal-ey^bayit* 'shoes-house' = 'slippers' occurs in early child speech, but not the singular *naal^bayit* 'shoe^house' = 'slipper').[11]

Initial learning of compounds thus involves no more nor less than learning of other vocabulary items. And such forms constitute a small proportion of the nouns used by children in general. Samples of adult–child interactions [selected from the 'conversational' materials] with children aged 2;6, 3;6, and 4;6 contained only between two and six compound nouns per 100 noun terms.[12] Subsequent increases in the number of compound nouns in children's speech reflect general vocabulary expansion. Analysis of the nonlongitudinal'conversational' data samples reveals the following figures: children aged under two years produced almost no compounds at all (nine out of a total of nearly 4000 output clauses); 2;0–2;11 years used 65 compounds (tokens, not types) in the total of 9249 clauses they produced (0.7%); those aged 3;0–3;11 produced 83 compound nouns out of their 7716 clauses (1.1%); those aged 4;0–5;6 produced 87 compound nouns in their 5105 output clauses (1.6%). And even a child with a highly developed vocabulary, such as the boy Or noted earlier (aged 4;11), used only nine compound nouns in an interview where he produced over 450 output utterances. Across well over 150 transcripts of conversational data from preschool children, then, only a small part of their lexicon consists of compound nouns, and these rise proportionately with age, as do other kinds of lexical categories, such as adjectives for instance.

Increased use of compound nouns with age also reflects reliance on a more literate mode of expression among older speakers. Analysis of stories based on a picture book about the adventures of a boy and his dog in search of their missing frog reveals little use of compound nouns in preschool narratives compared with schoolage children and adults (Bilev 1985). Overall, the numbers of bound-genitive compounds were as follows:

(7) Distribution of N^N combinations in Hebrew narratives:

			N^N	
Age	N	# Clauses	Tokens	Types
3, 4, 5	43	2095	14	9
7, 9, 11	51	2963	80	35
Adults	12	930	75	36

The stories of the preschoolers, including 19 kindergarten children aged five to six, contained very few compounds. These were all highly lexicalized items, so might have been known by rote — for example, *gan^xayot* 'garden^animals' = 'zoo', *kaveret^dvorim* 'hive^bees' = 'beehive', *geza^ets* 'log^wood/tree' = 'log of wood', 'tree trunk'. The school-age stories contained more noun compounds, both overall and per story, with roughly the same number of compounds across seven-year-old second-graders, nine-year-old fourth-graders, and 11–12-year-old sixth-graders (24, 27, and 29 compounds respectively). In each of these age groups, at least three-quarters of the children used one or more compounds in their stories (38/51 of the schoolage stories contained between one and four compounds). As in the conversational materials, so also in these narratives: the older children's use of conventional compounds reflects recourse to more specialized vocabulary — for example, two children — one aged 7;9, another aged 9;7 — talked about the protagonists having reached 'the end of the road', Hebrew *sof^ha-derex* 'end^the-way'; another child aged 9;5 referred to a log of wood lying in the water as *bul^ets* 'block^wood', in preference to the commoner *geza^ets* 'tree trunk'; and another 9-year-old described the dog as slipping off the windowsill — *eden^ha-xalon* 'edge^the-window'.

In their narratives, school-age children also used several less frozen, nonlexicalized compounds, such as *sof^ha-sipur* 'end^the-story' = 'the story's end' (age 7;0), *mexilat^axbar* 'burrow^mouse' 'a mouse-burrow' (7;5), *anfey^ha-ets* 'branches^the-tree' = 'the branches of the tree' (9;2), *nexil^dvorim* 'flock^bees' = 'a swarm of bees' (9;8). This indicates that these children have acquired compounding as a productive device (see section 4.3 below), even though they use it only sparingly in their narratives. Adults make far wider use of compounds, both well-established and nonlexicalized, than do even 4th- and 6th-grade children telling the same story. While the school-age children average one to two compounds each, most of the adults use six or seven compounds each in their stories. And the particular compounds used differed from one adult to the next. For instance, different adults referred to the jar in which the boy kept his frog as *tsintsenet^zxuxit* 'jar-glass', as *kli zxuxit* 'utensil^glass', and as *mexal^zxuxit* 'container^glass'; and they specified the spot where a deer dislodges the boy from the edge of a cliff as, variously, *sfat^ha-mayim* 'edge^the-water', *gedat^ha-nehar* 'bank^the-river', and *ktse^habrexa* 'end^the-pool'. Wider, more varied use of compounds by the adults reflects mature command of an increased repertoire of vocabulary items and a more literate deployment of the lexicon.

4.2. *Phrasal learning: acquisition of 'free' genitives [conversational]*

Another facet of genitive acquisition is gaining command of phrasal, syntactic means for expressing semantic relations between two nouns. The developmental steps to this process are as follows:

(8) Steps in acquisition of 'free' genitive phrases:
1. initial immature juxtaposing of N N: around age 2
2. free {N *shel* N} phrases acquired along with some common prepositions in {N Prep N} phrases: around 2;4 to 2;6
3. genitive particle *shel* extended to nonpossessive uses, and a wider range of prepositions used in {N—N} contexts

Up to around the middle of their third year, children show little evidence of having acquired the syntax of noun combination. Hebrew-learning children start out by merely juxtaposing nouns, much as has been recorded for other languages (Bloom 1970; Bowerman 1973; Slama-Cazacu 1973). The following are typical examples from conversational data of Hebrew-speaking children, at ages given in brackets.

(9) a. [1;11] *buba ayalda — doll the-girl — 'the girl's doll' vs. ha-buba shel ha-yalda — the-doll of the girl

b. [2;1] *bayit a-kele — house the-dog — 'the dog's house' — cf. bet^ha-kelev — 'the dog('s) home' vs. ha-bayit shel ha-kelev — the-house of the-dog

c. [2;3] *balon letsan — balloon clown — 'clown's balloon' vs. balon shel letsan — balloon of (a) clown

d. [2;4] *uga shabat — cake Sabbath — cf. ugat^shabbat — 'Sabbath-cake' vs. uga shel/le- shabat — cake of/for the Sabbath

Such strings contain no morphological or other cues to specify the semantics or syntax of the relationship between the two items and need to be interpreted by reference to the context in which they are used. The large bulk occur in the appropriate Head–Modifier order, although occasionally children invert them. For instance, Nimrod, aged 2;3, looking at pictures of a circus, first said *ine balon!* 'here's (a) balloon', followed by the ill-formed sequence **od balon letsan* of (8c), literally 'another balloon clown' (compare *balon^letsan*, *balon shel letsan* 'clown's

balloon'), and then later rephrased this as **ha-letsan balon* 'the-clown balloon' when pointing to a clown with a balloon — possibly intending the normative *la-letsan yesh balon* 'the clown has (a) balloon'. This clearly manifests presyntactic stringing of items typical of early word combinations across different languages (Slobin 1979). Moreover, such Noun–Noun combinations constitute a relatively small proportion of the two-word utterances typical of Hebrew-speaking children [conversational data base]. Analysis of the two-word strings contained in 50 output utterances of 36 boy-children aged 22 to 28 months (Rabinowitch 1974) shows the following: out of an average of 16 two-word utterances per child (ranging from 9 to 23 across the sample), fewer than half the children produced between one and three Noun–Noun strings, the rest no such combinations at all. But when they occur in the usage of children whose productions are as yet pregrammatical, with no morphosyntactic marking of the relation between the two nouns, they are very similar to what has been observed for other languages.

During their third year, children learn to combine nouns with *shel*, as in the examples in (9).

(10) a. [2;3] ima shel tali
Mommy of Tally
'Tallie's mommy'

b. [2;4] oto shel yeled
car of boy
'(the) boy's car'

c. [2;5] ha-mita shel ima
the-bed of Mommy
'Mommy's bed'

d. [2;7] bakbuk shel ha-tinok
bottle of the-baby
'the baby's bottle'

Early genitive phrases with *shel* nearly always have animate (mainly human) terms as the second, possessor nouns, and the possessee typically refers to family members, or to body parts, clothing, and other salient elements in the child's surroundings. That is, they are confined to possessive phrases and constitute a typical means of identifying something as belonging to someone. From around age three, *shel* is extended to other contexts and is used with nonanimates to express nonpossessive relations such as purpose, part–whole, and location. Expressions like the following occurred in the speech of most of the Hebrew preschoolers recorded in conversation with adults or with each other in a wide range of longitudinal and sampling contexts (section 3 above): (age 3;4) *ha-tsyurim shel ha-televizya* 'the pictures of=on television'; (3;7) *sikot shel ha-mehadek* 'pins of the stapler'; (3;9) *xultsa shel betsefer* 'shirt of school' = 'shirt for (wearing to) school', 'school shirt'; (3;11) *xelek shel ha-ets* 'part of the-tree'; (4;2) *ha-tipot shel ha-geshem* 'the-drops of (the) rain'; (4;4) *xultsa shel xoref* 'shirt of winter' = 'winter shirt'; (4;5) *tsura shel parpar* 'shape of (a) butterfly'; (4;8) *ha-atsitsim shel ha-gan* 'the plants of the (=our) kindergarten'; (4;11) *anaf shel arava* 'branch of (a) willow'. Nonetheless, across children aged two to five years, animate possession accounts for the bulk of *shel* phrases (148 out of 187 {N *shel* n} in the interview data).

This preschool data base [conversational] does not provide much evidence of further syntactic development in the internal construction of {N Prep N} expressions, beyond the fact that older children will string together two or more genitives. For instance, Sivan, aged 3;5 [longitudinal], describes the person she is talking about as *ha-metapelet shel ha-ax sheli* 'the-babysitter of the-brother of-me' = 'my brother's babysitter'; and Guy, aged 3;11 [interview data], comments that someone has forgotten to bring *ha-kli shel ha-salat shel ha-xasa* 'the dish of the salad of the lettuce' = 'the dish for the lettuce salad'. Similarly, in the children's stories [narrative data base], three-year-olds used only simple {N *shel* N} constructions, such as 3;2 *harosh shel hayeled* 'the-head of the-boy', 3;7 *magafayim shel ima* 'boots of Mommy', whereas four-year-olds already had a few more complex phrases with the second nominal expanded, such as 4;2 *ha'ima shel hatsfardea hakatan* 'the-Mommy of the-frog the-little' = 'the little frog's Mommy', 4;11 *mishpaxa shel tsfarde'im ve tsfarde'ot* '(a) family of he-frogs and she-frogs'.

Later in the third year children also start to make wider use of prepositions besides the genitive particle *shel* in N—N contexts, particularly *im* 'with'.[13] At first this is used mainly in an extended sense of accompaniment, as in (3;2) *doda im mastikim* '(a) lady with (bags of) gum'; (3;4) *ish im balonim* 'a man with balloons'; (3;7) *kabay im sus* 'a fireman with (a) horse'. But it also expresses other relations such as partitive and possessive, as in (3;4) *pijama im mixnasayim* 'pyjamas with pants', (3;6) *atsits im perax* '(a) vase with (a) flower'; and (3;11) *pil im af arox* '(an) elephant with (a) long nose' [interview, longitudinal = conversational data]. Children learn to use these flexibly, as when a child aged 3;11 describes a picture of an elephant being led by a boy holding on to its reins as *yeled maxzik xut im pil* '(a) boy is-holding (a) rope with (an) elephant', then rephrases this as *hine xut shel pil* 'here's rope of (an) elephant' = 'an elephant's rope'.

Earlier favoring of *shel* and *im* is supplemented with age by an increasing range of other prepositions used to link two nominals: for

example, purposives such as (3;9) *kova bishvil ha-geshem* '(a) hat for the rain'; benefactives like (4;3) *hafta'ot le-aba* 'surprises for Daddy'; substances like (4;9) *kadur mi bad* '(a) ball from = out of cloth'; and comparatives: for example, (5;1) *partsuf kmo letsan* 'a face like (a) clown'. These findings are characteristic of different children in different situations [longitudinal and interview conversational data, and responses to structured elicitations].[14] At this later phase of genitive acquisition, semantic and lexical development go hand in hand. Children specify a broader range of semantic relations, and they are able to do so by lexical recourse to more, and more different, prepositions.

4.3. *Acquiring the form and function of bound genitives [structured elicitation, longitudinal]*

Knowing how to construct and how to use bound genitives (the 'construct-state' forms of traditional Hebrew grammar) means that children can make use of compounds as a labeling device for purposes of new-word formation and for expressing semantic contrast between subcategories — compare well-established *na'aley^bayit* 'shoes^house' = 'slippers', *na'aley^akev* 'shoes^heel' = 'high-heeled shoes' with more recently lexicalized *na'aley^sport* 'shoes^sport' = 'sneakers', or with nonconventional *na'aley^pank* 'punk shoes'. They must also learn the structural properties of compounding, for example that the head noun may undergo morphological alternation when in the construct state of a compound — and that N^N combinations follow special patterns of gender and number agreement and definiteness marking compared with other Noun + Modifier strings. These tasks take children a long time to master, as indicated in (11) below.

(11) Steps in acquisition of bound genitives = noun compounding:
1. innovative compound formation combining two nouns as N^N, with errors where morphological change is required: age 4–5
2. command of compound morphological inflections: age 5–7
3. mastery of morphosyntax of compounding: age 7–up

Information on these developmental patterns was derived from two experimental studies supplemented by naturalistic data. The first study focused on labeling contrasting subcategories: Hebrew-speaking children aged two to seven years and a group of adults were asked to identify novel compounds by selecting the appropriate picture out of a set of four, and they were then required to produce other novel compounds as labels for

contrasting pictures in the same set (full details of design and findings are given in Berman and Clark forthcoming).[15] For instance, to test comprehension, the experimenter would ask subjects to choose the picture that showed *sal^klavim* 'basket^dogs' — a nonestablished compound referring to a picture of a basket with dogs inside; she would then show them a picture of a basket with books and ask them to name it — in order to elicit the innovative contrasting compound *sal^sfarim* 'basket^books' = 'book basket'.[16]

Results of this first structured-elicitation study showed that by age 3;0, children were overwhelmingly able to identify the head noun of an unfamiliar compound, just as was found for a similar task in English (Clark et al. 1985). That is, Hebrew-speaking two- to three-year-olds are able to comprehend compounds, at least in the limited sense of identifying which of the elements is the head, hence represents a category label, and which is the modifier, hence serves to subcategorize the head-noun referent. However, as shown by the figures in (12) below, production of compounds was a much later achievement.

(12) Percentage of appropriate compound nouns and other contrasting labels produced [N = 72]

Age	Compounds	Other N modifiers	Total
2;0–2;10 = 2s:	3	3	6
3;0–3;11 = 3s:	13	6	19
4;0–4;11 = 4s:	48	12	60
5;0–5;11 = 5s:	63	14	77
6;6–7;4 = 7s:	93	0	93
22–35 = Adults:	93	4	97

The younger children were in general not able to give appropriate labels for directly contrasting subcategories equivalent to English *book basket* compared with *dog-basket*, or *bike truck* as against *horse truck* for a truck carrying a bicycle compared with one carrying a horse. Two- and three-year-old children produced hardly any compound nouns at all, while four- and five-year-olds did so in half to two-thirds of their responses. In contrast, seven-year-olds (at the end of first grade) responded like the adults by giving compound nouns nearly all the time. This avoidance of compounding among preschool-age children is surprising, as they had heard compound nouns as models for their own answers in the immediately preceding comprehension question. It cannot be explained by structural difficulty with the FORMS they were required to produce, since (a) in Hebrew, compounding does not require any change in the stress assignment of the two nouns (unlike English, where compounds have a distinctive stress pattern); (b) this study used only nouns that do not

require any change in morphological form when occurring as the bound head of a compound compared with their free form when used in isolation or before an adjective; and (c) the syntax was straightforward, since the same Head–Modifier order occurs in compounds and in other constructions: compare the N^N compound *sal^klavim* 'basket^dogs' = 'dog-basket', the N+Adj phrase *sal gadol* 'basket big' = 'big basket', and the N+Pro possessive *sal sheli* 'basket of-me' = 'my basket'. The younger children's failure to produce compounds is, rather, due to two factors: the difficulty they have in providing suitable labels for subcategories in general, and a general lack of reliance on noun compounding as a labeling device among Hebrew-speaking children.

These findings are strongly supported by results of a second experimental study taking into account the morphology of compounding in Hebrew (Clark and Berman i.p.; Bilev 1985). Children aged 3 to 9 and a group of adults were required to produce novel compounds in response to a set of paraphrases based on different semantic relations between two nouns: for example, LOCATIVE 'a table that is in the yard' to elicit the equivalent of 'yard table'; MATERIAL 'a doll that is made of plaster' to elicit 'plaster doll'; or CONTAINER 'a can that has buttons in it' for 'button can'.[17] The head nouns in the 40 innovative compounds on this test were selected by the following morphological criteria: (1) nouns that incur no change in their surface form when bound in a compound, both masculine and feminine, (like masculine *sal* 'basket' and feminine *masa'it* 'truck' in the previous study); (2) feminine nouns ending in stressed *-a* which becomes *-at* when bound; (3) masculine plural nouns whose free-stem ending *-im* changes to *-ey* in the bound form; and (4) various stem changes. These are illustrated in (13) below by items used in the test, the free form given with a prepositional paraphrase in (a), and the bound form as head of a compound in (b).

(13) 1. No change:
- a. kise shel/le- tinokot — chair of/for babies
- b. kise^tinokot — baby (babies') chair
- a. karit mi tsemer — pillow from = of wool
- b. karit^tsemer — wool/woollen pillow

2. Feminine stressed -a ~ -at:
- a. kufsa im kaftorim — box with buttons
- b. kufsat^kaftorim — button(s') box
- a. simla shel rakdanit — dress of (a) ballerina
- b. simlat^rakdanit — ballerina('s) dress

3. Masculine plural -im ~ -ey:
- a. tsiporim ba-ya'ar — birds in-the-forest
- b. tsipor-ey^ya'ar — forest birds

4. Plural+stem change:
- a. bgad-im shel letsan — clothes of (a) clown
- b. bigd-ey^letsan — clown('s) clothes

Stem-vowel reduction:
- a. sade shel/im avanim — field of/with stones
- b. sde^avanim — stone(s') field
- a. shafan la-bayit — rabbit for house/home
- b. shfan^bayit — house/home rabbit

Other stem change:
- a. layla ba-xoref — night in-the-winter
- b. leyl^xoref — winter night
- a. xeder le-misxakim — room for-games
- b. xadar^misxakim — games room

The chart in (14) shows the overall number of compounds produced and the percentage of these which were correctly formed where some morphological change was required in the head noun [second structured elicitation study].

(14) Percentage of innovative compounds produced overall, and with correct morphological adjustments [N = 72]

Age group	Change	% correct change	% Correct change by type		
			-t	*-im* to *-ey*	stem
3s	11	31	62	62	0
4s	65	48	85	56	4
5s	74	60	90	94	10
7s	88	86	100	94	10
9s	92	90	100	100	74
Adults	86	98	100	100	95

Despite the different focus of the two studies [structured elicitation], their results are consistent. In both, production of novel compounds increased significantly as a function of age, and children under age four produced very few compound nouns. Four-to five-year-olds produced compounds in up to two-thirds of their responses, compared with over 85% from seven-year-olds (second-graders), nine-year-olds (fourth-graders), and adults. This study further reveals the importance of morphological factors in determining the correctness of the compounds produced. Between 30% and 40% of all the compounds given by children under age seven did not have the correct inflectional form of the bound head noun. The development pattern in acquiring this kind of noun morphology reflects an interaction between the acquisitional principles of formal simplicity and productivity (Clark 1982; Clark and Berman 1984; MacWhinney 1978; Slobin 1973, 1985). Four-year-olds were able to

provide a final *-t* in feminine nouns most of the time — that is, they correctly changed free-form *simla* 'dress' to bound *simlat-*. This relatively early acquisition could be because all that it requires is adding a perceptually salient consonant to the end of the word; besides, final *-t* is familiar as a marker of feminine gender on verbs and adjectives as well as nouns and is common in girls' names. But four-year-olds made errors in changing masculine plural *-im* to bound *-ey* nearly half the time: this modification replaces one suffix by another one, which occurs only in the context of bound genitives. By age five, kindergarten children show command of this alternation, but not of stem changes. As a word-internal type of modification, these are less perceptually salient than external affixes; and they are generally confined to specific morphological subclasses. For instance, stem changes affect only some nouns with an initial unstressed *-a* syllable (for example, *shafan* 'rabbit' alternates with *shfan-*, but *tavas* 'peacock' is the same in its free and bound form), and only some nouns with penultimate main stress (compare *xeder* 'room'/*xadar-* with *sefer* 'book' which remains unchanged in its bound form). Such superficially unmotivated or arbitrary alternations are a burden for the language-learner (Berman 1981), and they are not always mastered even by adults (two of whom failed to make the necessary stem change by vowel reduction on one item in this study).

The two structured-elicitation studies showed that Hebrew-speaking children will innovate compounds freely only from about age four — whether to express direct contrast in the picture-labeling task, or when required to provide labels for verbal descriptions of subcategories. The fact that this is a late acquisition is also revealed by analysis of naturalistic usage, which reveals virtually no innovative compounding on the part of younger children [conversational data base, mainly longitudinal]. The following instances of coinages showed up occasionally in the conversations of children aged over four years old: (4;2) *pijamat^sport* 'sports pyjamas' to describe pyjamas with a pattern of football players; (4;5) *ohaley^tsava* 'tents^army' = 'army tents' when a child passed a military camp; (5;3) *televizyat^iparon* 'pencil television' to refer to black-and-white television (compare well-established *televizyat^tseva* 'color television'); and (5;5) *kova^yabasha* 'hat^dry-land' = 'land cap' to contrast with conventional *kova^yam* 'hat-sea' meaning 'bathing cap'. Evidence of the late emergence of such coinages is provided by children for whom longitudinal data are available (section 3). No innovative compounds at all occur in almost 20 recordings from a very verbally advanced girl between ages 1;7 and 2;7; errors in form are found in transcripts from the interview data base made by children who have fully mastered other aspects of Hebrew inflection marking (for example, Merav aged 3;8 refers to a picture of a butterfly as **tmunat shel parpar* instead of the required compound *tmunat^parpar* or its analytic counterpart *tmuna shel parpar*); while the child named Sivan, for whom rich diary data are available, and who is particularly given to language play, proceeded as follows: at age 4;5 she made a morphological error in referring to **madafim sfarim* 'shelves books' to refer to bookshelves (*madafey^sfarim*), but she also innovatively referred to a man who gives a Sabbath sermon on television as *dod^ha-shabbat* 'man^the-Sabbath' = 'the Sabbath man'; at age 4;8 she described an easy chair with a wooden seat attached as *kursat^safsal* 'armchair^bench' = 'bench-chair' with the appropriate *-t* ending; and at 4;9 she told her mother she was sitting with *atsimut^eyaneyim* 'closure^eyes' to refer to her having her eyes shut.[18]

The above observations from naturalistic data support the results of structured elicitation tasks, to show that not only do Hebrew-speaking children take a long time to master the morphology of noun compounding, they also seem to coin fewer innovative compounds in both spontaneous and elicited speech output than do their peers in English and other languages noted for this (Clark i.p.). For instance, in a structured-elicitation study which preceded the two discussed in this section, fewer compounds were produced, and at a later age, by Hebrew- compared with English-speaking children in a task requiring them to produce innovative labels for agents and instruments (Clark and Berman 1984; Clark and Hecht 1982).

4.4. *Other facets of complex-nominal acquisition*

Two further questions are implied by the sketch of genitive structure and use outlined in section 1: how do children master the syntax of bound genitives, and how do they learn to deploy and alternate the structural options available to them? Little is known about how and when children learn the syntax of compounding in Hebrew, beyond the special issue of definiteness marking. We had anticipated that this would be a source of some difficulty, since it takes a very different form than in ordinary noun-phrase agreement and is known to be the source of numerous performance errors in adult Hebrew, too. The reason is that the *ha-* definite marker typically attaches both to the initial head noun and to its associated postnominal modifiers (as in *HA-sakim HA-gdolim HA-ele* 'the-bags the-big-Pl the-those' = 'those big bags'); but in compounds and in them alone, the definite marker is attached to the second, modifying noun, and to it alone (compare *sak-ey^HA-bananot* [*HA-gdolot*] 'bag-s^THE-bananas-Fem THE-big-Fem' = 'the bags of big bananas').

A study of definite acquisition in Hebrew which combined observation

of naturalistic picture-book descriptions with a wide range of structured elicitations showed that correct use of the definite marker in genitive expressions is learned far later than in other contexts (Zur 1983). In the corpus analyzed for this study, late preschoolers typically marked *ha-* 'the' as preceding the entire compound, rather than before the modifier alone. That is, they produced *ha*-N^N strings instead of normative N^*ha*-N, as in [naturalistic] (3;11) *hu mesaxek kaduregel im *ha-na'al^bayit* 'he's playing football with the-shoe^house' = 'in his slipper'; (4;3) **ha-mexabey^esh nosea lexabot et ha-esh* 'the-extinguishers^fire' = 'the fire-brigade are-going to-put-out the-fire'; (4;6) *hine kol ha-mexoniyot ba'arets, kol *ha-mexoniyot^meruts she mekulkalot* 'here's all the-cars in-the-world, all the-race^cars that are-broken'; (5;3) *ve *ha-mexoniyot^mishtara ba'u, ve az mexonit^mishtara atsra sham* 'and the-police^cars came, and then (a) police^car stopped there'. These utterances are fully grammatical in agreement and other inflectional markings, but not in use of definite marking on compounds. A similar difficulty was manifested in a highly expressive composition of a second-grader (aged 7;5) writing about animals (and not listed as part of our otherwise entirely oral data base, as described in section 3). The child used several compounds correctly, for example *gurey^xatulim* 'cubs^cats' = 'baby cats, kittens', and described a cat as *xayat^bayit ve gam xayat^sha'ashu'im tova me'od* '(a) house^animal and also a games^animal' (='plaything, pet') 'very good', with the proper bound form of *xaya* 'animal' and feminine agreement on the adjective *tova* 'good'; but she also used ungrammatical overmarking of *ha-* 'the' in the sentence *ha-xatul hu xaya mi *ha-mishpaxat ha-torfim* 'the-cat is (an) animal from the-family^the-predators' (compare well-formed *ha-mishpaxa* 'the-family' and *mishpaxat^ha-torfim* 'family^the-predators' = 'the predator family'). Finally, in the picture-book stories [narrative data base], children aged five and seven years used almost no definite compounds; but 9 out of the 12 definite compounds occurring in stories of nine-year-olds took the incorrect form of *ha*-N^N, and so did a few of the 38 definite compounds used by adults. This suggests that children's language mirrors a tendency on the part of less careful usage in general, perhaps presaging an area of potential language change.

A second question was that of options used by children in subcategorizing and modifying head nouns. The naturalistic data reviewed in section 4.2 showed that postnominal preposition phrases form an increasingly varied option in preschool usage. This is confirmed by the contrastive picture-labeling task described in section 4.3, where some of the children's noncompound responses took this form: for example, (3;3) *yeled im telefon* '(a) boy with telephone' for a boy wearing a shirt with a telephone drawn on it; (4;7) *tsalaxat im beitsim* '(a) dish with eggs'; (5;2) *ashan shel bayit*; and (7;4) *argaz bli klum* '(a) box without anything' for an empty box (Berman and Clark forthcoming).

Other studies have revealed Hebrew children's ability to specify classes of nouns by innovative affixation, most particularly from age four (Berman and Sagi 1981; Clark and Berman 1984; Walden 1982). Occasionally, when asked to paraphrase innovative compounds in the second elicitation task described in section 4.3, children used affixation, too; for example, for *ganenet^dardas-im* 'teacher-Fem^smerf-s = smerf teacher', one child (aged 5;8) coined the term *dardas-it* 'smerf-ess'; for *smixat^buba* 'blanket^doll' a child (7;3) coined *smix* + *on-et* 'blanket-ie + Fem'; while for *ben^pilim* 'son^elephants' = 'elephant child', an older child (9;1) used a conventional diminutive suffix in the form *pil-on* 'elephant-ie'.

Another affixal means we had anticipated was by use of denominal adjectives as noted in section 1 above. However, in the second of the two structured-elicitation studies described (section 4.3), when asked to provide names for subcategory descriptions, only a few out of 60 children aged three to nine years gave such responses; and seven of the eight such responses — all from children aged five and up — used a well-established adjective in the phrase *xatsa'it keyts-it* 'skirt summery'. In contrast, most of the 12 adults in the study gave at least one such response, including the Hebrew equivalents of 'educational games', 'military flags', 'wintry night', and 'domestic rabbit' alongside of the related compounds (play-games, army-flags, winter-night, and house-rabbit respectively). This is consistent with the very few such instances found in the naturalistic data examined, the earliest innovative example being from a child aged 3;9 — *rove barzel-i* 'gun iron-y' for 'an ironlike gun'. And it contrasts with the occurrence of several such innovations in the speech of an English-speaking child aged 2;5 to 2;7: for example *trucky*, *cracky*, *nighty* (from unpublished data kindly made available by Eve V. Clark). Yet suffixal affixation is a straightforward and widespread derivational process in Hebrew, common in both spontaneous and elicited usage by around age four (Berman and Sagi 1981; Clark and Berman 1984). I assume that Hebrew-speaking children do not coin many denominal adjectives as a means of noun specification because such forms, while very productive from a structural point of view, are confined to a more specialized, high-level vocabulary not generally familiar to young children.

5. Discussion

Not much is known about the development of syntactic processes like conjoining, modification, and different types of expansions within com-

plex nominals, beyond the difficulty encountered by children in assigning a definite marker to bound genitives. The fact that the naturalistic data base used above failed to provide clear evidence on the syntax of genitives suggests that specially devised elicitation and comprehension studies are needed for this purpose. There is reason to assume that this might be an area of relatively delayed acquisition. It has been noted that school-age children and even adults may violate the rules for assigning a definite marker to bound genitives in casual spoken usage (section 4.4), although more carefully designed study is needed in this respect. Conjoining of two or more head nouns bound to a single adjunct is another area where normative syntax is often violated, which could be experimentally studied in children's language (Ravid et al. 1985). Finally, NP-internal modification seems to represent a rather late linguistic development in Hebrew, and to be a good indicator of general verbal ability (Berman 1985a; Biran i.p.). Further investigation of related constructions might reveal that this is the case in other types of complex nominals and in the acquisition of genitives in other languages as well.

The developmental pattern of compounding morphology outlined in section 4.3 was attributed to language-internal factors of formal simplicity interacting with the general applicability of certain structural alternations. Yet this alone does not explain the relatively late age at which these modifications are mastered by Hebrew-speaking children, in contrast to their generally rapid and error-free acquisition of other inflectional systems (Berman 1985a, 1986b). By age four, they have typically gained command of plural marking, gender agreement, verb-tense systems, and case-marked pronouns — paradigms characterized by similar morphophonological operations as in compound nouns. The relative lag in acquisition of compounding is due, rather, to its limited productivity in current Hebrew, where productivity refers to actual usage, rather than to formal criteria of structural potential. Structurally, noun compounding is productive and a well-established device in contemporary as in classical Hebrew, for lexical purposes of labeling subcategories and for word formation as well as for syntactic stringing of related nominals. And noun compounds can be derived in Hebrew under broadly the same semantic and pragmatic conditions as in a Germanic language. But they are put to relatively restricted use today.

First, as means for new-word formation, speakers prefer the more typically Semitic devices of affixation to root consonants, along with more contemporary affixation to a word stem and even blending (Berman i.p.a, i.p.b). And children, too, will coin new names for objects by bound, affixal means far sooner, and more often, than by means of compound nouns (Berman and Sagi 1981; Clark and Berman 1984). A typological bias

explains their relative lack of reliance on compounding as a means for creating coinages. That they do so only from around age four is connected to the fact that Hebrew-speaking children in general make productive use of word-formation devices at an age beyond that at which they have gained mastery of a rich range of inflectional markings in their language.

It could be argued that the bound form of initial nouns in compounds and before stressed suffixes belongs with the inflectional system of Hebrew morphology. But the possessive pronoun suffixes used in this context are largely literary and restricted to a highly formal register unfamiliar to young children. Everyday usage prefers the periphrastic genitive with *shel*. (Compare bound *bet-i* 'house-my' versus spoken *ha-bayit shel-i* 'the-house of-my', both used to mean 'my house'). And where even older children make errors in the use of bound forms, it is often because they are confined to subclasses of nouns, and need to be learned as such, rather than by general rule. Where historically well-motivated morphophonological processes are not transparent in contemporary usage and appear arbitrarily confined to certain items and classes of items, even school-age children will violate normative requirements in their construals of less familiar forms (Berman 1981; Ravid 1985; Shwarzwald 1981).

As a means for syntactic stringing of nominals in different semantic relations, compounding is typical of more formal registers, including newspapers and other written usage. Speakers rely on phrasal options for combining nouns, such as the genitive particle *shel* and other prepositionals in their everyday colloquial usage. And since it is this type of speech that constitutes the base of preschool language input and output, compounding as a constructional device is not especially functional for young children. Bound-genitive constructions are among the constructions that come into use along with school-age mastery of a more literate style and more formal contexts of language use, like the abstract nominals corresponding to English *destruction* compared with *breaking* or *arrival* compared with *coming* (Meroz, in progress).

General applicability of a construction type in colloquial registers also explains why Hebrew-speaking preschoolers make only restricted use of denominal adjective formation. These do not occur much in everyday Hebrew vocabulary, compared with words like English *dirty*, *soapy*, *sandy*, but are part of a more highly specialized vocabulary (like English *historical*, *cooperative*, *neighborly*, or *western*). The impact of frequency of use on child language has recently been reevaluated by Slobin (1987) in relation to different linguistic subsystems. The present study also shows that for a particular construction to be functional for young children, it must be productive within the registers and across the levels of language operative for them at the appropriate phase of their development.

Compound constructions have been used to address central issues in current linguistic theory, since they represent a peculiar intersection between the lexicon and syntax (Borer 1983; Kiparsky 1982). Lexicon and syntax may constitute separate systems or distinct ends of a continuum in linguistic analysis, but they certainly serve one another and interact in language acquisition and in language use. With maturation, knowledge of language becomes more grammaticized and structure-dependent, and so less context-bound. But at the same time, language use also becomes lexically more autonomous. Analysis of syntactic structures used by Hebrew-speaking preschoolers showed that growth in formal command of grammatical structures is bound up with the overall augmentation of verbal expressiveness (Dromi and Berman 1986). Thus, overt lexical marking of referents, of predicates, and of interclausal connections renders the child's discourse increasingly more explicit. Syntactic development proceeds hand in hand with more specific predicates manifested by a decrease in the number of verbless clauses and more use of aspectual verbs like *start*; with greater reliance on lexically specified NPs instead of pronoun subjects; and with use of more different coordinating conjunctions marking sequential relations between clauses and a wider range of subordinating conjunctions to mark adverbial clauses. This is exactly analogous to what was revealed by analysis of the acquisition of genitives in the present context. Increased reliance on a wider range of lexical prepositionals signals growing command of the syntactic construction {N Prep N} as a kind of genitive — an instance of the lexicon at the service of syntax; while improved knowledge of the morphological forms of grammatical inflections enables children to produce and understand more lexicalized compounds; that is — as syntax develops, the learner can do more with more items — and so syntax is at the service of the lexicon.

Finally, the analysis proposed here has relevance for the issue of 'use' versus 'grammar'. I have argued that knowing a language means knowing both its grammar and its use (Berman 1985d). Learning the grammar of compound nouns, as of free genitives and other prepositional constructions, is an indispensable part of this. But for this to evolve into felicitous endstate command of the system, grammatical knowledge must be activated and deployed contrastively with other partly synonymous and functionally related structures.

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Notes

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1. In the Greek and Latin tradition, the term 'genitive' is used mainly for possessive relations, such as *a child's dream*, *children's clothes* as well as *the dream of a child*, *the psychology of children*. These are generally treated as distinct from constructions termed 'compound nouns' — *child prodigy*, *child torturer*. In the Hebrew tradition, however, a single term *smixut*, literally 'adjoining', 'adjacency', is used for both possessive phrases and compound nouns. The reason is mainly historical: in Biblical Hebrew, the bound 'construct-state' form was the primary means of expressing such relations (Gesenius 1910). Use of the genitive particle *shel* 'of' in 'free' or 'unattached' forms of *smixut* became widespread only in later, Mishnaic, language.
2. This view of linguistic analysis is compatible with one which assigns a central place to the notion of 'grammatical construction', as in the current work of Charles J. Fillmore and his associates (Fillmore 1985; Fillmore et al. forthcoming; Lambrecht 1984).
3. The caret mark ^ indicates a compound, that is, an initial, head noun followed by a modifying noun to which the head is 'bound', in the construct-state relation. The morphological bias of Hebrew scholarship determines the traditional terminology for construct-state nominals. The initial noun is termed *nismax*, literally 'adjoined, supportee, dependent' in contrast to the following, adjunct noun — *somex* 'adjoiner, supporter'. This is because the first noun is morphologically bound or dependent, even though semantically and syntactically it has the properties of a head nominal.
4. The so-called 'double-genitive' construction in (2c) is not considered here. Little is known about the syntax and semantics of such expressions, for example (i) *xalom-o shel ya'akov* 'dream-his of Jacob' = 'Jacob's dream', (ii) *xalom-a shel rina* 'dream-her of Rina' = 'Rina's dream', and (iii) *xalom-am shel ya'akov ve rina* 'dream-their of Jacob and Rina' = 'Jacob and Rina's dream'. They have been noted in newspaper usage (Azar 1976; Shlesinger 1985) but are almost never found in children's Hebrew, including school-age narratives like those analyzed here.
5. That is, *shel* does not assign case roles, and it differs from English *of* which can occur in environments such as 'beware of', 'complain of', or 'be fond of', 'be frightened of', 'be proud of'. Hebrew *shel* is semantically closer to English apostrophe *'s* functioning as a possessive marker, and rendering *shel* by 'of' is thus rather misleading. For instance, a productive use of English *of* is in partitives: for example, *piece of chalk*, *slice of cake*, *box of matches*, *sheet of paper*, where Hebrew prefers bound genitives for this purpose.
6. It would seem easy to test whether nonexpert adult speakers of Hebrew also treat different instances of what grammarians term *smixut* as quite separate constructs. However, the bulk of native speakers are exposed to formal language studies at school and so have been consciously introduced to these three constructions as forming a single grammatical category termed *smixut*.

7. Formation of analytic expressions with *shel* or other prepositions is far less restricted, syntactically and lexically, than is bound compounding. Shlesinger (1985) lists ten conditions which disallow or disfavor use of compound constructions, as against only two situations where a bound compound form is obligatory (see also Berman 1978).
8. Denominal adjective formation is morphologically productive and is widespread in newspaper and expository usage, though frowned upon by puristic preference for the classical device of bound compounding (Attias 1980; Ravid and Shlesinger i.p.). Hebrew thus contrasts with English, where denominal adjectives are typical of a more Latinate, higher style than the corresponding compounds — compare *aquatic insect* vs. *water bug* (Levi 1976).
9. Hebrew does not make an obligatory distinction in compounds with container head nouns, however, between the purpose sense of English *wine-glass*, *orange crate*, *matchbox* and the containment interpretation of the corresponding *of* phrases *glass of wine*, etc.
10. In his survey of a large corpus of contemporary newspaper articles, Shlesinger found that bound genitives accounted for nearly 60% of the total genitives, compared with only some 25% in the form {N *shel* N}, even though *shel* genitives are far less structurally constrained (1985: 173–206). The remaining 15% of genitive constructions were double genitives, as in (2c) of the text and in note 3, although these are very uncommon in everyday speech. Analysis of a comparative corpus of news reports showed them to contain a converse proportion of fewer bound genitives and more *shel* phrases, reflecting their less formal register.
11. Such nonanalysis may persist with a few very highly lexicalized items. This is shown by a first-grader's spelling of the compound noun *bet^sefer* 'place^book' = 'school' as a single word instead of two words, one ending with the letter for /t/, the other beginning with the letter for /s/, thus: conventional spelling — BYT SPR, child's — BYCPR.
12. This could reflect a generally sparse distribution of compounds in Hebrew conversational usage, since the adults in the sample used a similarly low number of compounds in talking to the children.
13. The forms *shel* and *im* are acquired early in general (Dromi 1979; Kaplan 1983). Other prepositions which are used even sooner — the locative *be-* 'in, at', dative *le-* 'to, for' — are not common postnominally. In a task requiring adults and children aged three to nine years to paraphrase innovative compounds [structured elicitation], temporal and locative descriptions rarely elicited {N be- N} forms like English 'elves on Saturday' for 'Sabbath elves' or 'birds in-the forest' for 'forest birds' (Bilev 1985; Clark and Berman 1987).
14. In the narrative data base, {N prep N} constructions with prepositions other than *shel* occurred in none of the preschool stories (12 each at ages three, four, and five years), and only once in the school-age stories (12 each at ages seven, nine, and eleven), while 12 adult stories in total included only four such occurrences — all with the preposition *im* 'with', such as *tsintsenet im tsfardea* '(a) jar with (a) frog'. We interpret this as due to the nature of the task, which elicited far more references to events and states than description or specification of objects.
15. I am indebted to Eve Clark of Stanford University, who initiated the study and cooperated fully in the analysis. Thanks are due to Ziva Wijler of Tel-Aviv University Department of Linguistics who conducted the fieldwork.
16. The design included another contrastive task, in which respondents were required to label a third picture in the set containing the head reference alone — for example, in the case in point, a picture of a basket with nothing in it (for details, see Berman and Clark forthcoming).

17. Subjects were also asked to paraphrase a set of innovative, nonestablished compounds, such as *rofe^parparim* 'doctor^butterflies = butterfly doctor', *kadurey^bad* 'balls^cloth = cloth balls', *gamadey^shabat* 'elves^Sabbath' = 'Sabbath elves'. Results are described in Clark and Berman (1987).
18. Thanks are due to Dorit Ravid, who recorded these examples, and also the following exchange from a brother and sister in grades I and II. The children innovate compounds freely as a means of contrastive subcategorizing, on the basis of a single conventional term — well-established *shkedey^marak* 'almonds^soup' = 'soup-almonds', 'croutons' from singular *shaked* 'almond' (compare bound *shked-* as in *shked-im* 'almonds', *shked-iya* 'almond-blossom').

Girl (7;2): *balata shaked^marak.*
You swallowed (a) soup almond.

Boy (6;1): *lo, ze haya boten^marak. halevay she yamtsi'u botney^marak.*
No, it was (a) soup peanut. I wish they'd invent soup peanuts.

G: *lo, ze haya orez^marak. halevay she yamtsi'u marmeladat^marak*
No, it was soup rice. I wish they'd invent soup marmelade
o shfan^marak, ve ani rotsa gam glidat^marak ve sukariyot^marak
or soup rabbit, and I also want soup ice cream, and soup candies, and soup
ve kolat^marak.
(coca)cola.

B: *halevay she yamtsi'u kasata^marak.*
I wish they'd invent soup 'cassata' [Italian ice cream].

These contrastive coinages for different kinds of *marak* 'soup' demonstrate command of the different morphological alternations of the head noun illustrated in (13) of the text. The only error is initially, where *shaked* should have the bound form *shked-* and in the last expression, where the loanword head noun *kasata* should end with *-t* to mark a feminine noun.

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