II. PRESENTING THE DIARY METHOD

PARTICIPANTS

The data in the present study come from diary records kept by eight mothers of their children's first 10 spontaneous uses of 34 common verbs. A total of 18 mothers initially agreed to participate, but 9 mothers withdrew from the study before having collected enough data for analysis (i.e., at least 10 uses each of 10 different verbs). For five of these mothers, their reason for withdrawing was that their child (always a boy) was not talking at all, and they planned to bring the child to clinical services for evaluation and treatment. The other mothers who withdrew gave the reason that their child was talking so much that they found they could not record or make note of every relevant utterance their child produced, and so they could not keep the diary accurately. One additional mother collected data for over a year from her child and completed the diary for a total of 31 verbs. However, after the data from seven verbs were collected, she lapsed in her diary keeping for 6 months. Given this lapse, we could not be certain that the data from the last 24 verbs really reflected the child's first 10 uses of these verbs, and this child's data were not analyzed further.

At the onset of the study, the children (5 girls and 3 boys) ranged in age from 15 to 19 months; all were European American. Detailed questioning of the mothers established that none of the children had yet produced any verbs; this was supported by the absence of any spontaneous verbs in the 20-min speech sample collected during the experimenter's first visit. The children's spontaneously produced word types during this speech sample were tabulated; on average, the children produced 25.12 different words ($SD = 11.47$). At the first visit, the mothers were asked to fill a questionnaire concerning the child's siblings, the parents' education and occupation, and the child's television and reading habits. Three of the children had older siblings ($M = 5$ years, $SD = 3$ years); one also had a younger sibling (3 months of age). All but one of the parents (mothers and fathers) had attended college for at least a year (M [mothers] = 3.33 years, $SD = 1.97$; M [fathers] = 4.0 years, $SD = 2.28$). Their occupations were generally middle class (the fathers included an accountant, several engineers, an

insurance executive, a landscaper, and a computer manager; the mothers had previously been accountants, teachers, and bookkeepers). All of the children were cared for at home by their mothers. The eight children watched an average of 9.83 hr of television per week ($SD = 7.54$) and were read to for an average of 11.08 hr per week ($SD = 7.67$), according to the maternal report.

MATERIALS

Each mother was provided with a bound diary with 34 individual pages. On each page was listed a different verb with 10 rows for recording the first 10 instances of that verb's use. The 34 verbs were chosen from prior data sets of the children's spontaneous verb use (Goldin-Meadow et al., 1976; Marchman & Bates, 1994; Tomasello, 1992; Tomasello & Kruger, 1992); these are all words that would be used as verbs in the adult language. They included 8 *light* verbs, which have more general meanings (H. Clark, 1996; Goldberg, 1999), and 26 *heavy* verbs, which had narrower meanings. Nine of the 34 were obligatorily transitive, 9 were obligatorily intransitive, and 16 were alternating verbs (i.e., they can appear in both transitive and intransitive frames). They are listed, by category, in Table 1. In the blank

TABLE 1
LIST OF 34 COMMON VERBS

	Transitive	Intransitive	Alternating
Light verbs	bring	come	
	give	go	
	put	look	
	take		
	want		
Heavy verbs	hold	clap	bite
	like	cry	cut
	need	fall	drop
	see	run	eat
		sit	jump
		walk	kiss
		wave	lay
			move
			open
			pull
			push
			roll
			stop
			throw
			wash

TABLE 2

DIARY PAGE

University of Connecticut/Florida Atlantic University
First Verbs Study
Child's Name___Heather___

Record of first ten uses of:

Birthdate___

PULL

	Date	Record of complete utterance	Was utterance a command or description?	For commands, who or what is command addressed to? For descriptions, who or what is doing the verb action?	Who or what is receiving the verb action?	Other comments
1st	10/2	Pull	Command	Mommy	Chair	
2nd	10/3	Pull	Command	Mommy	Wagon	
3rd	12/5	I pulling	Description	Heather	Car with handle	
4th	12/8	Uncle, pull	Command	Uncle	Sled	
5th	12/8	Pulling	Command	Uncle	Sled	
6th	12/8	Auntie, pull	Command	Aunt	Sled	
7th	12/8	Auntie, pull	Command	Aunt	Sled	
8th	1/3	Mommy, pull me	Command	Mommy	Cart	
9th	1/13	I pull that	Description	Heather	Blanket	
10th	1/13	I pull this	Description	Heather	Blanket	

diary, space was provided to record the complete utterance, the date, pragmatic function (i.e., command or description), and addressee of the utterance, as well as the actor and the affected object (when relevant) of the verb's action. A sample diary page is reproduced in Table 2.

PROCEDURE

Parents with children between 15 and 19 months of age were found by searching back issues of the birth announcements of the local newspaper. Letters describing the study were sent, followed by phone calls requesting volunteers willing to keep detailed diaries of their child's verb development. Extensive questioning confirmed that the child had not produced any verbs at that point and that the parent would be in primary contact with the child (approximately 20 families were excluded at this point because their child had already begun producing verbs). All the volunteer parents were mothers. The researcher then visited the family to train the mother on diary keeping and to collect a 20-min spontaneous speech sample.

The training session was conducted first. The researcher explained that the goal of the study was to investigate the child's language development in detail, so that it was of crucial importance to make note of *every utterance* that (a) contained a target verb and (b) was not an immediate repetition of another person's speech. The researcher then introduced the diary and provided a separate list of the 34 target verbs. It was explained that our focus was on verbs because they were less well studied than nouns. The researcher discussed with the mother the difference between nominal and verb uses of homonyms (e.g., *bite* in "take a bite" vs. "bite this"), described several examples of verb uses in one-word and multiword utterances, and emphasized that the study was about verb uses only. The researcher then discussed each column of the diary page, giving examples of possible utterances and how they were to be entered in the diary. Specifically, the mothers were instructed on (a) what constituted commands (e.g., "When your child is trying to get you or someone else to do—or stop doing—something") and descriptions (e.g., "When your child is telling you about an object, event, or relation"), (b) what constituted an addressee ("Whom the command is directed to"), actor ("Who is doing the verb action"), and affected object ("Who or what is the patient of the verb action") when these were and were not labeled by the child, (c) recording the utterance as exactly as possible, including inflections such as "-ing," "-ed," and "-s" if heard, and (d) the use of the right-most column involving contextual notes (mothers were encouraged to add notes at all times, but especially when they were not sure about pragmatic or semantic roles). Then, the researcher emphasized how important it was for the mother to note *every utterance* using the target verbs until 10 instances had been produced and told the mother repeatedly that *every utterance* meant that the child's exact and inexact self-repetitions of any target verbs should be included, as well as new utterances with that verb, but not repetitions of other people's speech. The researcher suggested that the mother put the diary in an easily accessible place in the house and carry the diary along whenever she and the child went out. The researcher asked and noted which words the child was currently producing (in case some verbs had emerged since the phone call; none had). The researcher then described her own role, which would be to phone the family every 2 weeks until the child began producing the target verbs. Once verb production began, the researcher would phone the family every week to check how data collection was proceeding and to answer any questions the family might have. The training session ended with a discussion of the duration for data collection; each mother was asked to keep the diary for at least 3 months. The actual duration of the study varied from child to child, ranging from a minimum of 3 months to a maximum of 13 months ($M = 8.625$ months, $SD = 3.62$).

After the training session, the researcher asked the mother to play with her child for about 20 min so that the child's current level of speech production could be recorded. The researcher brought toys for them to play with; they could also play with their own toys and read their own books (although little book reading was conducted), doing whatever they usually did at that time of day. The researcher then started the audio recorder and left the room for 20 min, staying outside or in another part of the house. Audio recording was used instead of video recording to minimize feelings of self-consciousness and concerns about privacy.

After this initial visit, biweekly phone calls were made to each family until the child began producing the target verbs. Then, the family was called weekly, reminding the parents of the diary procedure (especially, to record *every utterance*) and answering any questions the parents might have had in filling out the diary. Mothers typically used these conversations to discuss the children's new utterances and the records thereof, describing the utterances in detail and receiving confirmation and/or instruction concerning how they were recorded. Mothers reported little difficulty with the level of detail required by the records; those who did acknowledge some difficulty were the ones who soon asked to leave the study. Table 3 displays each child's age at the onset of the study, duration of the study, and the total number of target verbs produced to the 10-instance criterion out of the 34. Only those verbs for which all 10 instances were recorded were included in any of the coding and analyses.

MEASURES

The diary records provided measures of the age at which each verb was used and the number of days elapsed from the 1st to the 10th instance of

TABLE 3

AGE AND NUMBER OF VERBS PRODUCED BY EACH CHILD

Child	Age at Onset	Length of Study	# of Verbs Produced (Out of a Possible 34)	Rate of Target Verb Growth
Carl	1;8	11 months	24	2.18/month
Carrie	1;7	7 months	30	4.42/month
Elaine	1;8	5 months	19	3.8/month
Heather	1;7	7 months	31	4.42/month
Mae	1;7	13 months	31	2.38/month
Ned	1;5	3 months	14	4.67/month
Sam	1;6	11 months	31	2.82/month
Stacey	1;4	12 months	20	1.67/month
Mean	1;6	8.625 months	24.5	3.21/month
SD	1.5	3.62	7.07	1.15

use. In addition, the following measures were taken from the diary records or coded based on the information the mothers recorded:

Pragmatic Content

Each verb use was coded as a command or description (these accounted for over 98% of all utterances), and for each command, the addressee was noted. To illustrate, in Instance 1 of Table 2, Heather says "Pull" as a command to her mother to pull a chair; in Instance 3 she says "I pulling" as a description of her own actions with the toy car. The addressee is the person to whom the utterance is directed; in Instance 1, this is the child's mother, and in Instance 4 it is her uncle.

Semantic Role

The semantic properties recorded for each verb use were the particular person or objects filling the roles entailed by each verb. For all verbs, this involved recording who or what served as the actor, agent, or experiencer of the verb. For transitive and alternating verbs, who or what served as patient or theme was also recorded. For example, when a child said "jumping" and her mother recorded the child in the actor cell, then the child was coded as the actor of the action. With regard to affected objects, an utterance of "Pull" with "chair" recorded in the affected object cell would be coded with "chair" as the affected object, whereas an utterance of "pull me" would be coded with "Heather" as the affected object. These assignments of actor and affected object were made regardless of whether the semantic roles were overtly expressed or not because the purpose of the coding was to capture the extent to which children extend these verbs to actions by multiple actors and on multiple objects. The mothers were carefully instructed on how to determine actors and affected objects when these were not overtly expressed.

Action Referent

Each instance of each verb's use was coded as the same or different from previous uses of the verb in terms of the physical action referred to. This judgment was made for uses of 28 of the 34 target verbs, based on the actor, affected object, and other notes recorded by the mother. Action referent change was not coded for four internal event verbs (*like*, *look*, *need*, *see*, *want*), and it was not coded for the verb *bring* because the specific action referred to by uses of this verb was difficult to discern from the diaries. In our first pass of coding the action content of the remaining verbs, utterance pairs of the same verb were hypothesized to refer to different actions if (a) the actors were of different species (e.g., dog running vs. child running) or kinds (e.g., child coming vs. TV show coming), (b) the affected objects were of different

kinds (e.g., eating rocks vs. eating an apple), sizes (e.g., washing a chair vs. washing dishes) or configurations (e.g., opening a bag vs. opening a plastic container), or (c) the situations pertained to different locations (coming downstairs vs. coming out of the house), directions (taking Legos off vs. taking a Poptart out), or activities (taking a nap vs. taking a shower). A total of 93 distinct action pairs were initially identified. These were then presented in randomized order to 11 undergraduates, who were asked to rate them on a scale of 1–7, where 1 indicated *the pairs described identical physical actions* and 7 indicated that *the pairs described completely different physical actions*. An additional 20 items were included to anchor the lower end of the scale; these included action pairs performed by similar actors to similar affected objects in similar situations. The ratings were averaged for each action pair and only those whose rating averaged 4.0 or higher ($n = 76$) were included in the final analysis (mean rating for these 76 pairs averaged 5.63, $SD = 0.84$). The complete list of action pairs and ratings can be obtained from the authors.

Grammatical Frame

The grammatical frame of each target verb use was coded from the mothers' records of the children's complete verb-containing utterance. The coded components included overt subjects, objects, morphological markers, location words, negative markers, preposition/prepositional phrases, and full subject–verb–object (SVO) frames. For example, the utterance "I drop my cracker" includes a subject "I" and an object "my cracker"; it encompasses a full SVO frame. The utterance "My fall down" includes a subject "my" and a preposition "down." The utterance "no clapping" includes the morphological marker "-ing" and the negative marker "no," and the utterance "Go there" includes the locative form "there." Vocatives (e.g., *Mommy* in *Mommy, push me*) were not counted as a grammatical frame component.

Flexibility

In order to calculate flexibility of verb use, each instance of a verb in spontaneous speech was coded as the same or changed from previous instances in terms of its pragmatics, semantics, and grammatical frame. Changes are defined below and examples are provided in Table 4.

Pragmatic Flexibility

Two types of change were counted as instances of pragmatic flexibility: changes in function and changes in addressee. A function change was coded when a child first switched from using commands to using descriptions, or

TABLE 4
FLEXIBILITY CODING

Type of Flexibility	Baseline Instance	Changed Instance
Pragmatic		
Function	Pull (Command)	I pulling (Description)
Addressee	Pull (Ad = Mommy).	Uncle, pull (Ad = uncle)
Semantic		
Actor (A)	Eating (A = daddy)	Eating (A = dog)
Affected object (AO)	Daddy eating (AO = pizza)	Jill eating (AO = bagel)
	Pull (AO = chair)	Pull (AO = wagon)
Action		
Actor	Going (A = child)	Go (A = car)
Affected object	Open (AO = car door)	Open (AO = jar)
Situation	Come (downstairs)	Come (out of the house)
Grammatical		
Subject	Pull	I pulling
Object	Pull	Pull me
SVO	Drop	My drop my cup
Locative	Go	Go there
Preposition	My fall	My fall down
Negation	I bite	No bite
Morphology	Pull	I pulling
Lexical subject	Doggie eating	Daddy eating
Lexical object	Pull me	I pull that

vice versa, for a given verb. An addressee change was coded when a child first made a change in addressee with a given verb.

Semantic Flexibility

Three types of semantic change were coded. An actor change was coded when a child first made a change in actor during the 10 instances of a given verb. For example, the change from the dog to the father as actor in Table 4 instantiated this child's first actor change with *eat*. An affected object change was noted for the instance with each verb when a child used a different affected object from the first instance. For example, the change from the pizza to the bagel as affected object in Table 4 instantiated this child's first affected object change with *eat*. An action change was coded when a child first referred to an action physically different from his or her initial action referent for that verb, according to the ratings described earlier.

Grammatical Flexibility

Nine types of changes were coded as instances of grammatical changes; all consisted of the addition or subtraction of words or morphemes to/from a

previously attested frame. Table 4 shows the nine forms followed by examples. The first six forms (subject, object, SVO, locative, preposition, negation) collectively formed the category of syntactic flexibility. Morphological flexibility included any instance in which the child made a change in verb morphology. Past tense uses were vanishingly rare; therefore, we did not have to distinguish irregular past tense forms from regularized past tense forms (e.g., "fell" vs. "falled"). In addition to the foregoing measures of flexibility of syntactic frames in which the target verbs were used, measures of the flexibility of verb use with respect to the lexical items filling the subject and object roles were coded. Lexical subject and lexical object changes included any instance in which the child made a change in the lexical term used in the subject or object position. For example, a change from saying "I pull" to "Baby pull" was coded as a change in lexical subject use. In contrast, a change from "pull" to "I pull" constituted a change in syntax.

In sum, a total of 14 kinds of flexibility were coded for in the children's first uses of their first verbs. The measures of pragmatic flexibility were designed to address the relatively narrow question of the degree to which the children's verb uses were context bound: Children who use their verbs only as commands, and/or only in addressing their mother (when other addressees were available), may only understand these verbs as tied to a specific context of use. The measures of semantic flexibility were designed to address the core questions of extendability: to what extent were the children able to use their verbs with a variety of actors and affected objects, and to refer (appropriately) to different actions? Children who use each of their verbs with only a single actor or affected object, referring to only one instantiation of that verb, may not have acquired a principle of extendability that applies to verb meanings. The measures of grammatical flexibility were designed to address the core questions of productivity: To what extent were the children able to use their verbs in different (appropriate) sentence frames and/or with different morphology? Children who use each of their verbs in only a single frame may not yet have abstract frames that are represented or that operate independently of their verbs. The semantic and grammatical flexibility measures were also used to address the question of whether children use light verbs as pathbreakers to an adult/abstract grammar: Are light verbs used with greater semantic or grammatical flexibility than heavy verbs? These latter measures were also the relevant ones for the analyses concerning how semantic and grammatical flexibility of verb use might be related during language development.

The coding was first performed by the third author and then checked in its entirety by the first author. Disagreements were resolved by discussion.

For each verb for a given child, the following were calculated for each type of flexibility: (a) which of the first 10 uses manifested the change in

usage, (b) how many days elapsed between first use and first different use, and (c) how many different uses for each category occurred within the 10 instances. Variability in how children use their first verbs can arise both from differences among children and from differences among verbs. In order to investigate both sources of variability, all analyses were conducted: (1) treating children as the random factor and calculating measures for each child by averaging across the verbs they produced and (2) treating verbs as the random factor and calculating measures for each verb averaging across the children who produced them (H. Clark, 1973). Means and statistical analyses are reported for both types of calculations.