

VI. DIFFERENCES IN EARLY VERB GROWTH AND USE AS A FUNCTION OF DEVELOPMENTAL PERIOD, CHILD, AND VERB

In chapter V, we presented analyses that revealed some grammatical productivity and flexibility in the first verb uses of eight children. All children used at least one syntactic frame with multiple verbs; three children used all five coded frames with multiple verbs. All the children used at least some of their first verbs with grammatical flexibility, and each of these early-acquired verbs was used flexibly by at least some children during the window of this study. Within that picture of early and pervasive flexibility, there was variability among children and among verbs in the degree of flexibility observed. It is also possible that there was variability across the duration of the study that has been unexplored in the analyses presented thus far. In this chapter, we examine differences among periods of development, among children, and among verbs in more detail, and we examine the interrelations among the measured properties of children's verb use to provide further tests of the theories of verb development we have considered.

DOES FLEXIBILITY OF VERB USE VARY BY PERIOD OF VERB DEVELOPMENT?

According to the conservative-child hypothesis described in chapter I, grammar is at first lexically specific; only later are the combinatorial possibilities of verbs represented in a grammar with an abstract category of VERB (MacWhinney, 2004; Ninio, 1999, 2007; Tomasello, 2000). The present findings, that most verbs are used with multiple frames and most frames used with multiple verbs within the first 10 instances of verb use, are inconsistent with this position. It is still possible, however, that there is a developmental progression in the abstractness of children's grammars such that verbs that are learned first are used with less flexibility than verbs that are learned later. To address this proposal, we go back to the data to test the hypothesis that there is an early stage of nonproductive verb use, suffi-

TABLE 15a
CHILDREN'S AGE (MONTHS) FOR EACH DEVELOPMENTAL PERIOD

Period	Child							
	Carl	Mae	Sam	Heather	Elaine	Carrie	Stacey	Ned
1	20-21	19-20	16-17	19-20	20-21	18-19	16-17	17-18
2 ends	23.5	22.5	19.5	22.5	23.5	21.5	19.5	20.5
3 ends	25.5	24.5	21.5	24.5	25.5	23.5	21.5	
4 ends	27.5	26.5	23.5	26.5				
5 end	29.5	28.5	25.5	28.5				
6 ends	31.5	30.5						
7 ends	33.5	32.5						

TABLE 15b
CHILDREN'S MLU FOR EACH DEVELOPMENTAL PERIOD

Period	Child							
	Carl	Mae	Sam	Heather	Elaine	Carrie	Stacey	Ned
1	1	1	1	1.98	2.18	2.68	1.65	1.17
2	1	1.05	1.2	2.58	1.71	3.95	2.71	2.06
3	1	2	1.15	3.67	2.7	4.37	3.08	
4	1.93	2.32	1.48	5.08				
5	2.52	3.31	2.3	3.8				
6	2.2	4.04						
7	3.45	5.72						

Note.—MLU = mean length of utterances.

ciently brief that it was obscured by the overall productive and flexible nature of verb use during the long window of this study.

We analyzed each child's verb use across his/her participation in the study. We divided each child's span of participation into developmental periods, as follows: Period 1 included each child's first 6 weeks of participation and thus, given the participant-selection requirements of the study, their very first verbs. Period 2 included each child's next 8 weeks of participation, Period 3 included the next 8 weeks, Period 4 included the subsequent 8 weeks, and so on to the end of their participation. Some children (Carl, Mae) participated through seven periods (see Table 15a), others (Sam, Heather) participated through five periods, others (Elaine, Carrie, Stacey) participated through three periods, and one (Ned) participated through two periods. It is important to point out that because we have records only for each child's first 10 uses of each verb, the later periods include data only from later-learned verbs and not from additional uses of

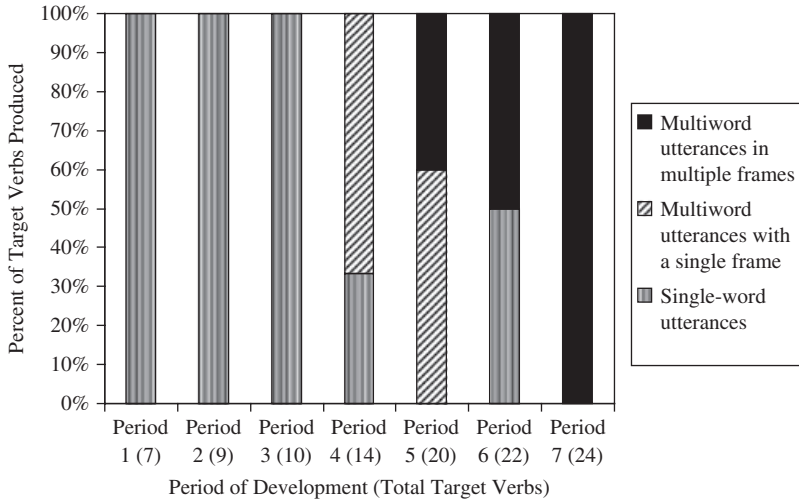


FIGURE 11.—The development of syntactic flexibility in newly learned verbs: Carl.

early-learned verbs. Thus, the crucial question concerns whether the first 10 instances of later-learned verbs consistently display more flexibility than the first 10 instances of early-learned verbs. Tables 15a and 15b present the children’s ages and mean length of utterances (MLUs), respectively, for each of the periods in which they participated. The MLUs are estimates, calculated using only the verb-containing utterances recorded in the diaries.

Figures 11 through 18 present each child’s timeline individually; Figure 19 presents all children in a single figure. The figures are ordered beginning with those children who participated for the greatest number of periods, Carl and Mae, and ending with Ned, who participated for the fewest periods. As shown in Figure 11, Carl began with seven verbs in his first period and added new verbs slowly during his next two periods. All of his verbs in these first three periods were in single-word utterances and hence not used grammatically flexibly (gray bars). During his fourth period, he began to use verbs in multiword utterances (striped bars); however, both verbs were only used in one frame (subject–verb [SV]). It was during his fifth period, when he was between 27.5 and 29.5 months of age, that he used two verbs both in multiword utterances *and* in different frames within the first 10 instances (black bars). The frames included SV, verb–object (VO), and SVO. Thus, Carl began to show grammatical flexibility during Period 5. Mae, shown in Figure 12, displayed a similar although not identical pattern. Mae began using two verbs in Period 1, then added eight more verbs in Period 2 but only eight more verbs in Period 3. Unlike Carl, throughout

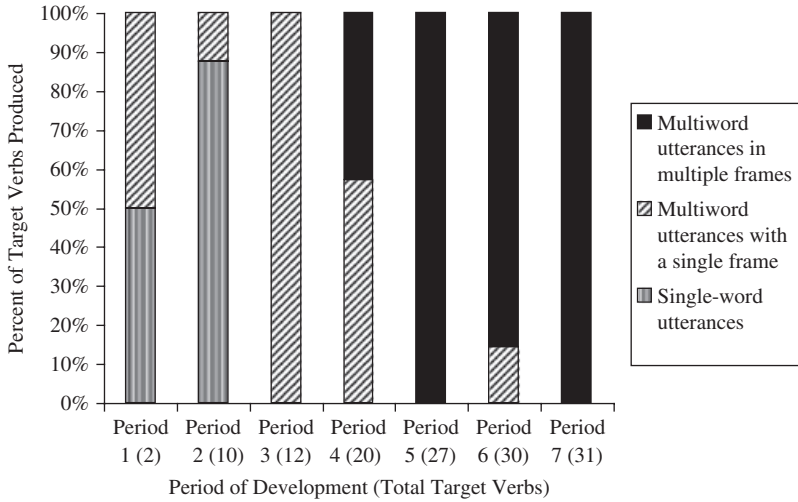


FIGURE 12.—The development of syntactic flexibility in newly learned verbs: Mae.

these three periods she used some verbs in multiword utterances within her first 10 instances. However, as was the case for Carl, each verb appeared in only one frame: During Period 1, one verb appeared with a preposition (P) and during periods 2 and 3, verbs appeared only in the SV frame. During Period 4 (i.e., one developmental period earlier than Carl), she used three verbs in multiword utterances *and* in different frames of multiword utterances within the first 10 instances. Frames of SV, VO, SVO, and verb-preposition (VP) were all represented. Mae thus began to show grammatical flexibility during Period 4, between 24.5 and 26.5 months of age. Sam, shown in Figure 13, also displayed this general pattern of (a) restricted use of his target verbs in multiword utterances for their first 10 instances during Periods 1–3 and then (b) mostly multiword use and multiframe use beginning at Period 4. At his Period 4, Sam used his verbs in the SV, VO, SVO, and VP frames. The timeline data from these three children (Carl, Mae, and Sam) provide some support for a weaker version of the conservative-child hypothesis: First verbs were produced in restricted frames (either single-word utterances or multiword utterances using only one frame); later verbs were produced in flexible frames.

However, not all of the children followed this pattern. Heather (Figure 14) and Carrie (Figure 15) demonstrated grammatical flexibility in their verb use starting at Period 1. Both girls produced many verbs even during their first 6 weeks of participation in the study ($n = 16$ and 13, respectively), and they used approximately half of these verbs in multiword utterances and in different frames within the first 10 instances during Period 1.

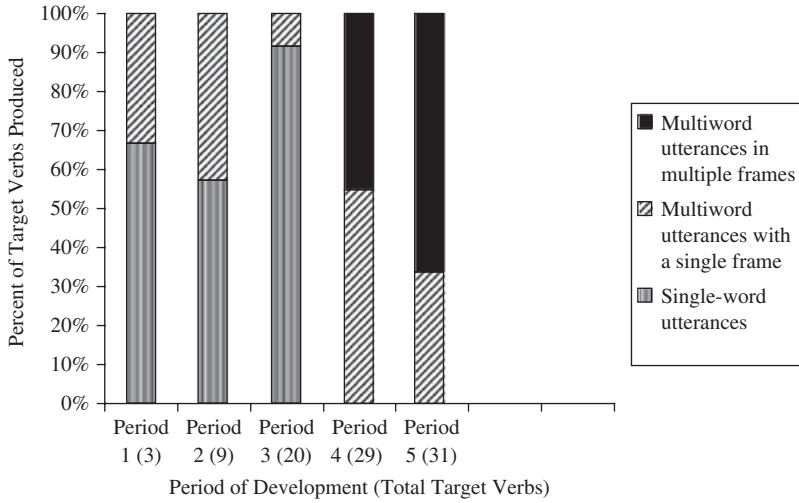


FIGURE 13.—The development of syntactic flexibility in newly learned verbs: Sam.

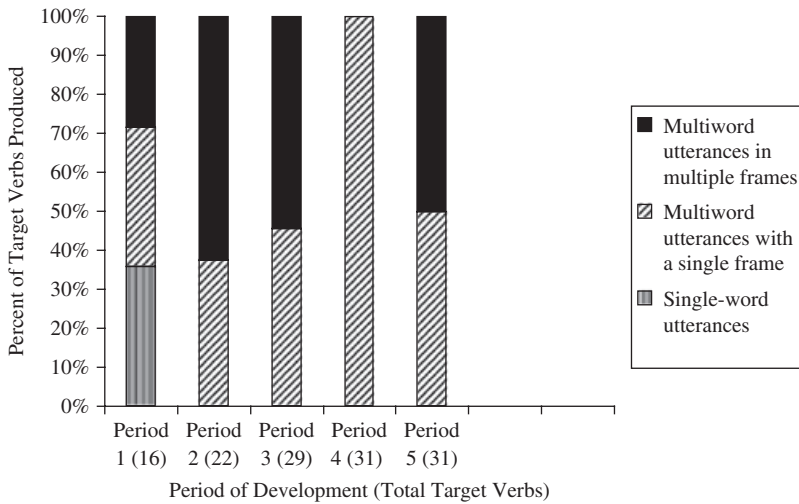


FIGURE 14.—The development of syntactic flexibility in newly learned verbs: Heather.

Heather and Carrie used the SV, VO, SVO, VP, and V-ing frames all during Period 1, and grammatically flexible use continued through each child's next two periods. Neither Carrie nor Heather provides any evidence of restricted verb use in terms of grammar, even for their very first verbs. They

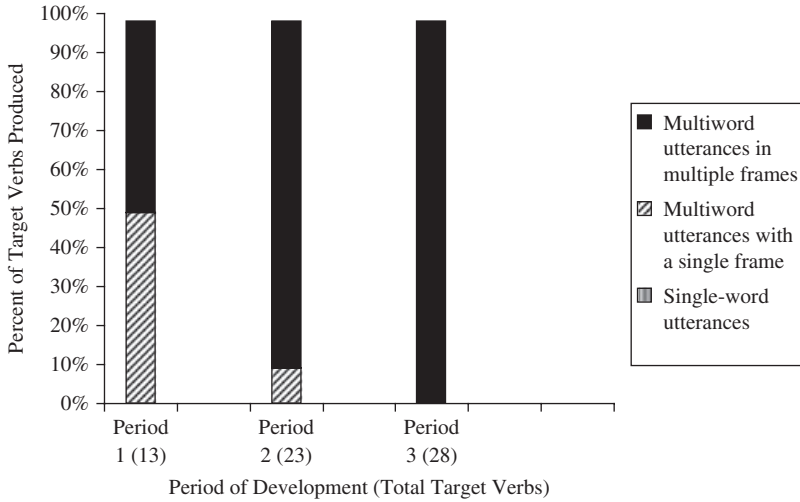


FIGURE 15.—The development of syntactic flexibility in newly learned verbs: Carrie.

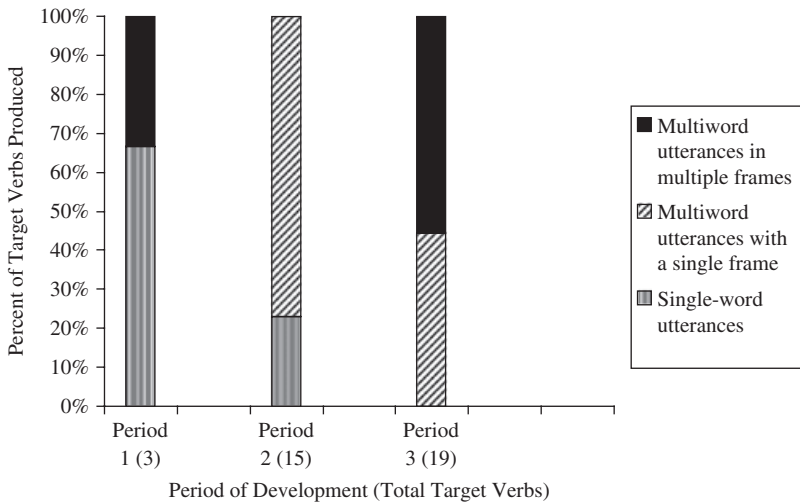


FIGURE 16.—The development of syntactic flexibility in newly learned verbs: Elaine.

also reached the ending point of the study more quickly than two of the three conservative-first children.

Elaine, Stacey, and Ned (Figures 16–18, respectively) may be considered “intermediate” with respect to their speed of reaching grammatical

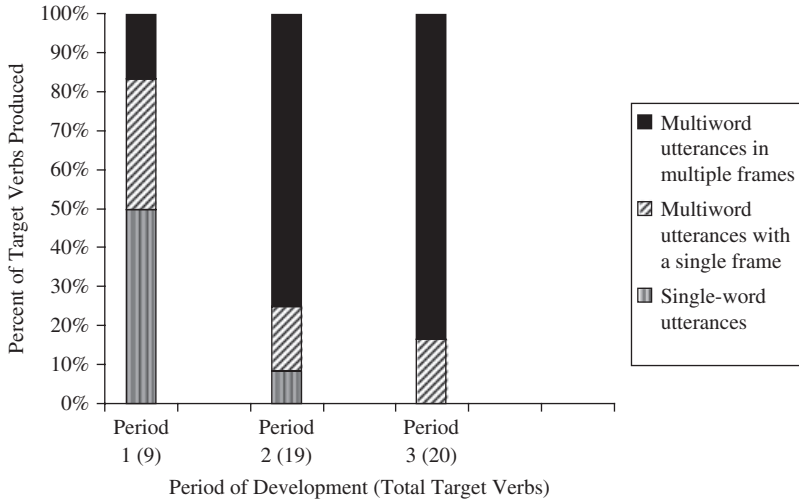


FIGURE 17.—The development of syntactic flexibility in newly learned verbs: Stacey.

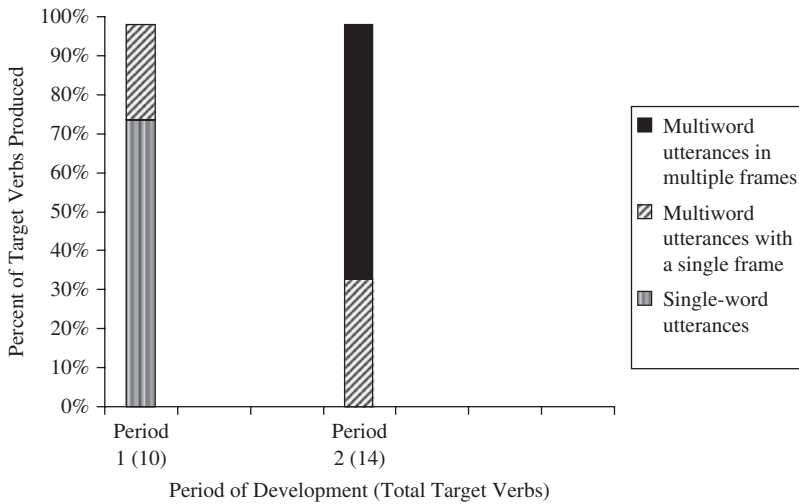


FIGURE 18.—The development of syntactic flexibility in newly learned verbs: Ned.

flexibility of verb use: Each used 1 verb in multiple frames within the first 10 instances during Period 1. Elaine and Stacey both used their one multiframe verb during Period 1 in the SV, VO, and SVO frames. Also during this period, Stacey used two additional verbs in just one multiword frame within the first 10 instances (Elaine used none in this way). Leaps in grammatical flexibility were then displayed during Period 2 (Stacey) or Period 3 (Elaine).

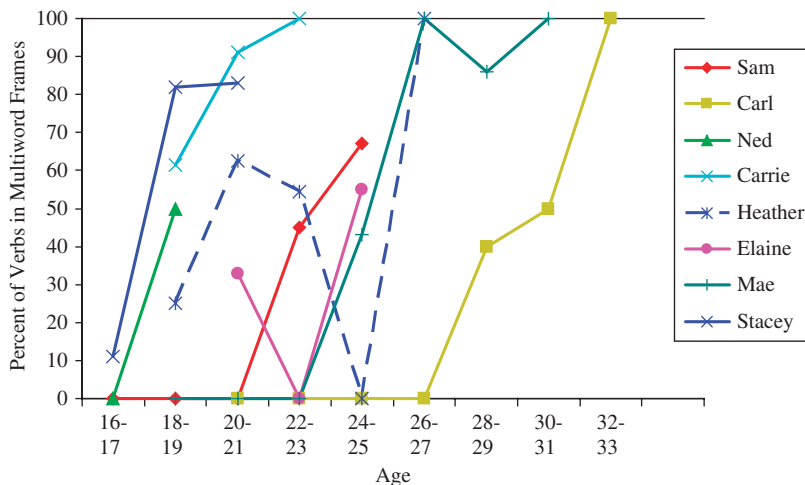


FIGURE 19.—Change in multiword use by age.

Thus, they showed earlier flexibility than Carl, Mae, or Sam; however, their flexibility was not displayed across as wide a number of verbs as was Carrie's or Heather's. Ned participated for the fewest periods and, like Carl, Sam, and Mae, used his first 10 verbs in only restricted single-word or multiword utterances for their first 10 instances during Period 1. During Period 2, though, he produced four new verbs and used two of them in multiword utterances and in different frames within the first 10 instances. Ned's frames during Period 2 included SV, VO, and SVO.

The different pathways to grammatical flexibility that these children demonstrated can be seen together in Figure 19. Figure 19 displays the cumulative *percent* of verbs produced in multiword utterances in different frames within the first 10 instances for each child across periods. As the figure shows, Carrie, Stacy, Elaine, Heather, and Ned produced considerable multiword utterances in different frames during Periods 2 and 3, whereas Sam, Mae, and Carl reached these levels only during Periods 4–6 of their verb use.

This analysis of individual children's developmental changes in the grammatical flexibility with which they used newly acquired verbs reveals that the majority of the children, although not all children, showed grammatical flexibility close to the very onset of verb use. Moreover, even the child who was slowest to achieve grammatical flexibility, Carl, displayed such flexibility before the age of 2.5 years; Sam, another "slow" learner, actually demonstrated grammatical flexibility before 24 months of age. Heather, Stacy, Ned, and Carrie demonstrated grammatical flexibility be-

fore 20 months of age. Both these developmental patterns and the ages of the first grammatical flexibility demonstration are at odds with those reported by other researchers, who have claimed that there is little grammatical flexibility until children are close to 2.5 years of age and that children's initial use of sentence frames is predominantly, if not exclusively, verb specific (e.g., MacWhinney, 2004; McClure et al., 2006; Tomasello, 2000, p. 213).

ARE LIGHT VERBS PATHBREAKERS TO GRAMMATICAL FLEXIBILITY?

Previous comparisons of the grammatical environments surrounding light and heavy verbs in children's first verb uses (in chapters III and V) revealed that light verbs appeared significantly more frequently with direct objects and in SVO frames than heavy verbs and that light verbs appeared significantly earlier and more frequently with different direct objects than did heavy verbs. These findings might be considered evidence for the claim that light verbs function as facilitators of children's acquisition of abstract phrase-level sentence frames (Chenu & Jisa, 2006; E. Clark, 1987; Goldberg, 1999; Goldberg & Casenhiser, 2006; Ninio, 1999, 2005a, 2005b; Pinker, 1989; Rice & Bode, 1993) because the light verbs, among the target verbs in this study, did seem—overall—to show more and earlier direct object flexibility. However, the finding of greater flexibility for light verbs was limited to the direct object slot; light verbs did not show greater grammatical flexibility overall (Table 14). Furthermore, light verbs may have appeared with more, earlier, and more varied direct objects not because of any syntactic privilege but because the meanings of light verbs are general and thus expressing the direct objects is necessary for communicative purposes to sufficiently specify the event or relation that the child is talking about (e.g., Snedeker & Gleitman, 2004; Theakston et al., 2004).

It is possible, however, that these averaged data missed potential pathbreaking functions that individual light verbs might have served for individual children. As listed in Table 1, the light verbs among the target verbs in this study were fairly diverse, and some of these (*go*, *put*, *want*) have figured more heavily in proposals of the pathbreaker hypothesis than others (Chenu & Jisa, 2006; Goldberg, 1999; Goldberg & Casenhiser, 2006; Ninio, 1999). The following analyses investigated such potential functions for each child individually, considering each light verb that each child produced. Following Theakston et al. (2004), we investigated whether individual light verbs participated in a wider range of different frames than verbs with more specific meanings that were acquired at the same age. We compared the frame flexibility of each light verb with (a) the heavy verb that appeared just

TABLE 16
CARL'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Push	GO	Kiss	658	680	1 (V)	Push
			680	680	1 (V)	Go
			715	715	1 (V)	Kiss
Sit			808	808	2 (SV, noV)	Me sit, No sit
Cry	COME	Cut	800	800	2 (V, SV)	Cry, Baby cry
			814	814	1 (V)	Come
Cut	GIVE	Hold	827	827	3 (V, VO, SV)	Cut, Cut paper, Mama cut
			827	827	3 (V, VO, SV)	Cut, Cut paper, Mama cut
			828	828	2 (VIO, SVIO)	Give me, Sissy give me
Cut	LOOK	Hold	861	861	1 (SVO)	I hold (flash)light
			827	827	3 (V, VO, SV)	Cut, Cut paper, Mama cut
			838	840	2 (V, V locative)	Look, Look punch bag
Like	WANT	Wash	861	861	1 (SVO)	I hold (flash)light
			911	911	2 (SVO, SV-neg O)	I don't like, I like cheese
			928	932	2 (SVO, SV+S)	Me want it, Me want to do it
			932	932	3 (SVO, VO, V)	Me wash table, Wash floor, Wash

Note.—V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to "regular" verbs.

before this light verb's first use and (b) the heavy verb that appeared just after this light verb's first use. We also looked across the range of earliest verbs used by each child to see which verb(s) first appeared with which frames. Given that our data set was verb centered rather than frame centered, though, we are unable to address the related question of whether the very first uses of a frame appeared with light verbs. The findings are presented in Tables 16–23, described below in detail for Carl and summarized for the rest of the children.

Carl produced six light verbs. Each was preceded in development by a heavy, more specific verb (see Table 16), and none of the light verbs was more flexible in its use than the just-preceding heavy verb. Moreover, light verbs were not consistently the first ones to be produced in new constructions. For example, *cry*, produced at 800 days, was Carl's 13th verb but the first verb used with a subject. *Cut* was the first one used with an object, and *hold* was the first one used in the SVO frame. Carl's light verbs were the first to be used in the verb+locative (VL) (inchoative motion) and VOL (caused motion) frames/constructions; however, his "first-in-frame" light verbs were

TABLE 17
CARRIE'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Push Wash	GO	Walk	564	574	3 (V, SV, VO)	Push, Arty push, Push mommy
			565	583	3 (V, SV, VO)	Wash, I wash, Wash my hands
			568	582	3 (V, V L, SVL)	Go, Go bye-bye, Daddy go work
Cry	COME	Run	569	644	3 (V, SV, SV-ing)	Walk, Mom walk, Doggie walking
			590	601	2 (SV, SV-ing)	Baby cry, Arty crying
			593	603	2 (V, SV-ing)	Come, Granny coming
Open	WANT	Kiss	594	603	2 (SV, SV-ing)	Arty run, My running
			585	600	3 (V, SV, VO)	Open, Open teeth, Daddy open
Hold	LOOK	Pull	593	626	1 (SVO)	I want my daddy
			595	616	3 (no V, SV, VO)	No kiss, Kiss baby, Daddy kiss
			604	622	3 (SVO, neg, -ing)	No Mom hold it, Daddy holding it
See	PUT	Need	608	625	2 (V, V locative)	Look, Look my shoe
			622	660	3 (SVO, neg, -ing)	No pull my shirt, Daddy pulling it
			628	660	1 (SVO)	My see doggie
Need	BRING	Wave	644	670	1 (SVO)	Mommy put shoes
			652	679	1 (SVO)	My need my binka
			652	679	1 (SVO)	My need my binka
Need	TAKE	Wave	659	683	1 (SVO)	I bring my baby
			672	691	3 (SV, SVIO, SVing)	Dad wave, I wave at A, My waving
			652	679	1 (SVO)	My need my binka
Roll	GIVE		659	681	3 (Neg VO, SVO, NegSVO)	No take it, No my take my nap, Daddy take my sippy
			672	691	3 (SV, SVIO, SVing)	Dad wave, I wave at A, My waving
			687	709	3 (SVO, SVP, SVing)	My roll my hands, Wagon rolling down, all rolling
			690	708	3 (VOB, SVOIO, VO)	Give mom hug, I give my cookie to A, Give that back

No verbs were produced after
Give

Note.— V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to irregular verbs.

not the ones predicted: *Look* was his first verb to be used in the VL frame (*look punch bag*) instead of the predicted *go*, and *give* was his first verb used in the V(O)L frame (*give me*) instead of the predicted *put*. Admittedly, given the time elapsed between Carl's 10th production of *go* and his 1st production of

TABLE 18
ELAINE'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
	WANT		602	613	1 (SVO)	I want veggies
	GO		613	710	2 (V, SV)	Go, I go
	LOOK		633	634	1 (V)	Look
		Open	651	651	1 (V)	Open
		Sit	653	656	1 (SV)	I sit
		See	658	672	2 (V, SV)	See, I see
Roll			695	716	1 (V)	Roll
	COME		696	716	3 (V, VV, SV)	Come, Come roll, My come
		Wash	696	741	2 (SVO, VO)	I wash hands, Wash hands

Note.— V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to “regular” verbs.

look, it is probably not the case that his VL production with *look* was his very first in that frame; however, this caveat does not hold for his 1st production of a verb in the VOL frame. That is, when Carl produced *give me* he had not yet produced even one instance of *put*, *bring*, or *take*; therefore, it is very likely that *give me* was one of his first, if not his very first, use of the VOL frame.

Carrie, Ned, and Heather each showed a similar pattern to Carl's, in that (a) none of their light verbs was used more flexibly than concurrently produced heavy verbs and (b) only some frames were used first with light verbs, whereas others were used first with heavy verbs (Tables 17, 19, and 21). For Mae, Sam, and Stacey, some proportion (one quarter to two thirds) of their light verbs were used more flexibly than their concurrently produced heavy verbs; however, they were no more likely to produce specific frames first with the predicted light verbs (e.g., VL with *go* or VOL with *put*) (Tables 20, 22, and 23). Note that the first 10 uses of *make* were (voluntarily) recorded by Mae's and Stacey's mothers; *make* has been proposed as a pathbreaker verb for the VO frame, yet it was neither the earliest nor the most flexible verb in this frame for either child. In fact, only Elaine followed the predicted pattern, such that both her first uses of grammatical forms and her first flexible uses of such forms appeared with light verbs (Table 18). These data, then, corroborate those of Theakston et al. (2004), who found no consistent advantage in grammatical flexibility for light verbs at this early point in development.

Table 24 presents a summary for seven commonly appearing frames, whether they were first used by the children with light or with heavy verbs. Clearly, there is no consistent advantage for the light verbs here either, as heavy verbs were the pathbreakers at least as frequently for the S, O, -ing,

TABLE 19
HEATHER'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Cut	GO	Sit	584	629	2 (VO, SVO)	Cut this, I cut this
			585	590	1 (V)	Go
			585	590	1 (V P)	Sit down
Sit	COME	Drop	585	590	1 (V P)	Sit down
			593	634	2 (SV-ing, V locative)	I coming, Come here
Kiss	PUT	Drop	595	629	4 (V, SV, SVO, SVedO)	Drop, I dropped it, I drop
			589	708	4 (V, SVO, VO, SV)	I kiss it, Mommy kiss, Kiss that
			593	701	4 (V, V locative, SVP, VOP)	Put here, Put top on, I put on
Wash	WANT	Like	588	600	2 (V, VO)	Push, Push this
			595	629	4 (V, SV, SVO, SVedO)	Drop, I dropped it, I drop
			593	652	2 (VO, V)	Wash, Wash it
Need	LOOK	Eat	595	624	2 (SVO, SV+negO)	I want it, I don't want this
			611	615	2 (VO, SVO)	Like this, I like this
Throw	GIVE	Stop	618	631	2 (VO, SVO)	Me need this, need this
			633	653	2 (V, V locative)	Look, Look here
			634	652	3 (V, SV, SVO)	Eat, Heather eat, Heather eat this
Throw	TAKE	Wave	669	701	5 (SVO, SV, V P, SVP SVOP)	I throw that, throw away
			687	708	5 (VO, VIO, VPP, SVPP SVOPP)	I threw down, I throw it away M give it, Give me, Give to D, A gave to me
			701	701	2 (VO, SVO)	A gave coin to me Take a bite, Daddy take this
			702	827	3 (V bye, V PP VL)	Wave bye, We need to wave to D, I waved M
			710	710	1 (V+gerund)	Stop eating the flowers

Note.— V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to "regular" verbs.

and P frames. Some frames did consistently first appear with light verbs; however, the pathbreaking verbs that were observed were not consistently the ones predicted. That is, a light verb *was* consistently the first one used for the VL frame; however, for only two children (Carrie, Stacey) was this, as predicted, *go*. For the other four children, the pathbreaker was *come* (one child) or *look* (three children). Similarly, a light verb was consistently used first in the VOL frame, but for only one child (Heather) this was the predicted *put*. For the other five children, the pathbreaker was *give* (two), *take* (two), or *bring* (one). Finally, *want*, a stative rather than action verb, was the first verb produced in the SVO frame for six of our children; *need*, another

TABLE 20
MAE'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Push	COME	Throw	577	589	1 (V)	Push
			616	625	1 (V on)	Come on
			624	630	1 (V)	Throw
Eat	GO	Fall	654	669	1 (V)	Eat
			661	684	1 (V)	Push
Run			673	756	2 (V, SV)	Fall, Mommy fall
			731	750	2 (V, VP)	Run, Run away
Cut	LOOK	Cry Pull	740	819	3 (V, SV, VO)	Cut, Me cut, Cut it
			757	757	1 (V loc)	Look me
			742	776	3 (V, SV, V-neg)	Cry, Jill cry, Don't cry
			765	898	5 (VO, VOP, SVOP SVO)	Pull feet, This one pull off, Me pull it over, Me pull it
Open	WANT	Pull	727	733	3 (V, SV, VO)	Open, Mommy open, Open this
			769	838	3 (SVO, VOS-bar, VO)	Me want cheese, Want Panda watch me, I want that
			765	898	5 (VO, VOP, SVOP, SVO)	Pull feet, This one pull off, Me pull it over, Me pull it
Hold	BRING		773	777	2 (SVO, SV)	Me hold her, Me hold
791			834	1 (SVO)	Me bring rock	
Need	TAKE		789	820	3 (VO, SVO, NegVO)	Me need that, No need that plate
			795	863	3 (VOP, SVOP, SVO)	Take that off, Me take my pie out, I take it
Drop	PUT		802	818	2 (SVO, VO)	Drop my Teddy, Me drop my Bandaid
			812	856	4 (VP, VOP, VOPP, SVPP)	Put on, Put me over, Put me up Jill's table
Like	GIVE	Like	833	910	2 (SVO, S-neg VO)	I like that, I don't like pears
			833	910	2 (SVO, S-neg VO)	I like that, I don't like pears
			840	928	3 (SVO, SVOIO, SVOPP)	Me give my ring to Jill, Me give Jill a toy
	Wash		851	880	3 (VO, SVO, past)	I made, Me made tower
			855	868	2 (SVO, VO)	Me wash it, wash my hands

Note.— V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to "regular" verbs.

desire verb, was the SVO pathbreaker for the seventh child, and *cut* or *hold* for the eighth.

The finding that the particular light verb used first in a frame varied across children is contrary to two crucial parts of the light-verbs-as-pathbreakers

TABLE 21
 NED'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Roll	COME		519	549	2 (V, Ving)	Roll, Rolling
			526	549	2 (V, V P)	Come, Come on
		Bite	526	580	1 (V)	Bite
		Lay	549	568	2 (V, V P)	Lay, lay down, lay back
Like	WANT		556	611	2 (V, VO)	Like, Like it
			578	593	1 (VO)	Want some
		Need	580	615	2 (VO, SVO)	Need a cookie, Pop needs a pen

Note.—V = Verb; S = subject; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to “regular” verbs.

hypothesis. One part of the hypothesis targets the pathbreaking verb's *transparency of meaning*, which is proposed to enable children to conceive of or to abstract the frames (Goldberg, 1999; Goodman & Sethuraman, 2006). That is, children learn how *go* encodes inchoative motion, or *put* encodes caused motion, or *make* involves caused action, and then deduce from the verb's meaning that *go* is to be followed by locatives, *make* is to be followed by object names, and *put* is to be followed by object names and locatives. From these “semantic frames,” they abstract the grammatical frames VL (or VPP), VO, and VOL (or VOPP). *Bring*, *take*, *give*, and *put* might all be considered equally representative of the caused motion construction VOL, such that the variation here is not particularly problematic. However, *look* could not possibly be considered a transparent representative of the inchoative motion construction VL, because *look* involves a more abstract sense of motion, with someone's *gaze* being directed toward a ground rather than an object or person actually moving toward a ground (Landau & Gleitman, 1985; Levin, 1993). Mae's and Sam's innovative use of the VL frame first with *look* seems inexplicable in terms of an argument based on semantically transparent underpinnings.

The children's variability with the SVO frame pathbreaking verbs is similarly problematic for the light-verbs-as-pathbreakers hypothesis: If semantic transparency of transitive action is the instigator of children's abstraction of the SVO frame, then *want* hardly qualifies; as Hopper and Thompson (1980) and others have discussed at length, verbs such as *make* or *push*, which capture caused changes of state or position, are better candidates. Ninio (1999) and others (e.g., Theakston et al., 2004) have already grappled with the inconsistency of verbs like *want* appearing so early in the SVO frame

TABLE 22
SAM'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Open	GO	Cut	495	566	1 (V)	Open
			531	567	2 (SV, V)	Go, I go
			540	583	1 (V)	Cut
Cut	LOOK	Eat	540	583	1 (V)	Cut
			553	592	1 (VPP)	Look at me
Eat	COME	Hold	569	660	1 (V)	Eat
			569	660	1 (V)	Eat
Drop	WANT	Roll	576	602	1 (V)	Come
			571	607	1 (V)	Hold
			602	783	4 (V, SV, VO, VPP)	M drop, Drop diaper, Drop in tub
Drop	TAKE	Roll	632	722	3 (SVO, VO, SVS-bar)	I want cup, Want cup, I want to go
			644	711	2 (V, VO)	Roll ball, Roll
			602	783	4 (V, SV, VO, VPP)	M drop, Drop diaper, Drop in tub
Need	BRING	Like	634	663	1 (V)	Take
			644	711	2 (V, VO)	Roll ball, Roll
			646	674	2 (VO, SV)	I need, Need this
Lay	PUT	Run	664	739	4 (VO, VOP, negV, Ving)	Bring that, Bring my plate over, No bring, Bringing
			673	705	3 (V, VO, negVO)	Like those, M like, Don't like you
			679	739	3 (SV, SVP, SVPP)	Teddy lay, Lay down, Lay down with me
			694	732	2 (V P, VOP)	Put away, Put that back
			697	750	5 (V, Ving, SVPP, SV, VPP)	Running, I run in water

Note.— V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to “regular” verbs.

but not encoding highly transitive actions, and they have proposed different resolutions. Ninio (1999) suggested that an even more abstract (“prototypical”) notion of transitivity, in which the subject’s/agent’s relation is more prominent, facilitates children’s abstraction of the SVO frame, and Ned’s use of *need* fits this notion. However, Carl’s use of *cut* does not (*cut* clearly changes the patient and is more similar to the Hopper and Thompson version); thus, there is still individual variation unaccounted for.

TABLE 23
 STACEY'S LIGHT/HEAVY VERB COMPARISON FOR FRAME FLEXIBILITY

Preceding Verb(s)	Light Verb	Following Verb(s)	Age (Days)		Number of Frames Used in 10 Instances (Frame)	Examples
			1st Use	10th Use		
Sit	GO	Eat	491	529	1 (V)	Sit
			491	498	2 (Wh SV, V)	Where Nanny go? Go
			495	624	5 (V, Ving, SVing, SVO, VingO)	Eat pizza, I'm eating, I eat it
Open	WANT	Run	503	533	1 (V)	Open
			512	611	2 (VO, SVO)	I want juice, Want some more
Open	COME	Jump	516	611	2 (Ving, SVing)	Running, Girl running
			503	533	1 (V)	Open
			518	600	3 (V, V P, SV P)	Come in, You come out
Hold	TAKE	Jump	520	595	2 (VO, VOP)	Take it, Take it off
			540	593	2 (VO, SVO)	Hold that duck, I hold this
			572	621	2 (V, V PP)	Look, Look in mirror
Wash	LOOK	Jump	559	584	4 (Ving, SVing, SVed, V)	Kitty jumping, Kitty jumped
			555	581	2 (SVing, VO)	Mommy's washing, Wash my hands
MAKE	PUT	Jump	572	598	1 (VOP)	Put it on, Put phone back
			598	675	3 (SVO, VO, -ing)	Daddy make it, making messes

Note.— V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object. Capitalized verbs are highlighted relative to "regular" verbs.

The second part of the light-verbs-as-pathbreakers hypothesis, and potential resolution of the inconsistency between the hypothesis and the data, is that children's abstraction of grammatical frames is highly dependent on the frequency with which particular light verbs appear in a variety of frames in the input. That is, an alternative process of abstraction is that after children learn how *go* encodes inchoative motion, or *put* encodes caused motion, or *make* involves caused action, they next observe that *go* is frequently followed by locatives, *make* (or *want*) is frequently followed by object names, and *put* is frequently followed by object names and locatives. Then, over numerous hearings of these verbs with a wide variety of locatives and object names in the relevant positions in the input, the children abstract the VL (or VPP), VO, and VOL (or VOPP) frames. This latter procedure does not rely on the meaning of the verb to enable the abstraction but does rely on the frequent appearance (with varied lexical items) of a single verb in a given frame

TABLE 24
FIRST USES OF GRAMMATICAL FORMS BY VERB SUBCLASS FOR EACH CHILD

Grammatical Form	Child	
	First Use With a Light Verb	First Use With a Heavy Verb
SV	Carrie, Heather, Sam, Stacey Elaine*	Carl, Carrie, Mae, Ned
VO	Heather*, Elaine*	Carl, Carrie, Mae, Ned, Sam, Stacey
SVO	Carrie*, Elaine*, Heather*, Mae* Sam*, Stacey*	Carl, Ned
“-ing”	Carrie	Heather
VP	Sam, Stacey, Ned (<i>come</i>)	Carrie, Heather, Mae, Ned (<i>lay</i>)
VL	Carl (<i>look</i>), Carrie (<i>go</i>), Heather (<i>come</i>) Mae (<i>look</i>), Sam (<i>look</i>), Stacey (<i>go</i>)	
VOL	Carl (<i>give</i>), Carrie (<i>give</i>), Heather (<i>put</i>) Mae (<i>take</i>), Sam (<i>bring</i>), Stacey (<i>take</i>)	

Note.—*Child's first use was with the verb *want*.

V = Verb; S = subject; SV = subject-verb; VO = verb-object; SVO = subject-verb-object.

(e.g., Casenhiser et al., 2003; Chenu & Jisa, 2006; Goldberg, 1999; Goodman & Sethuraman, 2006; Kidd, Lieven, & Tomasello, 2006; Theakston et al., 2004).

This frequency-based procedure does indeed account for the predominance of *want* as the children's pathbreaker for the SVO frame; however, it encounters difficulties in accounting for the occurrences of *look* or *come* as Mae's, Heather's, and Sam's pathbreakers for the VL frame, because *look* and *come* are much less frequent verbs than *go* in children's input and output (Naigles & Hoff-Ginsberg, 1998). Moreover, the highly differential frequencies of *put*, *bring*, *take*, and *give* (*put* appears approximately 2.5–3 times more frequently than the other verbs; Goldberg, 1999; Naigles & Hoff-Ginsberg, 1998) in corpora of caregivers' and children's speech make this process less viable as an explanation of children's acquisition of the VOL frame/construction: If *put* is so frequent in the VOL construction, why do Sam, Stacey, Carrie, Mae, and Carl all use other verbs with their first VOL frame?

In other words, the semantic transparency-based version of the light-verbs-as-pathbreakers hypothesis may account for the children's first uses of the VOL construction, but it does not account for their first uses of the VL and SVO frames. The frequency-based version of this hypothesis may account for the children's first uses of the SVO frame, but it has difficulties accounting for their first uses of the VL and VOL frames. Our data, then, do not support the pathbreaking-verbs hypothesis as a process by which children learn to abstract sentence frames.

HOW ARE DIFFERENT MEASURES OF VERB DEVELOPMENT AND USE RELATED?

According to generativist theories, the abstract grammar that underlies language productivity is autonomous, yielding the prediction that children's development of grammatically flexible verb use should be unrelated to the development of semantically flexible verb use or to the growth of a verb lexicon (e.g., Chomsky, 1981). Other theories of verb development, including theories that grammatical development results from domain-general learning processes, theories that grammar emerges from the lexicon, and the syntactic bootstrapping hypothesis, predict that the acquisition of a verb lexicon, the development of semantically flexible verb use, and the development of grammatically flexible verb use should all be positively related across children. The syntactic bootstrapping hypothesis additionally predicts that the grammatical flexibility with which different verbs are used should be related to the semantic flexibility with which those verbs are used because semantic understanding of a verb is based on syntactic analysis of that verb's environments.

One way to investigate these hypotheses with the current data might be to compare the degree and onset of flexibility demonstrated by the children in the different domains. Although it is not a given that our measures of pragmatic, semantic, and syntactic flexibility are so directly comparable (i.e., is a change in actor of the same magnitude as a change in syntactic frame?), we performed pairwise *t* tests between addressee, actor, affected object, and syntactic flexibility using four indices of flexibility (percent of children, number of instances, number of days, percent of verbs) and the Bonferroni correction to set alpha at .0083. Of all 16 comparisons, only 1 reached significance: Children were significantly more flexible with their affected object use than with their syntactic frame use, $t(7) = 4.83$, $p = .0018$. Importantly, *none* of the time-related comparisons reached significance, providing no evidence for the notion that flexibility in one domain emerges earlier than in another.

A better way to address these proposals, we feel, is to examine intercorrelations among properties of verb development and use. To reduce the number of correlations calculated, we focused on selected measures of descriptive and theoretical interest, and, where possible, we created composite scales.

INTERCORRELATIONS AMONG MEASURES OF CHILDREN'S VERB DEVELOPMENT AND USE

Composite measures were created to index the age at which the children started to use verbs and the semantic and grammatical flexibility of

TABLE 25
 INTERCORRELATIONS AMONG MEASURES OF CHILDREN'S VERB DEVELOPMENT AND USE ($N = 8$
 FOR ALL ANALYSES)

	1.	2.	3.	4.	5.	6.
1. Age verb use begins	—	-.670*	.042	-.527 ⁺	-.456	-.189
2. Semantic flexibility composite		—	.624*	.749**	.110	.586 ⁺
3. Grammatical flexibility composite			—	.537 ⁺	-.222	.796**
4. Number of verbs at 21 months				—	-.119	.839**
5. Number of frames at 21 months					—	-.183
6. Number of productive frames at 24 months						—

Note. —⁺ $p < .10$ (one-tailed), * $p < .05$ (one-tailed), ** $p < .01$ (one-tailed).

their first 10 uses of early-acquired verbs. The scales were created as follows: *Age at which verb use begins* was the average of two measures—the age of first verb use and the mean age of first use of all the target verbs the child used in the window of this study. Cronbach's α for this scale was .75. *Semantic flexibility of verb use* was the average of three measures: the percent of verbs used with different actors, the percent of verbs used with different affected objects, and the percent of verbs used to refer to different actions (Cronbach's $\alpha = .89$). *Grammatical flexibility of verb use* was indexed by the average of four measures: percent of verbs used with different frames (excluding vocatives), percent of verbs used with different morphology, percent of verbs used with different lexical subjects, and percent of verbs used with different lexical objects (Cronbach's $\alpha = .87$). We also included two snap-shot measures of children's verb lexicons and verb grammars at 21 months, which was the oldest age at which we have data for all participants: the number of target verbs in the child's vocabulary and the number of frames (out of 5: SV, VO, SVO, VP, V-ing) in the child's utterances. Last, we counted the number of productive frames each child had at 24 months, employing the 5-verbs-per-frame criterion. For each correlation, we expected that if the measures were related they would be positively related, except that age would yield a negative correlation because a younger age at the beginning of verb use is a positive indicator of verb development; therefore, all significance tests were one-tailed. The correlation matrix is presented in Table 25.

The correlations among measures of children's verb use in Table 25 reveal that children who began verb use at a younger age showed more semantic flexibility in their first verb uses, and they also tended to have larger verb vocabularies at 21 months compared with children who began verb use at an older age. The semantic flexibility with which children used their first verbs was also significantly related to the grammatical flexibility of their verb use, to the size of their verb vocabularies at 21 months, and (marginally) to the number of productive frames they had at 24 months.

TABLE 26

INTERCORRELATIONS AMONG VERBS' PROPERTIES OF USE IN EARLY CHILD SPEECH (NUMBER OF VERBS IN ANALYSIS)

	1.	2.	3.	4.	5.
1. Age of onset	—	-.277 ⁺ (28)	.122 (34)	-.036 (25)	.336* (34)
2. Percent children using to refer to different actions		—	.100 (28)	.373 ⁺ (19)	-.294 ⁺ (28)
3. Percent children using with different actors			—	-.020 (25)	.349* (34)
4. Percent children using with different affected objects				—	.307 ⁺ (25)
5. Grammatical flexibility of use composite					—

Note.—⁺ $p < .10$ (one-tailed), * $p < .05$ (one-tailed).

The size of children's verb vocabularies at 21 months showed a marginally significant positive correlation with overall grammatical flexibility of their first verb uses and a significant positive correlation with the number of productive frames they had at 24 months. The grammatical flexibility of children's verb use also was positively related to children's number of productive frames at 24 months, suggesting that flexibility of use is, in fact, a good index of grammatical productivity.

INTERCORRELATIONS AMONG MEASURES OF VERBS' DEVELOPMENT AND USE

To analyze the intercorrelations among properties of verbs, as they are first used in children's speech, a composite measure of *grammatical flexibility* was created by averaging four measures: the percent of children using the verb with more than one frame, with more than one morphological inflection, with more than one lexical subject, and with more than one lexical object (Cronbach's $\alpha = .79$). The multiple indices of semantic flexibility did not form an internally consistent scale—as Table 26 shows, the three indices of semantic flexibility were not significantly related to each other. Thus, the following three measures were entered into analysis individually: the percent of children using the verb to refer to more than one action, the percent of children using the verb with more than one actor, and the percent of children using the verb with more than one affected object. The final measure of how verbs appear in children's speech was the average age at which the verb first appeared. As was the case for the by child correlations, the predictions were that positive indicators would be positively related, and all

significance tests were one-tailed. The correlation matrix is presented in Table 26.

The correlations among measures of how verbs were used within these first instances of children's verb production show that later-appearing verbs (i.e., verbs with an older age of onset) tended to be used by fewer children to refer to varied actions and were used by significantly more children with grammatical flexibility. There were also trends toward the number of children using a verb to refer to multiple actions being positively associated with the number of children using that verb to refer to different affected objects and negatively associated with the number of children showing grammatical flexibility of use. Verbs used by more children with different actors were also used by more children with grammatical flexibility.

The correlations with age of onset indicate that, on average, early-appearing verbs were used with grammatical flexibility by fewer children than later-appearing verbs. Such correlations might appear to be consistent with hypotheses that grammar emerges later, and thus perhaps as a consequence, of lexical development (e.g., Bates & Goodman, 1999). However, these correlations were only significant in the by-verb analysis; across children, the age at which children began to use verbs was unrelated to their composite grammatical flexibility. Similarly, the analyses of individual growth patterns by period of development, described earlier in this chapter, indicated that some of the children used their very first verbs with grammatical flexibility. This appears to be a case in which averaged data (in this case average properties of verbs rather than of individuals) present a picture that is true for some individuals but not for others (see Molenaar, 2008, for discussion).

CONCLUSIONS

In this chapter, we looked at the grammatical flexibility of early verb use in more detail, asking whether the overall grammatical flexibility we observed might obscure a limited, very early period of less flexible verb use and whether the lack of average differences between light and heavy verbs might obscure a pathbreaker role played by some light verbs for some children. We found that a small number of children did manifest conservative before flexible verb use, but the majority of children demonstrated flexibility close to the beginning, if not at the beginning, of verb use. We also found that sometimes a light verb was the first to appear with a particular syntactic frame, but that sometimes heavy verbs appeared in syntactic frames before light verbs. These findings support the conclusion that early flexible verb use is widespread and not limited to a late stage of develop-

ment or a particular kind of verb. These findings also pointed out that descriptions of average developmental paths do not necessarily reflect all individual developmental paths.

We also asked whether different aspects of early verb use were related. Direct comparisons of the degree and onset of grammatical, semantic, and pragmatic flexibility yielded little indication of differences between these domains; however, the correlations were more informative. Across children, grammatical flexibility and semantic flexibility of verb use were related to each other; similarly, verbs showing actor flexibility with more children also showed grammatical flexibility with more children. These findings are consistent with many hypotheses about the interrelation between lexical and grammatical development: The correlations may reflect the effect of a common underlying ability and/or common effects of input, and the correlations may also indicate mutually supportive effects of syntactic understandings on semantics and vice versa. The hypothesis that grammar emerges once the lexicon reaches a particular threshold size received only very weak support—in a marginally significant correlation between the number of the target verbs children used at 21 months and their overall grammatical flexibility of verb usage. Although we found that those verbs that appeared at younger ages were used with grammatical flexibility by fewer children, on average, than were those verbs acquired at later ages, we do not interpret this as reflecting a pregrammatical period of verb use because children who began verb use earlier were not less grammatically flexible in their verb uses than children who began later. We did find that those children who began to use verbs earlier showed greater semantic flexibility. Thus, earlier-learned verbs may be used with less grammatical flexibility, but earlier verb-learning children are likely to be more semantically flexible. We consider these findings again in the discussion of the theoretical implications of these data.