

Developmental Perspectives on Transitivity: A Confluence of Cues

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The study argues for a developmentally motivated view of language acquisition, and for multiple mechanisms to account for the passage from entry to exit in the process. Linguistic knowledge such as transitivity marking is not acquired in a single step, but involves partial and piecemeal knowledge en route from initial to endstate mastery. And there is no strict dichotomy between the principled, rule-bound knowledge of syntax and idiosyncratic knowledge of lexical particulars. Rather, children rely concurrently on a "confluence of cues"—prosodic, semantic, syntactic, and lexical—to bootstrap into, and move across, acquisition of linguistic structure. This view is consistent with the idea of "multiple bootstrapping" suggested by Shatz (1987), but the notion of multiple cues applies beyond initial entry into a system, taking into account subsequent reconstructions across the developmental path.

In attending to these different cues, children are guided by different psycholinguistic factors (e.g., typological bias, rhetorical options, and levels of lexical productivity) and they have recourse to various acquisitional strategies (e.g., rote learning, avoidance, or overgeneralization), which interact in language learning and in language use.

The linguistic system analyzed in support of these claims concerns transitivity distinctions in Hebrew. I propose that knowledge of the major fact of transitivity, that predicates take one or more arguments, need not

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be learned. Relatedly, children do not need to learn that there are different kinds of verb-argument relations in the most general sense of people performing an activity on their own or in relation to some other entity as against something happening or being in a state. These universal distinctions are expressed from the time children produce clause-like utterances. The moment children start formulating clauses, they do so with all kinds of predicates (including existentials and possessives, which are not considered here), whatever their mother tongue. That is, there are two interrelated sets of universal semantic distinctions underlying children's acquisition of systems of transitivity: The major thematic roles such as the difference between doer and receiver or agent and undergoer, and the major types of predicates, such as the difference between activity, state, and event, between doing versus being or becoming. These are universal categories distinguished in the semantics of all natural languages. In line with Talmy's (1987, 1988) proposals concerning a universal set of conceptual systems, which are shaped by (and possibly also shape) human cognition, and are specialized for verbal expression by grammatical means (Slobin, 1991). This shared, basic set of distinctions sets constraints on the hypotheses children can construe about possible form-meaning relations in the mother tongue and hence are presumed accessible to children at the phase of early syntax.

Children do, however, need to learn the particular means employed for marking these distinctions by the syntax of their language, through the grammatical devices of constituent word order, case marking, and/or (classifier or inflectional) agreement. In Hebrew, as in other languages, this knowledge is mastered rapidly, by around age 2;6, as part of early grammatical development (section 1). Children also need to learn the morphological properties of transitivity marking specified by their native tongue. In Hebrew, as a Semitic language, valency distinctions are expressed by verb morphology, analogous to a few frozen alternations in Modern English (e.g., *rise vs. raise, sit vs. seat, or fall vs. fell*); in the Hebrew counterparts of these pairs, both verbs share the same root (*šam* vs. *šekin, yashav vs. boshev, or nafal vs. bipil*, respectively; section 2).¹ In general, English relies on other devices: idiosyncratic lexical alternation (e.g., *learn vs. teach, eat vs. feed*; cf. Hebrew *lamad vs. limed, axal vs. be'axil*); changes in syntactic configuration (*the boy broke the window vs. the window broke*; cf. Hebrew *shavar vs. nisbar*); or syntactic auxiliaries (e.g., *sicken = intransitive inchoative get sick vs. transitive causative make sick*, cf. Hebrew *xaia vs. be'xil*). As these examples

¹Hebrew verbs are cited in the morphologically simple form of past-tense, third-person masculine singular, unless otherwise specified. The stops *p, b,* and *k* may alternate with the fricatives *f, v,* and *x* in different forms of verbs constructed from the same consonantal root.

suggest, children also need to learn the specific subcategorization properties of verbs and the membership of verb classes entering into different verb-argument relations, because these will differ from one language to another. For instance, the Hebrew counterparts of English verbs listed in Levin (1989, pp. 5-12) as sharing various transitivity alternations would fall into rather different groupings.

A number of interrelated claims about the nature of language development underlie my analysis of how children acquire the morphosyntax of transitivity in Hebrew (section 3). First, language acquisition is viewed as a stepwise progression from unanalyzed, rote knowledge of isolated forms to structure-dependent, rule-governed representations of individual systems, which are subsequently integrated by knowledge of conventions of language use and how these systems function in extended discourse (Berman, 1986b). Second, language acquisition is construed as starting out with shared, cross-linguistic principles and constraints, and as moving toward greater sensitivity to typologically relevant factors, eventually being narrowed down to a highly language-particular construal of linguistic structures (Berman, 1986a). Third, this narrowing down from most universal to most particular explains the relatively early mastery of the syntax of transitivity, before systematic morphological marking of this distinction, which in turn precedes specific lexical knowledge about conventions of usage, lexical exceptions, and incidental gaps (Berman, *in press-a*).

These developments converge as follows along three interrelated dimensions in acquisition of transitivity distinctions as well as of other domains of linguistic knowledge.

- (1) a. Item-based > structure-dependent > usage-sensitive
- b. Language-shared > language type > mother tongue
- c. Simple-clause syntax > word-level morphology > vocabulary mastery

Morphology, or word structure, has a special status in this analysis, as a highly language-particular phenomenon, which typically formed the basis for traditional structuralist classifications of language types.² A central aim of this study is to examine how children proceed from a typological (Semitic) bias to language-particular form-meaning correspondences and eventual command of lexical specificity. The developmental pattern that emerges is accounted for by the interrelated factors of typology

²Word formation also tends to be a particularly robust facet of language structure. Even where a language like Hebrew has undergone quite a radical typological change in the course of its history, its means for new word formation will remain relatively stable.

Semantically, the same relations hold between the verb and the patient or object NP in the (a) and (b) sentences of each pair; but in the (b) sentences, the verb governs an object with prepositions other than *et* (*be, le, al, me*), which are both obligatory and nonalternating. Syntactically, the (b) sentences are less transitive; for instance, only the *et* marked verbs like those in (a) permit passivization and construct-state nominalization. But they are closely parallel in surface structure and thematic relations. That is, all the sentences in (6) obey the schema in (5).

Children acquiring Hebrew can thus rely on different structural cues to transitivity: (a) *word order*—the surface array of argument nominals *vis-à-vis* the predicate; (b) *case marking*—zero versus accusative *et* or oblique prepositions; and (c) *verb inflections*—marking number and gender agreement between the subject nominal and the predicate verb. I argue that the unmarked, canonical SV(O) schema has such a privileged status that other word-order options are largely irrelevant to early acquisition of valency distinctions (section 1.1); the distinction between accusative versus nominative and other prepositional case marking is critical (section 1.2); and subject-verb agreement is a slightly later development that depends on command of the grammatical relations of subject and object (section 1.3).

1.1. Word Order: SV(O), VS, and VO

Basic word order of everyday Hebrew is clearly SV(O) in both structure and use, even though Hebrew also allows VS order (Givón, 1976). In structural terms, all three predicate types—transitive verbs, intransitive activity verbs, and intransitive change-of-state verbs or so-called "uncusatives" (Borer & Grodzinsky, 1986; Perlmutter, 1978)—can take an initial subject, that is, occur in SV order; and SV but not VS constructions, allow either a lexical noun or pronoun, and both definite and indefinite NPs, as surface subject. Across a wide range of spoken corpora, including conversational usage and narratives of adults and children, we found very low occurrence of the VS option in either child input or output.⁴ Strings of a lexical verb followed by a lexical subject accounted for

⁴The naturalistic materials relied on in this study include: (a) longitudinal corpora—a brother and sister in intermittent interaction with each other from ages 1;10 to 5;6 years of age, and another 3 girls and 1 boy starting around age 1;6, and going up to 3 years in interaction with their parents (Berman & Weislerborn, 1991); (b) cross-sectional speech samples of over 100 children from ages 1;6 to 5;6 (Drorai & Berman, 1986); (c) narratives based on a picture-storybook elicited from preschoolers age 3 to 5 years, schoolchildren age 7 to 12 years, and Hebrew-speaking adults (Berman, 1988); and (d) a collection of over

at most 5% of all clauses analyzed, while obligatorily predicate-initial existential and possessive constructions came to another 5%. The bulk of all utterances were either SV subject-initial, both transitive and intransitive, or else subjectless, predicate-initial constructions, for example, impersonals and verbs marked inflectionally for first or second person (Berman, 1990a). Further evidence for the strong bias toward (SVO) order is the general avoidance of object-initial OSV or OVS options, and the very few dislocations and other types of noncanonical word order that we found in preschool children's input as well as output, even though Hebrew tolerates a range of left dislocations and topicalizations that move nonsubject arguments and adjuncts to utterance-initial position.

In sum, Hebrew child language input and output utterances are predominantly either SV or else lacking in a surface subject. Correlation of surface word order with the semantic distinction between actor-controlled activity versus patient-endured event or between different syntactic classes of intransitive constructions is thus not a reliable basis for children to acquire Hebrew transitivity (despite certain formal claims to the contrary, as in Borer & Grodzinsky, 1986).

1.2. Case Marking and Grammatical Relations

In contrast to the lack of fit between surface word order and syntactic transitivity, the grammatical status of subject compared with direct and oblique objects provides a highly relevant cue to transitivity distinctions. An important surface feature of the grammatical subject in Hebrew, apart from its syntactically unmarked position as clause initial NP, is that it alone has no prepositional case marking, and it governs verb agreement. Initial word combinations, in Hebrew as in other languages, typically lack any grammatical marking of the subject relation, but by early in their third year, children no longer manifest indiscriminate subject omission in contexts that require a grammatical surface subject. From ages 1;9 to 2;4, six different children (see fn. 4) learned to use a surface subject as required by Hebrew grammar, with verbs in the third person and/or in present tense, and they also started to alternate null subjects with third-person pronoun and expective subjects (Armon-Loreem & Kfir, 1990; Berman, 1990a). Their shared acquisitional pattern is charted in (7) for one highly precocious child (Smadar, a girl) and two others with more typical rates of language development (Hagar, a girl, and Leor, a slightly slower boy).

600 unconventional lexical usages collected from the 6 children in our longitudinal sample, from parental reports on another 10 to 12 children, and from published records of Hebrew children's coinages in the 1930s to 1950s (Berman & Clark, 1992).

(7) Steps in Early Acquisition of Grammatical Subject and Null Subjects:

0 *Pregrammatical*

Low MLU, no productive verb inflections
No surface subjects, no grammatical null subjects

I *Initial Acquisition: Restricted Subjects*

Some alternating verb inflections

Deictic *ze* 'it, this' or lexical subjects

Occasional grammatical null subjects

Smadar 1;6 Hagar 1;7 Leor 1;9

II *Main Acquisition: Personal Pronoun Subjects*

Productive verb inflection (all singular, some plural)

First and second person pronoun subjects, occasional third person (singular)

Past-tense verbs with and without grammatical null subject
Present tense with (ungrammatical) null subjects recoverable from context

Smadar 1;8 Hagar 1;10 Leor 2;0

III *Grammatical Subjects and Null Subjects Established*

Full use of third-person pronoun subject, as required in all tenses

First- and second-person pronoun used with present-tense verbs
Elsewhere, first and second pronoun subject reflects usage—typically dropped in past tense, and retained in future tense (nonimperatives)

Initial use of expletive *ze* 'it'

Smadar 1;10 Hagar 2;2 Leor 2;4

The developments set out in (7), coupled with the findings for word order (section 1.1), indicate that once children have established the notion of grammatical subject, they can reliably identify it with the utterance-initial NP.

Recognition of the grammatical relation of 'object' depends on more than linear order, because postverbal NPs may take various kinds of complements or adverbial adjuncts, in addition to object-type arguments. The most critical cue in this context is the accusative marker *et*, required with definite NPs as the direct object of verbs that govern accusative case—shown in the (a) sentences in examples (1) to (3). Acquisition of this marker was analyzed for cross-sectional speech samples using picture-description tasks with children from 1;10 to 2;8 (Zar, 1983) in addition to our longitudinal corpora (see fn. 4). Children typically used the accusative

marker *et* as required by age from 2;3 to 2;6. Relevant developments are shown in (8) for the same three children as in (7).

(8) Steps in Early Acquisition of Direct Object Marker *et*:

	0			I		II		III	
	No suitable context [no + def Object NPs]	Omitted in context [except formulaic]	Initial usage [sporadic]	Well established [most oblig contexts]					
Smadar	1;7	1;8	1;10	1;11					
Hagar	1;10	1;11	2;0	2;1-2;2					
Leor	2;0	2;1-2;2	2;3	2;5					

Other, nonaccusative case markings are also potential cues to different degrees of transitivity. Acquisition of oblique nonnominative pronouns, obligatorily inflected for case marking, takes place at the phase of early grammatical development. By around age 2;6, children distinguish between nominative *bu* 'he' and accusative *oto* 'him', genitive *shefo* 'of him = his', or comitative *ito* 'with him', while dative pronouns such as *to* 'to-him' contrasting with *la* 'to-her' or *li* 'to-me' are among the earliest of these forms to emerge (Berman, 1985, 1986b; Kaplan, 1983; Rom & Dgani, 1985). By this age, children use dative-marked constructions quite widely, of the kind that Borer and Grodzinsky (1986) termed "possessive datives," which I analyzed as serving to present an affectee rather than an agentive perspective on events (Berman, 1982a). For example, nominative-accusative SVO *ani shafaxti et ha-xalav / et ze* 'I spilt [P1] OM the-milk / OM it' alternates with nominative-dative *haxalav / ze nishpax li* 'the milk / it spilt [P2] to-me = went and got (itself spilt on me)', or with subjectless *nishpax li* 'spilt to-me' and, occasionally, with VS *nishpax li ha-xalav* 'got-spilt to-me the-milk'; and in place of nominative-accusative *bu pocec et ha-balon* 'he burst [P3] OM the-balloon' children, possibly adults as well, prefer the dative *ha-balon bitpocec lo* 'the-balloon burst [P4] to-him' or even verb-initial *bitpocec lo ha-balon*.

In sum, by around the middle of their third year, children manifest knowledge of the basic syntax of verb-argument relations within the simple clause, including: cognizance of the grammatical relation of syntactic subject, typically the initial NP in the simple clause; specification of direct-object NPs by the accusative marker *et*, generally in contexts that manifest high transitivity (inanimate, specific, and referential definite object NPs); appropriate use of verbs that govern other prepositions to form oblique objects, as in the examples in (6); and reliance on dative marking to reduce transitivity by referring to protagonists as affected-undergoers of events rather than as nominative agents of actions.

1.3. Morphological Marking of Agreement and Tense versus Predicate Transitivity

The distinction between subjects and nonsubjects is reinforced by children's increasing conformity to the rule that the subject noun triggers number and gender agreement on the verb (Levy, 1983a, 1983b). A range of sources—from spontaneous speech output in cross-sectional surveys (Kaplan, 1983; Maoz, 1989; Zur, 1983) and longitudinal studies (Berman, 1990a; Berman & Weissenborn, 1991)—reveal the following developmental sequence: Sentence Initial Subject > *et* or other prepositional marking on Object > Subject-Verb agreement. These findings are confirmed by a careful elicited imitation study: Guri-Herling (1988) found that 3- and 4-year-olds (with a mean age of 3;3 and 4;3) both imitated and corrected input sentences in the form [S V *et* O] when presented with various types of NVN strings (e.g., they would change both *baze* [N V N] and [et N V N] to [N V *et* N]); older children, from age 5 years, like adults, took appropriate account of the accusative marker *et* in sentence-initial position in the contexts [et O S V] and [et O V S], and they also paid increasing attention to markers of subject-verb agreement.

It seems hardly surprising, then, if a child of less than 3 years old uses the same verb form in both the following [N V Pr N] contexts, one well-formed and one ungrammatical:

- (9) a. *ba-tinok nafal [P1] me ba-kise*
the baby fell off the chair
b. **ba-tinok nafal [P1] et ba-kise*
the baby fell [sic] OM the chair
cf. *ba-tinok bipil [P5] et ba-kise*
the-baby made-fall OM the chair =
knocked the chair over

Just such errors have been documented in the naturalistic speech output of different Hebrew-speaking children. This is shown by the examples in (10) from Hagar and Leor in the latter part of their third year at a point where, as outlined in (7) and (8), both already have command of the grammatical relations of subject and direct object.

- (10) a. Hagar, 2;8;10, talking about a rabbit in a storybook:
*ve bu nafal letox dor ... Yonatan *nafal oto*—cf. P5 *bipil*
and he fell into (a) hole. . . Johnny fell him
b. Hagar, 2;8;27, to her mother, who is rubbing lotion on her legs:
at nofetet. ot! —cf. P5 *mapila*
you + FM fall + FM me + ACC + 'You're falling me'

7. DEVELOPMENTAL PERSPECTIVES ON TRANSITIVITY

- c. Hagar, 2;9;4, to her mother, who is trying to pick her up:
ima, lama nafal ot? —cf. P5 *bipil*
Mommy, why fell + FM + 2nd me? =
why did you push me down?
d. Leor, 2;9;30, to his aunt, wants her to come play with him on the rug:
bo' la-sbevet ve ani yipol otax —cf. P5 *apil*
come + FM to-sit and I will-fall you + FM =
'come and sit down . . .'

The utterances in (10) are grammatically well-formed and reveal command of basic clause structure in: word order, the accusative case form of the object pronoun, and subject-verb number and gender agreement. Other examples of such levelings of grammatically mandatory *binyan* distinctions from different children are analyzed in detail in section 3.4.2. Here, note that both Hagar and Leor have proceeded beyond the initial, prototypical past-tense (perfective) use of the very common early verb meaning 'fall' or intransitive 'drop' (the P1 form of the root n-p-*l*), as shown by the present- and future-tense forms in (10b) and (10d). This same verb occurs with high frequency in narratives elicited from 3- to 4-year-olds (see fn. 4): All 16 children used a past-tense form of Infr P1 *nafal* (or plural *nafila*) 'fell' to describe what happened to a boy (and his dog) in search of his missing frog; and over half of them also used the causative P5 form *bipil* 'make-fall, throw down' to describe what the animals they encountered did to the boy (Berman, 1988). That is, these somewhat older children did *not* misuse the intransitive form with a causative sense or in a transitive syntactic context.

Younger children, like Hagar and Leor, also know which thematic relations are involved in simple clause verb argument configurations—for instance, an animate patient to whom something happened and the locative source of that event in (10a), compared with the mother as an agentive actor who has done something to the child patient in (10b) and (10c), or the child who wants to perpetrate something to the adult in (10d). They also have command of the relevant syntax: SVO word order and locative compared with accusative case marking. What they do not yet know is the relevant verb morphology, which requires that the verb *nafal* 'fell' or *bipil* 'to-fall' from the root n-p-*l* can occur only with intransitive syntax; where it has a direct object, this verb must be morphologically transitive, in the P5 verb pattern, taking forms like past tense *bipil* 'made-fall, dropped, knocked down' or infinitive *le-bapil* 'to knock down' from the same root n-p-*l*. Consider, next, what kind of knowledge this entails.

2. LEXICAL MARKING OF TRANSITIVITY: THE BINYAN VERB PATTERNS

The morphological verb patterns known as *binyan-im* "conjugations" are outlined later with the aim of integrating syntactic, semantic, and lexical factors in a unified characterization, taking into account the task facing the language-acquiring child. (For a summary of other analyses, see Junger, 1987). Three factors are analyzed as relevant to the acquisitional task: *structural generality* along the transitivity axis—that is, the correlation between morphosyntactic alternations in the *binyan* patterns and valency distinctions (section 2.1); *semantic regularity*—the extent of one-to-one mapping between *binyan* form and semantic content in terms of inherent verb semantics and the functional uniqueness of the verb-argument relations expressed by each *binyan* pattern (section 2.2); and *lexical productivity* compared with lexical convention—that is, the effect of processes for new word formation compared with knowledge of the established lexicon (section 2.3). The developmental prediction motivating this analysis is that generality of rule application and closeness of fit between form and function combine to facilitate and accelerate acquisition in this as in other domains of language knowledge.

2.1. Structural Generality: Syntactic Correlates of the *Binyan* System

The five patterns considered here (see fn. 3) display typical values for syntactic transitivity, where [+Transitive] verbs are narrowly defined as occurring in SVO constructions and governing accusative case (i.e., the object nominal takes *et*) and [-Transitive] means all the rest. Under this strict definition, the patterns cluster as follows:

	[- Transitive]	[+ Transitive]
P1 - QAL: PA'AL	<i>caxak</i> laugh <i>yasher</i> sleep <i>yamad</i> go down <i>nispax</i> spill <i>nibera</i> tear <i>nifbal</i> get a fright	<i>daxaf</i> push <i>shavar</i> break <i>sagar</i> open
P2 - NIFAL:		<i>iken</i> fix, mend <i>nifex</i> inflate, blow-up <i>nigev</i> wipe
P3 - PUEL:		
P4 - HITPA'EL:	<i>hitracex</i> wash (oneself) <i>histovev</i> turn around <i>hitbayesh</i> be ashamed	

[- Transitive]

[+ Transitive]

P5 - HIF'IL:

bixan put-in, insert
hidlik light, ignite
hirdim put-to-sleep

Several properties relate syntactic transitivity and *binyan* verb morphology. (a) P1 is syntactically neutral, because it alone is equally available to both intransitive and transitive predicates. (b) Only, though, not all, verbs in P1, P3, and P5 govern accusative case direct objects marked by *et*, as in the first sentence in each pair of examples in (2) through (4). (c) Verbs in P2 and P4 can be "loosely transitive" because they may require an object argument, for example, P2 *nixmas le* 'go in to', *nibena me* 'enjoy from' or P4 *bitstakel be* 'look at', *bitgabber al* 'overcome on', but this will never be marked by *et*. And (d) verbs in the intransitive P2 and P4 patterns have no passive voice counterpart, in contrast to transitive verbs in P1, P3, and P5.

That is, children need to learn that verbs in P1 can be either transitive or intransitive, that verbs in P2 and P4 never govern accusative case, and that P3 and P5 are generally transitive and may, but need not, take direct objects. These are broad generalizations, however, rather than across-the-board rules of grammar, and they are not readily accessible to non-specialist native-speaking adults on the metalinguistic level of conscious awareness.

Another type of structural cue is provided by the fact that typical patterns of alternation hold between the five patterns. These are illustrated in (12), without regard for directionality, that is, the question of which patterns are "basic" and which are derived.

(12) Typical Interpattern Alternations:

a. P1	[- Tr]	P5	<i>caxak</i> laugh	[-	<i>bixan</i>	amuse
			<i>yamad</i> go down	-	<i>hordil</i>	take-down
b. P1	[+ Tr]	P2	<i>sagar</i> shut, close	-	<i>nigar</i>	get-shut
			<i>shofax</i> spill	-	<i>nispax</i>	get-spilled
c. P2	[- Tr]	P3	<i>nibbal</i> get-a-fright	-	<i>bitbil</i>	frighten
			<i>nirdam</i> fall asleep	-	<i>birdim</i>	put to sleep
d. P3	[+ Tr]	P4	<i>nifex</i> blow up	-	<i>bitmexex</i>	swell up
			<i>nigev</i> wipe	-	<i>bitmagev</i>	wipe oneself

These alternations mean that any change in valency is marked by a morphological shift in *binyan* assignment. This is a more robust generalization than the distribution of transitivity distinctions set out in (11). There are only two classes of exceptions to this general rule of Modern Hebrew, both cases where a single P5 form can be either transitive or

intransitive: (a) causative and inchoative versions of adjectives—for example, *bišbin* 'whiten' means both 'make white' and 'become white'; *bitušil* 'ripen' means both 'make ripe' and 'get ripe'; and (b) aspectual verbs for phases in a process, particularly *bišxil* 'begin, start', which occurs only in P5 both in transitive and intransitive contexts (and, less nominatively, *biššibix* 'continue, go-on', which does have an intransitive P2 alternant). But these exceptions are marginal, and largely irrelevant to children's construal of the system. First, the intransitive inchoatives in P5 derive from Biblical Hebrew and are rare in everyday colloquial usage, where they are generally replaced by a periphrastic inchoative auxiliary plus adjective (e.g., 'turn white', 'become ripe') or by extension of the P4 intransitive pattern to nonnormative forms such as *bizāaken* 'grow old' [cf. *zaken* '(be) old'] *biššabēl* 'become ripe' (cf. *bašēl* 'ripe'), and *biššaban* 'turn white' (cf. *šaban* 'white'). Second, the verb 'begin' is used by children mainly in its transitive sense without any overt argument, in imperative *tašxil* 'start, begin' analogously to P5 *tašxil* 'stop!' (which does contrast with intransitive P1 *pašak* or P2 *nifšak*). These high-style, normative forms of inchoative adjectives, and an occasional aspectual verb, are the only instances that could provide learners with positive evidence for assuming that pattern switching is optional in Hebrew. The fact that valency alternation at the level of the sentence entails morphological alternation at the level of the verb can thus be considered part of the *grammar* of Modern Hebrew.

2.2. Semantic Regularity, Form-Meaning Relations and Functional Uniqueness

The learning process could also be facilitated by an invariant mapping between *binyan* form and semantic content. However, this does not hold at either of the levels of inherent verb semantics or of thematic verb-argument relations. There is, again, only a partial fit between *binyan* pattern and the presumably universal division of predicates into the four classes of Aktionsarten or aspectual semantics distinguished by Dowty (1979), and defined by Van Valin (1990) as follows: *State* predicates refer to an entity BEING in a given state of affairs; *Activity* predicates refer to an actor DOING something, performing a (nontelic) activity; *Accomplishment* predicates refer to an agent or actor CAUSING some entity to BE in a state or BECOME something; and *Achievement* predicates refer to an entity BECOMING something, entering into or undergoing a change of state. Hebrew statives can take the form of adjectives (e.g., *šāxam* 'be wise'), verbs in P1 (e.g., *yada* 'know'), or in P5 (e.g., *bevin* 'understand'); activity verbs occur in P1 (e.g., *caxak* 'laugh'), P3 (e.g., *šixer* 'smile'), or P5 (e.g., *bišbia* 'vote, raise one's hand'); accomplishment verbs can occur

7. DEVELOPMENTAL PERSPECTIVES ON TRANSITIVITY

in P1 (e.g., *daxax* 'push'), P3 (e.g., *šiken* 'fix'), or P5 (e.g., *birgiz* 'annoy'); and achievement predicates can occur in P1 (e.g., *kafa* 'freeze'), P2 (e.g., *ne'elam* 'disappear'), P4 (e.g., *biš'alaf* 'faint'), and even P5 (e.g., *bigla* 'arrive').

Again, children can rely on partial semantic generalizations, and on the partial interface between these and the structural distinctions noted in section 2.1: Statives and accomplishments favor the transitive patterns P3 and P5, intransitive activities favor P1, achievement verbs favor P2 and P4. However, as the preceding examples show, lexical mismatches occur across the board, and in both directions: One semantic verb type can occur in different *binyan* patterns and a single *binyan* is not exclusively used for one verb type. Thus, P1 has several achievement predicates, like those meaning 'freeze', 'boil', 'grow (bigger)', as well as the common children's verb *nafal* 'fall'; P2 has an activity predicate such as *nixnas* 'enter = go in, walk into' (also interpretable as achievement 'enter = get inside'); P3 has a largish group of activity verbs, including *šyel* 'go for a walk', *šteak* 'play (games)', *šixer* 'draw, paint'; P4 has a subset of iterative and other activity verbs—for example, *bišroec* 'run around', *bištekel* 'look'; and P5 has some achievement ('unaccusative') type verbs as well as the inchoatives of adjectives noted in the preceding section.

This bidirectional lack of functional uniqueness is also manifested in the type of predicate-argument relations expressed through the *binyan* patterns. For example, *endstate resultatives* can take one of three forms: the passive participial forms of CaCuC3 (e.g., *šəva'ur* 'broken', *bašifur* 'inverted = upside-down'), mC₁CaC (e.g., *mevushal* 'cooked, not raw', *mesudar* 'arranged, tidy'), and mC₂CaC (e.g., *murgash* 'sensed, tangible', *mudbak* 'stuck [on]'); and, relatedly (see, further, section 4.2), *passive voice* can be expressed by P2 *nif'al* (e.g., *nignav* 'be-stolen', *niškar* 'be-taken'), by P3-*ps pu'al* (e.g., *tukan* 'be-fixed', *šudar* 'be-brought'), and by P5-*ps hof'al* (e.g., *šudbak* 'be-pasted', *buva* 'be-brought'). Different subclasses of achievement predicates also have a mixed distribution, for instance, *reciprocals* are generally in P4 (e.g., *biškatav* 'correspond, write one another', *bišmagesh* 'collide, clash'), but they may occur in P1 *rav* 'quarrel' or P2 *nifgash* 'meet (one another)'; and adjective-based change-of-state inchoatives may be in P1 (*xala* 'get-stick'), P2 (*nextash* 'grow-weak'), P4 (*biš'ayef* 'grow tired'), or P5 (*biširi* 'get-well, become-healthy'), and their causative counterparts may also take different forms—as in P3 *šiyef* 'tire, make-tired' or P5 *bešitsh* 'weaken = make-weak'.

⁵These forms follow the convention of using uppercase C for root consonants and lowercase consonants and vowels for affixal elements in Hebrew derivational paradigms.

It follows that under this analysis, the *binyan* patterns are construed as associated with the lexicon. That is, they manifest the irregularities and accidental gaps typical of derivational compared with inflectional systems of morphology, and so constitute more of a learning burden than the latter. On the other hand, children can be aided by attention to structural generalizations about transitivity alternations and the partial syntactic regularities noted in the preceding section. These combine with the usage-related factors of lexical frequency and productivity to explain children's acquisition of this system as both relatively rapid and as staggered across different developmental phases.

2.3. Lexical Factors of Frequency and Productivity

The notion of "productivity" is applied here to explain children's acquisition of *binyan* alternations (like other aspects of new word formation in different languages, see Berman & Clark, 1992) in a rather different sense than what is commonly accepted in linguistics or child language research. In the former, productivity is generally defined in purely structural terms (e.g., Jensen, 1990; Matthews, 1991). For example, an inflection like English *-ed* is productive in that it applies to nearly all verbs to mark past tense, in contrast to a suffix like inchoative *-en*, which is not productive because it appears on only a small number of existing verbs. In general, inflections or grammatical affixes are regarded as fully productive, and derivational word formation affixes as less productive, because they are more limited in where they can apply.⁶

A rather different idea of productivity is adopted here, following on from earlier accounts of *speaker preferences* in the domain of innovative nouns and noun compounding in Hebrew (Berman, 1987a, 1987b; Berman & Ravid, 1986; Clark & Berman, 1984; and see, too, Clark & Clark, 1979, on productivity of new verb formation in English). In this sense, productivity is linked (a) to transparency of form-meaning relations in the lexicon (section 2.2) and (b) to the activity of a word form type for the expression of a meaning not yet represented in the conventional lexicon. This characterization involves interrelated distinctions between lexical frequency and productivity (section 2.3.1), on the one

⁶In the field of language development, the notion of "productivity" has been used in a rather different sense. It was originally intended to capture the progression in children's language use from an occasional word combination to producing five or more new ones in a single session (Brown, 1973). It also serves to characterize the move from item-based rote learning to rule-based knowledge of entire classes of items and constructions, for instance, from using an inflectional affix like *-ed* on a single verb, to using it on a small group of verbs, to general application on all possible verbs (e.g., Gordon & Chafeiz, 1990; MacWhinney, 1978; Pinker, Lebeaux, & Frost, 1987).

hand, and between current processes of new word formation and the established lexicon (section 2.3.2), on the other.⁷

From an acquisitional point of view, children as well as adults are affected by the frequency of input forms in actual language usage. And children as well as adults are not necessarily able to distinguish on-line, novel coinages from established, conventional lexical items in their speech input and output. But adults have a very large conventional lexicon, whereas children know only a small subset of the total adult repertoire. As a result of this imbalance between endstate and developed knowledge of the lexicon, children are likely to be more affected by relative frequency of input items. They are also more likely to fill lexical gaps by new word coinage and reliance on unconventional forms of existing words, where adult usage conforms largely to the established lexicon.

2.3.1. Frequency versus Productivity: The Special Status of P1.
The preceding sections suggest that the P1 pattern enjoys a privileged status from several points of view: Semantically, it contains state, activity, and accomplishment predicates, as well as a few achievement verbs, including the highly salient verb *nafal* "fall"; that is, P1 has no specific semantic or functional bias, and its verbs equally refer to durative activities or to states, with or without a specified patient or location. Syntactically, P1 is unique in that it includes strictly transitive verbs governing accusative *et*, weakly transitive verbs governing oblique objects, and intransitive verbs with no obligatory complements. P1 also enters into the most varied cluster of interpattern alternations: Intransitive activity verbs alternate quite regularly with P5 causatives (and some also have semantically specific or accomplishment counterparts in P3), whereas transitive P1 activity verbs have regular alternants in P2 achievement predicates or in P2 syntactic passives, and sometimes also in P4 reflexives.

From the point of view of usage (of the conventional lexicon), P1 verbs include most of the generic level, semantically basic and least specific verbs typical of young children's early verb usage—for example, the verbs meaning *come* and *go*; *sit* and *stand*; *give*, *put*, and *take*; *go up* and *go down*; as well as more specific but very common children's verbs like *eat* and *drink*; *want* and *see*; and *sleep*, *laugh*, or *cry*. Finally, P1 verbs have the highest frequency of occurrence across different registers of adult usage (Schwarzwalid, 1981, p. 70); they account for over half the verbs, both in types and tokens, used by children in a variety of cross-sectional

⁷Most linguistic accounts of productivity fail to take explicit enough account of this distinction. Important exceptions in the domain of word formation are the line drawn by Aronoff (1976) between "new" versus "old" words and Andersen's 1985 discussion of the relative "activity" of word-formation processes.

studies of preschool and early school-age usage (Berman, 1982b; Berman & Dromi, 1984; Elath, 1989; Kaplan, 1983; Rabinowitch, 1985); and between 50% and 60% of the early verbs of the children we studied longitudinally (see fn. 4) were in P1, prior to productive mastery of verb inflection, up to age 2 years. The robustness of these findings is confirmed by the highly similar distribution of pattern usage for both verb types and verb tokens across all these different corpora, as follows: Twenty-five percent to 35% of the remaining verbs divide fairly evenly between the two [+Transitive] patterns P3 and P5, followed by the two [-Transitive] patterns P4 and P2, in that order, accounting for between 10% to 5% of all verbs.

As against this predominance in frequency of usage from the established lexicon, P1 is uniquely *not* exploited for new verb formation in current Hebrew. This is partly due to structural constraints on the morphophonological alternations involved by P1 compared with other verb patterns. But it also relates to the preference of adults and children alike for making specialized use of other patterns to coin new verbs in Hebrew (see, further, in section 2.3.2); P3 is favored for transitive and P4 for intransitive verbs based on existing nouns (whether native Hebrew or loan words) and P5 for coining verbs from other verbs or adjectives. Avoidance of P1 coinages is almost total across a wide variety of spontaneous verb innovations as well as in experimental studies (Berman, 1989, 1990b, and see fn. 4). The only exception is reported in a study where both 4-year-old and adult respondents quite often relied on P1 to change the transitivity value of verbs derived from innovative, nonexistent roots (Alroy, 1992). But this runs counter to normal processes of new verb derivation in Hebrew: New verbs are invariably formed from existing verbs (e.g., P5 *bisbil* 'imply' from P1 *shatat*), from existing Hebrew nouns or adjectives (e.g., P3 *shped* from the noun *shpud* 'skewer'), or from loan nouns or adjectives (e.g., P4 *bil'akim* 'be acclimatized' from *aklim* 'climate'). In these highly productive processes for new verb formation in Modern Hebrew, P1 plays no role, as children as young as age 3 already know.

These observations suggest that P1 verbs are learned, and used, as unanalyzed amalgams, with no reference to how they interact with transitivity. This is generally true for initial acquisition of all early verbs, irrespective of *binyan* pattern, but it does not apply to subsequent use of verbs in other patterns (section 3.1). P1 has a privileged status semantically, syntactically, and in frequency of usage. Yet it is the least productive in the *binyan* system as a whole: it is rarely used to coin new verbs or for innovative alternations along the axis of transitivity.

2.3.2. *Three Levels of Lexical Productivity.* In earlier analyses, a distinction was drawn between structural productivity, defined as the formal options available to speakers through the grammar of their lan-

guage, compared with colloquial or speaker productivity, characterized by contemporary preferences in choosing from the range of grammatical devices for specifying form-meaning relations. Here, I elaborate these distinctions to a three-way contrast between nonproductive, semi-productive, and actively productive sets of form-meaning relations in the lexicon. These three degrees of lexical productivity are critically affected by the distinction between the established lexicon, which includes all the items at the less productive end of the continuum, and processes for new word formation, which account for those at its more productive end.

1. *Nonproductive* form-meaning relations have become frozen or fossilized, and so need to be learned by rote. An example would be the small groups of causative verbs in English that are derived either by vowel apophony (e.g., *rise-raise*, *lie-lay*, *sit-seat*, *fall-fell*) or by lexical suppletion (e.g., *eat-feed*, *learn-teach*, *fall-drop*, *see-show*). In Hebrew, use of morphological marking of aspect by *binyan* is similarly frozen in history, for example, P1 to P3 intensive aspect (compare *shavar* 'break - shiber 'shatter', *shatax* 'send' - *shibtax* 'send away') and P1 to P4 iterative aspect (compare *balax* 'walk' - *bilbalex* 'walk up and down', *rac* 'run' - *bitroec* 'run around'). These play only a marginal role in marking the aspectual contours of events in extended narrative productions (Berman & Neeman, in press), and they are nonfunctional for purposes of new verb formation.

2. *Semi-productive* form-meaning relations are transparent, they are relatively easily recognizable by naïve speakers, and they include larger numbers of items. They also tend to represent options that are preferred by language-policy institutions, lexicographers, school grammars, and other representatives of the official language establishment. Nonetheless, they constitute closed classes, because they are *not* favored as a current device for new word formation, and so lack genuine colloquial, speaker productivity. This category includes (a) processes that are lexically defunct, such as use of P5 *bif'il* in Biblical Hebrew for intransitive, denominated verbs indicating direction of movement (e.g., *lebasmit* 'go left' from *smol* 'left', *leba'apin* 'go north' from *cafon* 'north'); and (b) processes that have been replaced by some other productive device, for example, use of the same P5 pattern in Mishnaic Hebrew for indicating both the causative and the inchoative version of color and other adjectives (e.g., *leba'abin* 'whiten' from *lavan* 'white' means both 'make white' and 'become white'; *lebaushil* 'ripen' from *bashef* means both 'make ripe' and 'become ripe'), whereas today the inchoative sense is taken over either by intransitive P4 or by syntactic periphrasis (see section 2.1).

3. *Actively productive* form-meaning relations are also transparent,

but they are not lexically restricted like the previous category. They constitute open-ended classes, as demonstrated by the following properties: (a) Speakers rely on them in spontaneous coinages to fill gaps in the contemporary lexicon; (b) they are favored as a means of new word derivation in structured experimental settings; (c) they are the source for solecisms and deviations from normative requirements in lexical usage stipulated by the language establishment; and (d) they are indicative of ongoing processes of language change in the usage of two groups of non-literate, less educated, and less self-conscious speakers (i.e., adult speakers of nonstandard variants and young children). Three examples of such productive trends in the current lexicon of Hebrew for which both naturalistic and experimental data are available are: (a) reliance on P3 in coining new, denominal transitive-activity verbs, from native or loan-word sources; (b) use of P5 in coining causative verbs from adjectives and from existing verbs in P1; and (c) preference for the passive participial patterns *meCuCaC* or *clse CaCuc* and rejection of the third option *muCCaC* for expressing resultative endstates.

Underlying this analysis is the assumption that language acquisition is directly affected by the kind of knowledge involved in items with different degrees of lexical productivity. In acquiring Type 1 nonproductive classes, children must learn the items by rote, then relate them to other associated forms (e.g., *eat* and *feed*), and eventually recognize what general semantic relationship obtains between them (e.g., that *feed* is to eat as *show* is to *see* or *bring* is to *come*). That is, item-by-item learning is the basis for gaining command of members of this class, both initially and subsequently. Eventually, however, they will be recognized as special instances of more general morphosyntactic classes and/or semantic classes, for example, causatives.

At the other end of the scale, command of Type 2 actively productive classes of form-meaning relations is more similar to acquiring command of grammatical rules. For instance, children need to recognize that P5 is a means of forming causative verbs in Hebrew, with intransitive verbs in P1 (e.g., P5 *leba'aziz* 'move (something)' from P1 *lazuz* 'wet') and with adjectives (e.g., *leba'ariv* 'make wet' from *ratuv* 'wet'). The prediction is that these active derivational processes will shape children's initial hypotheses, and enable them to extract relevant generalizations about the interrelation between syntactic transitivity, verb semantics, and morphological form. These alternations will be the basis for children's "creative errors," indicating that the child has the rule but lacks command of the conventional lexicon and of lexical exceptions. Such errors are evidence that these processes are in fact "active," and may suggest directions of possible language change.

In the middle lies learning that combines features of Type 1 item-based lexical learning and Type 3 rule-based structural learning. A later kind of knowledge are lexical conventions I have characterized as Type 2 "semiproductive." These may be anchored in processes that at an earlier stage in the history of the language were the canonic way for doing things, and hence are most often specified in schoolbooks and other normative descriptions. But in contemporary usage, they are lexically restricted in unmotivated ways to a frozen set of items. This appears to be the case with English use of the suffix *-en* to produce inchoative verbs with causative counterparts from (generally Germanic) adjectives, for example, conventional *soften*, *whiten*, compared with the currently productive *-ize* suffix for producing (predominantly Romance-based) activity verbs like contemporary *finalize*, *definitize*. Such partial generalizations often tend to belong to a higher register, which would provide another reason for their being acquired later than either the item-based nonproductive (Type 1) alternations or the more regular, fully productive (Type 2) processes.

Processes manifested within the *binyan* system of Modern Hebrew can now be reanalyzed as in (13), to distinguish between those that are (i) syntactically fully productive; (ii) lexically fully productive or "active"; (iii) lexically partially or semi-productive; and (iv) nonproductive, closed classes.

(13) <i>binyan</i> Pattern	Transitivity Value	Semantic Class	Direction of Alternations	Degree of Productivity
P1	Basically, a "closed class" of verbs: - Trans Activity + Trans Accomplish + Trans Accomplish		> P3 Causative > P2 Achievement > P2 Passive	II = active III = semi I = syntax
P2	- Trans Achievement - Trans Achievement		< P1 Accomplish < P5 Causatives	III = semi III = semi
P3	+ Trans Accomplish + Trans Accomplish + Trans Causative		< Nouns < Adjectives	IV = closed II = active III = semi
P4	- Trans Achievement - Trans Reflexives, Reciprocals		< P3 + Trans	II = active III = semi
P5	+ Trans Causative + Trans Causative + Trans Inchoative - Trans Inchoative		< P1 - Trans < P2 - Trans < Adjectives < Adjectives	II = active III = semi II = active III = semi

As shown in (13), each pattern can be analyzed as currently coopted for a particular lexically active process; all other, nonsyntactically governed form-meaning relations between verb content and verb morphology need to be learned piecemeal. The next section considers how children move into, and across, acquisition of this knowledge.

3. ACQUISITION OF BINYAN TRANSITIVITY DISTINCTIONS

What, then, underlies children's acquisition of a system in which syntactic transitivity, verb semantics, and lexical morphology interact in only partly systematic ways? Earlier studies on the acquisition of the *binyan* system yielded two main observations. First, early verb usage does not entail any systematic alternation in verb morphology (Berman, 1982b). Initially, children fail to use *binyan* patterns to express any or all of the following functions: Syntactic distinctions of transitivity; semantic notions such as causativity or reciprocity; and lexical processes of new word formation, for example, for denomination. Verbs are used by 2-year-olds as unanalyzed amalgams from these three points of view, even after children have command of the rich inflectional system of person, number, gender, and tense marking. Second, knowledge of the system emerges clearly after early grammatical acquisition, both syntactic and inflectional, and is reflected in "creative errors" (Berman & Sagi, 1981). These may violate lexical convention, but they are grammatically appropriate in terms of the transitivity values typical of the five *binyan* patterns (Berman, 1980).

These two observations are examined here in light of the reanalysis of the *binyan* system sketched in section 2, combined with more extensive findings from naturalistic speech output (see fn. 4) and more recent structured elicitation studies. As noted in the preceding discussion, children are assumed to start out with the knowledge that predicates may enter into different kinds of verb-argument configurations, and there are different semantic types of predicates. This forms the basis for acquisition of language-particular knowledge of form-meaning relations, along the following developmental route. First, children acquire what I term *syntactic transitivity*, expressed in Hebrew through SVO order and the distinction between the grammatical relations of subject, direct, and oblique objects, aided by inflectional marking of subject-verb agreement. Second, they recognize that the grammar of their language requires morphological marking of valency alternations, typically from around age 3, after basic clause structure is established. Next, they need to extract out subgeneralizations regarding how this is achieved through *binyan* pattern alternation, and this is accompanied, finally, by command of the numerous lexical exceptions and form-meaning mismatches that characterize the system.

This stepwise progression is motivated on the basis of a more general model of language development (section 3.1); factors impinging on acquisition such as typological imperatives; lexical productivity, and the difference between grammatical and lexical knowledge (section 3.2); and strategies employed by children in acquiring the system (section 3.3).

3.1. General Developmental Path

The acquisitional model adopted here views language acquisition as proceeding in three major phases from (I) item-based rote learning to (II) structure-dependent rule learning, followed by (III) discourse-sensitive language use. This entails the following stepwise progression for acquisition of the *binyan* system, as well as other areas of language knowledge and language use:

- (14) I. a. Early verb-use is rote-learned, *item-based*
 b. *Initial alternations* based on familiar exemplars, lexically associated isolates
- II. c. Emergence of a *generalized knowledge* of the system, shown by lack of transitivity errors in choice of *binyan* forms and by juvenile interim strategies ("creative errors") in using verbs in nonprototypical contexts
 d. *Consolidated knowledge* of the system, shown by increased spontaneous use of alternating forms of the same verb and by success on structured elicitation tasks with both familiar and novel items
- III. e. *Adultlike command*, shown by mastery of lexical exceptions and partially productive lexical classes, by the ability to coin innovative transitivity switches in structured elicitations; and by flexible deployment of *binyan* alternation for alternating perspectives in extended discourse.

The progression delineated in (14) is consistent with MacWhinney's (1978, 1982) proposals for the acquisition of morphology and early word combinations, by the mechanisms of rote, analogy, and combination, but aims, at a generally integrated developmental view, beyond these three processes. My model is closely allied to the developmental phases proposed by Karmiloff-Smith (1986, 1987), in characterizing knowledge acquisition as being initially bottom-up or data driven, then top-down procedurally driven, and eventually integrated within a systematic conceptual gestalt.

This developmental sequence was first proposed to account for the acquisition of inflectional and derivational morphology (Berman, 1986b), and has since been supported by findings in other areas: for example, the development of complex nominals (Berman, 1987a), narrative structure (Berman, 1988, 1993a), and subjectless constructions (Berman, 1990a). The same progression also holds for results of a recent study of *binyan* alternation in structured elicitation settings (Berman, 1993b). But this

model fails to address two important developmental issues: the question of *transitions*, of how children move from Phase I to II and on to end-state Phase III knowledge; and the issue of *cross-system ordering* of acquisition, for example, why agreement inflections emerge earlier than *binyan* transitivity marking, or why causative-verb innovation is both earlier, and more widespread, in Hebrew child language than intransitive verb formation.

3.2. Developmental Factors⁸

To this end, and in keeping with the view of multiple bootstrappings and a confluence of cues proposed in the introduction, other factors need to be incorporated in this account of the acquisition process. The shift from Phase I to II is motivated by *typological bias* in the sense of the relative weight of particular structural properties of the target language (section 3.2.1); the relative order of acquisition within the *binyan* system is explained by the impact of *lexical productivity* and usage preferences (section 3.2.2); and the relative order across different linguistic domains—by the principled distinction between grammatical and lexical knowledge (section 3.2.3). Factors that motivate the shift from Phase II to III, such as lexical convention (Clark, 1983; Clark & Clark, 1979), and the impact of formal study and literacy are noted in section 4.

3.2.1. Typological Structure. Verb usage in the longitudinal corpora of six children at Phase I, Step (14a), during the period of initial word combinations and early grammar, confirms findings of cross-sectional distributions (Kaplan, 1983) and diary reports (Berman, 1978; Dromi, 1986). Initially, children use verbs in all five patterns, but the same child will rarely use a single verb root in more than one *binyan* pattern. A similar initial lack of alternating forms, and the view of early acquisition as "item based" and "context bound," have been noted for inflectional morphology and early word combinations, explained by MacWhinney (1978, 1982) as early reliance on rote learning, and in causative verb usage attributed by Bowerman (1974, 1982) to learning based on unanalyzed amalgams.

A separate question, not addressed in the present context, is what factors determine *which* forms of verbs are favored in early use. For example, children tend to use intransitive P1 *axal* 'eat' and *razav* 'ride' well be-

fore P5 causative *he'extil* 'feed', *hirkiv* 'give a ride'; on the other hand, intransitive P2 *nishpax* 'be-spill' or *nish'ar* 'stay, remain' are used long before their transitive counterparts, but some transitive P1 verbs like *gar-shut* or *niaca* 'find' occur *before* their P2 intransitive counterparts. In contrast, both P1 *yamad* 'go-down' and P5 *horid* 'take-down', both P2 *niyas* 'go-in, get-into' and P5 *hivrit* 'put-in, insert' may be used at around the same time.

I argue that these highly familiar initial exemplars form the basis for eventual rule extraction (Step 14b). This assumption corresponds to what Ingram (1985) called the "lexical principle," by which children "learn individual paradigmatic alternations as separate lexical items . . . [and] first acquire(s) paradigmatic variants like 'cat, cats', 'dog, dogs' as separate words, and only later realize that there is a separable plural morpheme '-s'" (p. 65). At the phase of early grammar, around age 2, such alternations in the *binyan* system are few and far between. And there is as yet no evidence that children recognize that a more general relationship is encoded between, say, P2 *nishpax* as referring to a change-of-state (be-spilling) and P1 *ishpax* as referring to someone's activity (spilling something), or between P1 *laredet* for their own going down and P5 *lehorid* for making something or someone else go down. Not, as a result, are children yet able to extend these form-meaning alternations to other, less familiar instances.

Two facets of verb acquisition thus need to be reconciled. The evidence is overwhelming that from ages 1;6 to 2;6, children rarely use the same verb with more than one transitivity value; that is, the same verb root will generally occur in only one *binyan*. But this poses a problem for explaining eventual acquisition of Hebrew grammar, which stipulates that a change in syntactic transitivity requires a change in verb morphology. These facts are confirmed by results of two picture-based elicitation tasks (Berman, 1993b). Children age 2;6 to 3;0 (mean age 2;9), 3;6 to 4;0, and 7;6 to 8;7 were presented with sentences containing familiar Hebrew verbs, and were required to provide verbs of inverse transitivity, to yield two types of responses: (a) conventional, existing verbs and (b) novel, nonexistent items. On the (a) part, the 2-year-olds used the correct verb morphology to mark-changes in transitivity only around one third of the time (37.5%), differing significantly from the 3-year-olds (66%), whereas the 8-year-old schoolchildren did significantly better than both younger groups (92%); and both younger groups did even better when their responses were rated as *appropriate* though not necessarily morphologically normative changes in transitivity—for example, morphologically acceptable but nonconventional forms, or suitable syntactic recastings of the input sentences—52% among the 2-year-olds, compared with 84% of the 3-year-olds. On the (b) part of the test, when

⁸ I adopt the neutral term *factors* in preference to the theory-dependent use of the term *principles* in psycholinguistics, for example, Slobin's (1985) "operating principles" and Clark's (1983, in press) "acquisitional principles," and particularly the sense given this term in the context of the "principles and parameters" model of current generative linguistics.

required to coin novel items, 2-year-olds were able to produce an appropriate response about one quarter of the time (26%). 3-year-olds were successful 59% of the time, and 8-year-old schoolchildren responded like adults, giving morphologically normative coinages around 70% of the time. That is, children in the latter part of their third year manifest good knowledge of transitivity, by age 3 to 4 they can alternate morphology of input verbs most of the time, and by age 8 they can do so innovatively, much like adults.

The first factor invoked to explain how children move forward from occasional familiar exemplars to rule extraction (i.e., from Phase I to II) is the structural factor of "typological imperative." This underlies the sensitivity that develops in children around 2 to 3 years old regarding what is "relevant" in their language, the realization that certain constructions, or linguistic systems have a favored structural status (Berman, 1986a, 1993b). The recognition in question is the fact that it is un-Hebrew, hence from their point of view nongrammatical in general, to use the same form of a verb in both the contexts [S V] and [S V]. There is no communicative or semantic need to switch verb morphology in order to describe a situation as an intransitive event rather than a transitive action. Word order, case marking, and inflectional agreement markers will generally suffice. But a child must do so in order to be a Hebrew speaker. This exactly corresponds to the claim that gender or number agreement may not be necessary for communicative purposes, but is essential to and pervasive across Hebrew grammar. That is, following the initial rote use of verbs as individual items, extended by lexical learning of pairs of isolated alternations, children's verb usage becomes typologically driven to attend to the Hebrew-particular fact of how transitivity affects the morphological shape of verbs. In other words, typological biases trigger rule learning in the most general sense of recognizing that some general linguistic category requires some kind of formal marking.

3.2.2. Lexical Productivity and Expressive Options. A second factor, interacting with target-language typology, is that of lexical productivity (section 2.3). This concerns a rather different kind of "bias," relating to factors of language use within the frame of typological structure. What I term *rhetorical bias* refers to the expressive options favored by speakers of a language (often at a given time in its history) for formulating certain relations of form and meaning. For instance, the relation of P1 transitive activity and P2 intransitive event verbs (cf. *li-sippox - nisb-pax 'spill'*) and between P1 intransitive activity and P5 causative verbs (*la-reidet - le-borid 'get down'*) are highly "productive" alternations in current Hebrew. Experimental findings confirm this:

Of four types of alternations elicited from 2- and 3-year-old children, those between P1 Intr and P5 Trans and between P1 Trans and P2 Intr and between scored highest, followed by P4 Intr alternating with P3 Trans, and even less for P2 Intr switching with P5 Trans (Berman, 1993b). These contrasts were even more marked on the *innovative* part of the test, where respondents were required to fill lexical gaps by coining verbs of inverse transitivity from lexically established verbs. Here, children age 2, 3, and 8 years as well as adults did significantly better on coining novel causative verbs than on novel change-of-state intransitives. This is because causative predicates lack a periphrastic expressive counterpart in Hebrew, analogous to English *make swim, put to sleep, get to crawl*, whereas achievement predicates *do* have an expressive option with an auxiliary verb *na'asa* or *nihya* 'get, become' and so do reflexive predicates with *self* pronominals.

Both naturalistic data and structured elicitation thus reveal that once children recognize the typologically motivated *structural* demand for switching verb patterns to mark transitivity, once they abandon earlier rote learning in favor of rule-bound assignment of morphological transitivity, the particular *lexical* solutions they seek will be affected by increasing familiarity with the conventional lexicon combined with the impact of currently favored processes for new word formation.

Processes that are more "productive" in the sense applied here aid children in recognizing certain alternations as expressing quite general form-meaning relationships in their language. And the factor of lexical productivity interacts with lexical familiarity and relative frequency of item use as follows: Productivity helps children extract generalizations, and frequency determines to which sets of items these generalizations are first applied. That is, children come to recognize the commonality of such early verbs as P1 *yarad* 'go down' and P5 *leborid* 'take down' on the one hand and P1 *nafal* 'fall' and P5 *lehapil* 'make-fall, drop' on the other; only later will they extend this to more specific, less high frequency verbs such as P1 *avar* 'pass' versus P5 *leba'ar* 'make-pass, convey'; similarly, alternations between P2 intransitive versus P1 transitive verbs will start out with very familiar verbs like those meaning *break, spill, tear*; later they will be extended to less prototypical instances of such alternations, for example, the P2 unaccusative-achievement versions of P1 transitive activity verbs meaning *catch, throw, write*. Semiproductive alternations will also be mastered late, as part of the growing command of convention and the established lexicon.

3.2.3. Grammatical and Lexical Knowledge: Verb Tense versus Verb Transitivity. Initial unanalyzed use of verbs is exactly analogous to what children earlier do with verb tense marking, in Hebrew as

in other languages: To start with, most verb stems occur either in infinitive or imperative, or else either in past- or in present-tense forms—with past tense favored for telic achievement predicates (e.g., *naʕal* 'fell', *našbar* 'broke') and present tense for atelic activities (e.g., *baʕe* 'cry', *yašben* 'sleep'). The earliest verbs to show alternation are the high-frequency, general purpose verbs such as the P1 verb with the root h-l-x 'go' [e.g., children might use both imperative *lex* (*mišpo!*) 'go away from here' and past tense or perfective *abə* (*šəlaʕ*) *avoda* 'Daddy has gone to work'] or the verbs meaning *do*, *make*, and also *put*, *give*, and *take*. And this is followed by well-established command of the relevant distinctions between past, present, and future tense in forms and meanings (Berman & Dromi, 1984).

Yet the analogy between the two systems holds only so far, owing to critical differences between grammatical compared with lexical constraints. As noted, acquisition of morphological marking of transitivity through *binyan* alternations emerges later than verb tense marking, which is typically well established by around age 2;0 to 2;6 (see example 7). Compare, for instance, the sentence in (15a), produced by Smadar at age 2;3, with the required version in (15b).

- (15) a. *Miryam overet [P1] et kol ha-dapim
Miryam passes OM all the-pages
= Miryam goes over all the pages
b. cf. Miryam ma'asira [P5] et kol ha-dapim
Miryam makes-pass OM all the-pages
= Miryam turns (over) all the pages

Example (15a) is ungrammatical because an intransitive verb form is used in a transitive context, but it can be interpreted as exactly what the child meant: She was complaining to her mother that Miryam (her older sister) kept turning the pages of the book, without giving her time to do so herself. Compare this to a hypothetical case where the child might have meant one of the following:

- (15) c. Miryam ta'avor [P1] et yadi
Miryam will-pass by-me
d. Miryam be'asira [P5] et kol ha-dapim
Miryam passed = turned OM all the-pages

Both (15c) and (15d) are grammatically well formed; but if the child had intended to use present tense rather than future with the intransitive verb in (c) or rather than past with the transitive verb in (d), she would

have been violating the temporal semantics of her entire utterance. In principle, children might use other cues for temporal marking of their utterances, such as adverbials like those meaning 'now', 'all the time', or 'the other day'. But in fact Hebrew-speaking children make minimal use of such options (Berman & Neeman, in press), so that the only indication of verb temporality within the simple clause remains verb morphology. Morphological neutralizations of valency distinctions, in contrast, impinge on the categorization of the verb alone, rather than on the semantics of the entire proposition, because this is derivable by other cues to its verb-argument configuration (word order, agreement, case marking).

A related difference between verb tense marking compared with verb transitivity marking is its *obligatoriness*, because grammatical tense has no "expressive options" in the language. Hebrew speakers *must* assign a temporal value to each sentence through verb tense marking, either past, or present, or future, and this value must be consistent with the temporal content of the event described. In contrast, they can select to present the same real-world event from different perspectives, as transitive or intransitive; for example, (15a) could be reworded as intransitive 'all the pages are passing = are turning', just as Hagar could have said the equivalent of 'I fell (because of you)' or 'Why did you push me?' in place of (10b) and (10c). Transitivity marking thus represents a pragmatic, discourse-based choice for speakers, compared with the semantic necessity for specification of verb tense. Besides, as already noted, alternations in transitivity can be expressed by syntactic paraphrase, for example, use of an auxiliary-type verb to yield the equivalent of 'Miriam does so that all the pages turn [turn]', or 'become old' rather than an inchoative verb, or use of pronouns meaning 'self' or 'one another' in place of morphological reflexives or reciprocals. Tense marking has no such options for semantic paraphrase in Hebrew.

A major reason why verb transitivity is acquired later than verb tense marking lies in the difference between lexical compared with grammatical knowledge involved by these two systems. Tense marking applies across the board, to all verbs that meet the syntactic criterion of being members of the major category V. Assignment of *binyan* marking depends on the particular class of lexical items to which a given verb belongs, and so applies less generally across the grammar of the language. As a result, *binyan* assignment can change across time without radically affecting the grammar of the language. But if tense/aspect systems change, the entire typological character of the language is bound to be affected (Givón, 1976). The limited productivity of the *binyan* system, in the sense of its functional nonuniqueness and the structural and semantic gaps and anomalies that it displays (sections 2.1 to 2.3), is a further factor. Com-

mand of *biyan* alternations requires command of a rich and varied vocabulary, before children can attend both to the general properties of the system and the many irregularities it manifests in the established

lexicon.

These factors combine to explain why inflectional morphology is acquired before derivational and why in Hebrew, as in other languages, children generally make little use of derivational morphology for word formation during the period when they are gaining command of the syntax of simple clause structure. Not only do grammatical inflections express quite constant and regular relations—for example, singular versus plural, past versus present tense, first versus second person—even where there is no clear semantic basis (as in Hebrew gender agreement), a given structural process applies broadly across the lexicon. Early avoidance of derivational processes is particularly marked in Hebrew, where word-formation processes nearly all entail affixal morphology. In contrast to English, English-acquiring 2-year-olds take advantage of options such as zero derivation (without affixes) and they also coin words with certain derivational affixes that are morphologically and semantically transparent and do not demand any changes in the shape of the root or stem to which they are added (e.g., *-er* in *jump-er*). Yet in English, as in other languages, the period from around age 3 to 4 emerges as critical in the acquisition of word formation in general, and of verb-transitivity marking in particular (Berman & Clark, 1992; Clark, in press). These facts together explain why the 2-year-old quoted in (152) marks her verb correctly for number, gender, person, and tense, but not for transitivity.

3.3. Acquisitional Strategies

The strategies children employ and the errors they make in acquiring the grammar of transitivity were analyzed in the context of: (a) their responses on the structured elicitation tasks described in the preceding section; (b) examples of unconventional lexical usage from parental reports and diary studies; and (c) longitudinal records of six children from around 1;6 to 3 years. These sources reveal relatively few errors in transitivity marking. Only 10% of the 2-year-olds' responses and 5% of those given by the older children were rated incorrect in transitivity on both the familiar and novel sections of the test described in the preceding section (Berman, 1993b). In conversational contexts, young children appear to avoid the problem of transitivity marking altogether, they typically do not go beyond a prototypical or favored verb-argument configuration for any given verb. For example, they will use P1 *poshev* 'sit' a lot, but have no occasion to use a transitive counterpart, either P3 *yishev* 'sitting' or

P5 causative *masiv* 'seat', they use P1 *zorek* 'throw' often, but will rarely produce a context requiring intransitive P2 *nitzak* 'bc/gct thrown'. As noted, at most they will produce unanalyzed alternations of a few very common verbs.

Initial usage is thus constrained by the immature nonanalytical strategies associated with "pregrammatical" knowledge (section 3.1). Once children move into the grammar of transitivity, they adopt various strategies that reflect how they represent the system. Two main phases were identified in the process. During initial entry into the system, children resort to two kinds of avoidance strategies: Reliance on general purpose verbs like *make*, *do*, or *put* (section 3.4.1); and lexical overextension, yielding "neutralization" errors, where an intransitive verb is misused in a transitive context and vice versa (section 3.4.2). Later, when children have grasped the principle of transitivity marking in their language, but have not yet fully mastered the morpho-lexical alternations that this requires, they rely on different kinds of strategies, mainly syntactic paraphrase or lexical innovations in the form of "creative errors." (section 3.4.3).

3.3.1. Immature Use of General Purpose Verbs. Examples of

this immature strategy were more common among the 2-year-olds than the older children in the transitivity test. For instance, in place of P5 *mit-biba* = transitive 'dress', children said things like *sama lo mixnasayim* 'puts to-him = on-him trousers', *sama alav bagadin* 'puts on him clothes'; or for P3 transitive *mexasa* 'covers' — *sama la mexa* 'puts to-her (a) blanket'; for P5 *ma'axila* 'feed' children said things like *notenet lo le exot* 'gives him to-cat', *notenet lo adaya* 'gives him porridge'; whereas for P2 *nitzbar* 'got broken, broke', one child said *libel make* 'received a hit = got hurt'; or for transitive *metalex* 'dirty'—children said things like *zorek hipot* 'throws peels', *ose litzuk* 'makes = creates dirt'. These are all grammatically well formed, and represent felicitous though juvenile-sounding usages. Use of general purpose motion verbs—for example, *bolex lemata* 'go downwards' for P1 *yored*, *bolexen bolex* 'the dog goes outside' for P5 *mocel* *et bakeren* 'takes-out the dog'—were very rare, showing that by the age of 2;6, Hebrew children are fully attuned to the typology of their language, as one that marks direction of motion lexically, within the verb (Talmy, 1985).

In principle, children could use the general activity verb *la'asot* 'do, make' to express causatives and other agentive activities, even though the Hebrew verb lacks the syntactic status of French *faire* or of English *make* in causative constructions. And it is in fact occasionally used in a way that points to early grasp of the causative notion; for example, when Hagar, age 2;4, is having salve smeared on a rash, she says *yesh li litzuk*

ba-beten. ima osa ixixux kaze 'I've got dirt on my tummy. Mommy's making sort-of dirt' (to which her Mother replies, *ko, ani lo ftxaxxi et ba-beten shel Hagari, ani maraxxi aleba mishxa* 'No, I didn't dirty [P3] Hagari's tummy, I smeared salve on it'). A week or so later, telling her mother a story from *The Jungle Book*, she says *ima ze'eva asta bananot le-Mogli* 'Mommy Wolf made bananas for Mowgli', to which her mother responds with the lexical causative *bi he'exita bananot le-Mogli* 'she fed bananas to Mowgli'. Hagar, age 2;6, complains that *ba-naknik asa H* [P1] *ko'ev* 'the-sausage made-to-me hurt' (cf. *banaknik bix'fu* [P5] li 'hurt'); later in the same session, she pinches her mother, who yells *ay/ouch!*; the child replies *kasi ay le-Hagari* 'make = do "ay" to Hagari', which her mother queries with the P5 transitive verb *leba-x-fu le-Hagari et mit-kavenet?* 'to-hurt (to) Hagari you mean?'. But the very early, and semantically nonspecific activity verb *le'asof* is not commonly used with another predicate to express causation—in children's as in adult Hebrew. This syntactic option is strictly immature, and it is abandoned by children once they acquire the productive means for expressing causativity by verb morphology. That is, the factors of "productivity in use" and of favored expressive options (section 3.2.2) push children to *lexicalize* causatives in Hebrew.

Two-year-olds' limited use of general purpose verbs in place of transfer-of-location or causative verbs reflects a general lack of lexically specific verbs, as one facet of their inability to use morphology for alternating valency. Another such strategy takes the form of overextension of intransitive verbs to syntactically transitive contexts and vice versa.

3.3.2. Early Transitivity Errors: Lexical Neutralizations. Early command of syntactic marking of transitivity was contrasted with use of the high-frequency P1 verb *nafal* 'fall' in example (10) and in the use of intransitive *over* 'pass' in a transitive context in example (15). These occurred not only in well-formed intransitive contexts, but also erroneously, in transitive constructions, in place of P5 *bipil* 'make-fall, drop, push down' and *ma'avar* 'make pass, cause to turn'. Such errors typically occur at a phase when children do not make corresponding errors in marking grammatical verb tense (see section 3.3), but they are nonetheless an early type of error, rare in the speech usage of children beyond ages 3 to 4. These errors, akin to Bowerman's (1974, 1982) causative over-extensions in English, and to what I term *neutralizations* of transitivity distinctions (Berman 1980, 1982b), are of considerable theoretical interest, particularly in Hebrew, which disallows use of the same verb form in both intransitive and transitive contexts, apart from two marginal exceptions (section 2.1). Consider, first, the distribution of such transitivity "misassignments" across the database examined here.

The structured elicitation test yielded relatively few such errors across 32 items—20 requiring established verbs and 12 lexical innovations (Appendix I-1). They accounted for only 5% of total responses from the youngest children, age 2;6 to 3. At least one such error was made by 8 out of the 10 youngest children, compared with only two of the older children (Lital, age 3;7, and Liat, age 7;9), and theirs were all on the innovative part of the test, in the form of intransitive P1 verbs not being changed to novel transitive verbs in a causative context. These findings confirm that neutralizations are an early strategy, at a period when children have not yet recognized the typological imperative for alternating morphology along with syntax to mark transitivity changes. Fully half the errors were, as predicted, overuse of the basic P1, with no switch to causative P5—but these verbs all elicited innovative forms, a task that is in general beyond the abilities of children younger than 3. More errors were made by overextending intransitive to transitive contexts, seeming to confirm Bowerman's (1974, 1982) claims for English. The only exceptions were from a single child (Yasmin, 3;0) who used P3 transitives in place of P4; *ba-kadir megatze!* 'the ball rolls + Trans', *ze megabec levad* 'it irons alone = by itself'. Finally, on both this test and an earlier pilot study, children extended P4 *biphal* verbs to transitive contexts with object marking *et* far more than with P2 *nif'al* forms.

Parental observations and longitudinal samples of spontaneous speech show identical patterns (Appendix I-2). Neutralization errors were made at least once by around 20 different children; over two thirds were intransitive verbs used in transitive contexts; well over half were neutralizations to P1; and direct objects case marked by *et* occurred far more often with intransitive verbs in P4 than in P2. These findings indicate a phenomenon that is sporadic and yet consistent, occasional and yet robust, across different elicitation settings and different children. The claim that 2- and 3-year-old children, in the period of early grammatical development, do not know how to alternate the transitivity value of the verbs they use seems strongly corroborated.

But how can these errors be explained? They are remarkable because, unlike the case for the analogous English errors documented by Bowerman, Hebrew grammar prohibits the same verb form from being used with both intransitive and transitive syntax. This means that Hebrew-acquiring children have no "positive evidence" for overextending the transitivity value of verbs.⁹ Bowerman's (1978, 1982) account of this phenomenon

⁹An analogous problem was encountered by Gergely (1989) in Hungarian. His daughter sometimes omitted a required causative suffix, using intransitive verbs in a causative context. He explained this by a two-phase processing model: Children start out by using bare stems, by means of "affix-stripping," and later they realize affix attachment must be assigned whenever a verb is used causatively. Such a strategy also characterizes how some

in English as overgeneralization of a rule that applies to part of the verbs in the target language might be upheld in one of two ways. It could be argued that children do have positive evidence, from the two small classes of Hebrew verbs that allow the same form both in causative and inchoative adjective-based verbs, both in transitive and unaccusative process verbs (section 2.1). This must be rejected, because the P5 inchoative forms of adjectives meaning *become red*, *healthy*, *ripe*, *white*, are not found in 2-year-old Hebrew input or output, whereas the P5 verbs meaning *start* or *continue* typically occur with agent subjects but no surface object, for example, in sentences like "No, I won't begin," "You can go on." So it seems unlikely that children's overgeneralizations derive from these marginal exceptions to the rule that the same verb cannot occur with both transitive and intransitive syntax in Hebrew. A more motivated alternative relates to the special status of verbs in the P1 pattern, described as having a privileged status: it has the highest frequency of occurrence across child and adult Hebrew, it alone is made up equally of verbs that are canonically transitive and intransitive, and it is semantically most "basic" or nonderived (section 2.3.1). All neutralization errors in Hebrew would then take the form of P1: intransitive P1 verbs used in place of causative P5 verbs, and/or transitive P1 verbs used in place of change-of-state P2 verbs. However, overextensions of P1 verbs account for only around half the examples listed in Appendix 1. And the fact that different children do sometimes use the intransitive P4 and P2 patterns with a direct object still needs accounting for. Thus the nature of endstate Hebrew cannot account for these errors as overgeneralizations from input data.

Other solutions have since been proposed to account for these phenomena: Pinker (1989) suggested that children may initially assign erroneous argument structure to the verbs they learn, whereas Braine (1988; Braine, Brody, Fisch, & Weisberger, 1990) argued that new verbs are acquired with a default argument structure, so that initially, their lexicon lacks any specific argument structure. My explanation is rather different. Initially, children acquire verbs with one specific argument structure (unlike Braine), and that argument structure is correct for that verb (unlike Pinker). The overextension errors they make in a language like Hebrew are due to lack of a relevant linguistic generalization: Use of a verb in a different argument structure than the one in which it is acquired demands a morphological operation on the form of the verb. This

children first conceive Hebrew verb morphology, because their earliest verbs may take the form of (no next tense) free stems stripped down from the exhaustive infinitive or imperative forms with prefixes. But this is relevant to the acquisition of Hebrew *inflectional* morphology. Because this takes place much earlier, well before age 2, perceptual difficulties may indeed play a major role in early verb constraints and omission of obligatory affixal inflections.

knowledge builds up as follows: (a) Each verb has a single argument structure. (b) A single verb form can be used with more than one argument structure. (c) When the initial argument structure of (a) is changed, the verb form must change. The precise synchronization and integration of knowledge components (b) and (c) will determine for individual children and individual verbs how often, if at all, the syntactic knowledge of (b) is applied without the language-particular morphological constraint of (c). Finally, knowledge-component (c) needs to be further constrained by (d) the principle of lexical productivity and (e) learning of lexical idiosyncrasies. The strategies deployed in moving across these phases are next reviewed.

3.3.3. Creative Errors and Other Later Strategies. What strategies are adopted by children once they proceed beyond the knowledge previously defined in (b), that verbs can be used with more than a single argument structure? To answer this question, different kinds of later, "creative" errors documented in earlier work on acquisition of Hebrew verb morphology (Berman, 1980, 1982; Berman & Sagl, 1981) were extended to include the following categories: *Periphrastic syntactic* means may replace verb morphology; *lexical mismatches* arise through *pattern mixing*, nonconventional use of P2 or P4 for intransitives, and of P3 or P5 for transitives; *semantic overmarking* operates on P1 verbs to express inchoativity by P2 or P4 and causativity by P5; and *lexical innovation* serves to fill genuine gaps in the established lexicon.

Hebrew has two main ways of marking transitivity distinctions: *bi-nyan* verb morphology and syntactic periphrasis. It transpires that children prefer the *first* option almost universally. The three main classes of intransitive predicates all have productive syntactic means of expression: reflexives by 'self' pronouns (e.g., *acmi* 'myself', *acmo* 'himself'); reciprocals by 'each other' pronouns (e.g., colloquial *exad et ba-sbeni* 'one OM the-other'); and *inchoatives* by an auxiliary verb meaning 'become': *nibya*, the P2 form of the verb for 'be' or *na'asa*, the P2 form of 'make, do'. Detailed analysis of these constructions in children's Hebrew is beyond the present study. But there is evidence that children use reflexive pronouns from age 3; for instance, on the structured test described earlier, one child aged 3;0 said *meqalget et acmo* 'is-rolling OM himself' in place of expected P4 *meqalget*, and another age 3;9 said *mesareket et acma* 'is-combing + Fem OM herself' in place of P4 *mistaraket*. These children are clearly beyond step (b), although they avoid verb morphology in these examples. A rather different picture emerges for syntactic constructions expressing reciprocals and inchoatives. I do not recall a single use of a reciprocal pronoun in all our extensive database; but there are several examples of morphological expression of reciprocity among

older children who overextend P4 to express this notion, for example, a boy age 4;3 says *hayeladim kaza miltaxamim ba-gan* 'the kids kind of fight at school', in place of conventional P1 *loxamin* or P2 *nixamin*; a girl of 5;1 says *ani lo ohevot ube mitravim kol bazman* 'I don't like (it) that (people) quarrel all the time (cf. established P1 *ravim*); and a 6-year-old describes a game by saying *ba-yetdot mitpagschim be'emca* 'the pegs meet in the middle' (cf. established P2 *nifgashim*). Similarly, to express inchoatives, preschool children rarely, if ever, use the auxiliary verbs meaning *become*; they do innovate inchoatives morphologically with P4, as in the following examples from different children age 3½ to 6: *bitrazet* 'you got thin' from 'thin' *raza*, *bitkatim* 'got-stained' from *kétem* 'a stain', *bit'avek* 'got-dusty' from *avak* the noun 'dust', *bitparat* 'I got (my hair) untidy' from *parua* 'untidy', *mitxasber* 'getting dark' from *xosber* 'dark' (cf. established P4 *bizdaken* 'grow old', *bit'ayef* 'get tired', *bitragez* 'get angry').

Children's "creative errors" in extending predicates to different syntactic contexts thus favor *binyan* morphology for marking reciprocity and inchoativeness. Reflexives alone alternate with the fully productive set of *self* pronouns, specified by Condition A of government and binding theory (Chien & Wexler, 1989; Kaye, 1990). In Hebrew, these reflexive pronouns apply across the board, beyond the restricted set of syntactic accusatives and of semantic-bodily activities such as washing, dressing, or drying oneself. In expressing reciprocals and inchoatives, by contrast, children prefer verb morphology by P4, both in normative and unconventional extensions.

An earlier study noted the importance of lexical mismatches in the form of "pattern mixing" (Berman, 1980), as evidence that once children recognize that morphological changes are required—that is, they reach step (c)—they may select the wrong pattern for a given verb, but this will not cross the bounds of transitivity. Instead, P2 and P4 forms will be reserved for intransitive predicates, and P3 and P5 for transitives (section 2.1). We recorded about 40 such P2/P4 intransitive switchings. For example, Daniel (3;5) uses P2 *niktat* for P4 *bitkalef* 'peel off', and Ran (5;0) uses P2 *hexlaf* for *mitkalef* 'change, switch places'; whereas Nir (3;9) uses P4 *mitxankim* for P2 *netxanim* = Intr. 'suffocate' and Sival (4;1) uses P4 *bit'alev* for P2 *ne'elav* 'be-offended'. As for the even commoner P3/P5 transitives, Asaf (3;10) says P3 *xibeti* for P5 *hexbeti* 'hid (something)', Anat (5;10) says P3 *mesaba* 'at for P5 *masbi'a* 'satisfy = fill up with food', Ginat (4;6) says P5 *bigdalti* for P3 *gidalti* 'raise, grow', and Shelly (4;8) says P5 *bitcifu* for P3 *cofsu* 'they-crowded'. Similarly, the syntactically productive passive participle resultant endstate forms alternate between the P1-derived CaCuC pattern and the P3-derived meCuCaC pattern, for example, Nir (3;7) uses *kamat* for *mekumat* 'crushed'. Ido (5;0) says

mechba for *cavua* 'colored' (see, further, section 4.2). These errors manifest grammatical rule-bound knowledge, earlier defined as operating prior to command of lexical convention. And they support the claim that the factor of productivity precedes that of convention in the acquisition of word formation in general (Clark & Berman, 1984).

At this phase, a rather different strategy is revealed by semantic overextension, in the form of overmarking of P1. Children turn P1 intransitives into nonoccurrent P2 forms to express inchoativity; or they turn P1 transitives into nonoccurrent P5 forms to express causativity. For example, the highly precocious 2-year-old Smadr describes entry into a state of pain by P2 *nik-av* 'got-hurt' (cf. P1 *ko'ev* 'be-hurt'), Sivan (3;7) uses P2 *nifxadeti* for 'get-scared' (cf. P1 *parxadeti* 'be-scared'), Rama (4;6) says that her achi P2 *ne'avar* 'passed, got-over' versus P1 *avar* 'be-over'. These children clearly distinguish between entering into and being in state, and they use unconventional verb morphology to mark this. Other instances of innovative P2 forms where the only conventional intransitive verb is in P1 show that children reject the basic P1 as a means of expressing unaccusative change-of-state predicates (noted as very rare in this form in Hebrew)—for example, Avik (5;2) *nimbal* for P1 *naval* 'faded, got faded' (of a flower that had withered), Anat (4;6) says the boy *nigdai* 'got-big' for P1 *gadal* 'grew', Ron (5;3) *nikepe'u* for *kafu* 'froze = became frozen', and the same child also innovated P2 *nitatan* 'got smaller, shrank', cf. *katan* 'small'.

A similar pattern is revealed when children change P1 transitive verbs to P5 to express high transitivity, even though these forms are syntactically unmotivated, because they fail to alter the surface verb-argument configuration. Thus, a 4-year-old girl demonstrating how she is turning her cardboard crown around to show the gold-painted side says *tir'ei ani mabastaxa et ba-keter* 'look how I am-making-invert [P5] OM the crown' (cf. conventional [P1] *bofexet*); a 5-year-old boy brags he can unlace his shoes by himself, saying *ani yaxol levat le-baxetic et ba-na'atayim* 'I can alone make-take-off [P5] my shoes' rather than established P1 *ta-xolac* and when Hagar is 4;1, her mother tells her not to stifle her baby sister with P1 *al tarneket et ba-ttoket*, to which she replies *ani lo marnikta ota* 'I'm not stifling [P5] her' (cf. P1 *roneket*). There are other examples: Hagar (4;0) P5 *masbixta* for P1 *shofexet* = Trans 'spill', Asaf (3;7) *nam-xik* for *moxek* 'erase', Rama (3;5) *madxifa* for *doxefet* 'push', Yael (3;4) *bitritax* for *marax* 'smear, spread', Ginat (4;5) *masrif* for *soref* Trans 'burn'.

In modifying the basic, high-frequency P1 pattern, children are guided by productivity in current lexical usage and new word formation: P2 rather than intransitive P1 functions to express semantic change-of-states, and P5 rather than transitive P1 to mark an activity as highly agentive and causative in content. Children's construal of P5 as *the* means par-

excellence for expressing causativity is supported in several ways. First, they quite often use P5 for lexically missing causatives and so fill accidental lexical gaps by spontaneous coinages, for example, *mesbin* (normative *mosbin*) from P1 *yashen* 'sleep', *maxxe* from P1 *soxe* 'swim', *maxxik* from P1 *xorek* 'creak'. Second, they almost never use available optims for syntactic periphrasis with verbs meaning *make* or *cause*. And, third, on the structured elicitation task described earlier, they did much better on coining novel causatives than in producing other innovative forms. However, children's overextensions from P1 transitives to P5 causatives violate what was defined earlier as canonic, productive causative formation in current Hebrew: by P5 applied to P1 intransitive activity verbs and stative adjectives. The fact that children go beyond this to causativize P1 transitive-activity verbs could be symptomatic of a more general process of *language change* now under way in Hebrew. There is a tendency to extend P1 transitive verbs to P5 in colloquial usage (e.g., novel P5 *le-bakke* 'to make someone feel under pressure, put under pressure' versus P1 *le-bak* 'to press [on]'), *le-ba'azru* 'cause to leave, fire' from *la'azov* 'leave'), as well as in specialized contexts (e.g., *le-bashtit* 'implant' from *le-shbot* 'to plant', *le-besbigt* 'to-launch' from P3 *le-shager* 'send-off'). Moreover, colloquial usage avoids the classical morphological identification of P5 for both intransitive inchoatives and transitive causatives akin to English *boycott*, *blacken*, *ripen* (section 2.1). Although children's nonnormative usages will not *cause* change in language, their more sophisticated, knowledge-based "creative" errors are indicative of quite general directions of ongoing processes of change.

In sum, the nonfelicitous immature errors as well as more creative later errors reviewed here support the developmentally constructionist view underlying this study. In learning how transitivity distinctions are marked in Hebrew, as in acquiring other systems of the grammar, children do not proceed from zero to endstate knowledge, from entry to exit in one single jump. They acquire partial, piecemeal knowledge, extended through varied strategies. The errors they make are evidence of reorganizations and reconstructions en route from initial to full mastery.

4. DISCUSSION: IN DEFENSE OF DEVELOPMENT¹⁰

An important criterion of language acquisition theory is how it explains the child's task in distinguishing between general and particular knowledge: general in the sense of common to all input languages com-

¹⁰The phrase "in defense of development" is the title of my commentary to Crain's article "Language Acquisition in the Absence of Experience" (Berman, 1991).

pared with the particular native tongue, on the one hand, and of rule bound and regular compared with idiosyncratic, on the other. I suggest that from the phase of early grammar, children become increasingly sensitive to the typological bias of their particular native tongue, which pushes them to recognize that Hebrew verb morphology is relevant to verb-argument configurations. However, they do not acquire this system in toto, by a one-step jump into full, endstate knowledge. As in other areas of the grammar, no knowledge gives way to partial knowledge, which is then extended and reorganized to encompass major and minor regularities (e.g., particular directions of *bitivim* changes), and these in turn are constrained by detailed knowledge of particular subsystems and idiosyncratic groups of items.

Certain assumptions about the development of linguistic knowledge guide the following discussion of continuity (section 4.1), speed (section 4.2), and order (section 4.3) of development in this analysis. The same "operating principles" and processing explanations (Slobin, 1985), the same "acquisitional principles" (Clark, 1983, in press), and the same developmental factors (section 3.2) impinge both on how children move into new knowledge and how this knowledge changes and gets reorganized across time. However, such factors do *not* apply equally across the board by invariant, age-related stages, as within a Piagetian constructionist view; rather, they interact with developmental phases that recur at different periods of time in relation to different subdomains of linguistic (and other) knowledge (Karmiloff-Smith, 1986). Structurally equivalent linguistic subdomains do not emerge at the same time in all languages, as in a maturationalist view of acquisition (Borer, 1991; Borer & Wexler, 1987); rather, acquisition of specific subdomains is affected by how these factors interact in the development of specific target languages (section 4.3).

4.1. Continuity in Development: Universal versus Particular

My analysis was based on the assumption that linguistic universals are accessible to children from the outset: Children do not need to learn that there are different semantic classes of predicates, that predicates can have one or more arguments, or that different types of propositions will entail different configurations of verb-argument relations. They do have to learn how these distinctions are specified in the surface morphosyntax of their native language. Such language-particular knowledge includes: (a) the subcategorization constraints that apply to specific verbs and verb classes—an issue not considered in the present context; for instance, in Hebrew the verb *use* governs an instrumental case-marking preposition,

and the verb *want* can take an infinitival and a *that* complementizer (for English, see Fisher, L. Gleitman, & H. Gleitman, 1991, and for Japanese, Rispoli, 1991); (b) the system of case marking, by bound inflections, positions, and so on, and how these markers are distributed in realizing predicate-argument relations; (c) possible correlates between predicate semantics, such as activity versus achievement and morphosyntactic realizations; and (d) the focus of this study: morphological correlates of different values for syntactic transitivity.

An earlier finding for which new evidence was marshaled in this study relates to this last issue, the occurrence of morphological "neutralizations" of the obligatory change in morphological form with a change in transitivity (section 3.3.2). Any account of acquisition must contend with children's espousal of rules, or of constructions, not available in the input (see, for examples, Borer's, 1991, study of Italian children's marking of participle agreement on the object of verbs that take *have* as well as those taking *be*). This issue can be accommodated within the general model I have proposed for language development as proceeding from pregrammatical to structure bound and on to conventions of language use (section 3.1). Early verb use of Hebrew-speaking children is definable as "pregrammatical": It does not violate universal constraints, because there are languages in which syntactic configurations suffice to indicate a change in transitivity values (e.g., the *break, change, or open* class of verbs in English); it does, however, violate the grammar of the input language, Hebrew. But this is exactly what one might predict, because the principle of *binyan* pattern alternation needs to be *learned*; it is simply not available to children at the pregrammatical phase of acquisition of language-particular markings of transitivity distinctions. This set of claims is consistent with what has been termed the "weak continuity" hypothesis: Early Hebrew, like early Italian or English, conforms with universal constraints on possible form-meaning matchings in natural languages, but not with all the particular manifestations of these relations in a given target-language.

4.2. Rate of Acquisition: The Developmental Paradox

The developmental thrust of this discussion follows from the assumption that in language as in other areas children do not proceed in a single jump from initial to endstate knowledge. This is shown by the different strategies and distinct types of unconventional, non-endstate usages of children at different phases in the development of *binyan* transitivity marking (section 3.3). The "developmental paradox" is that the rate of this development is both very rapid and long drawnout. Rapidity is demonstrated, for instance, by the brief duration of only a few months

characterizing the stepwise developments sketched for acquisition of the grammatical relations of subject and object in examples (7) and (8) (section 1.2). Yet elsewhere I argue that such knowledge, too, is only partial, often confined to the domain of the simple clause. For instance, the knowledge that null subjects in Hebrew can occur in the syntactically inadmissible contexts of third person and present tense across strings of clauses, when discourse motivated by the need for topic elision, emerges much later than age 3, and is not fully commanded even by school-age children (Berman, 1990a).

Work in progress on the development of diverse structural domains (e.g., tense-aspect systems, relative clauses, and clause linkage) in narrative texts elicited from children at different ages in five different languages reveals the selfsame paradox (Berman & Slobin, in press). Three-year-olds may manifest near-complete mastery of the structural devices available to their native tongue. But they use them in very restricted contexts, from a syntactic and semantic as well as from a discourse-point of view. For example, English *-ing* participles are used first without and later with auxiliary *be* as a default present tense, only later with *be* as a relative tense in past progressive or without *be* in complement constructions, even later as a major means of expressing attendant circumstances through nonfinite modifying clauses. That is, initial acquisition of this construction and errors in its grammatical form are shortlived, yet its full developmental path is staggered across different interrelated subsystems, across a long period of time. Acquiring command of Hebrew verb morphology, too, is both an early and a lengthy process, dependent on a complex interaction of the developmental factors delineated earlier.

4.3. Order of Emergence: Language Structure and Language Use

I have suggested that a "typological imperative" motivates Hebrew-acquiring children to recognize that they must mark the transitivity value of predicates by means of *binyan* morphology. I also argued that this knowledge emerges later than the highly pervasive or structurally "weighty" inflectional markings of subject-verb agreement, and of verb-tense inflections. The relatively later acquisition of *binyan* transitivity was explained as due to the more central structural status of inflectional compared with derivational morphology, of (simple-clause) grammar compared with lexicon. This is confirmed by research based on naturalistic data and structured elicitations showing that *binyan* verb morphology emerges at much the same time as *other* processes of Hebrew word formation. The age of 3 to 4 also proves to be critical for derivation of: (a) innovative nouns from familiar verbs (Clark & Berman, 1984);

(b) innovative denominal verbs from familiar nouns and adjectives (Berman, 1989); and (c) adjectival passives marking resultant endstates from familiar verbs in different transitive *binyan* patterns (Berman & Clark, 1992). Two-year-olds typically make errors in these areas, or else they avoid such formations altogether; from around age 3, children apply appropriate morphological modifications much of the time; 4- to 5-year-olds show good command of the structural properties of such alternations; and by early school-age, children conform increasingly to conventions of the established lexicon.

In marked contrast to these processes of word formation, three other areas of Hebrew morphology constitute much later developments: (d) noun compounds derived from the combination of two simplex nouns; (e) abstract verb-derived nominals based on the *binyan* distinctions; and (f) syntactic passives, derived from the finite forms of the three transitive *binyan* patterns (sections 2.2, 2.3.2). The later emergence of these constructions is explained in large part by the factor of "rhetorical bias," in the sense of the structural options preferred by speakers out of those available in their language in order to express different form-meaning relations and discourse functions. The idea of "rhetorical bias" is closely allied to the factor of relative productivity in current usage, as defined for new verb formation (section 3.2.2). It explains why it takes longer for children to acquire certain constructions that appear equally available for expressing the same semantic content.

Consider, first, the relatively late emergence of noun compounds in Hebrew. The morphological operations demanded by these constructions are in principle accessible to Hebrew-acquiring children from the rich bound morphology of the inflectional systems they master by age 3. And syntactically compounds are straightforward, because they follow the head-initial order of all noun-plus-modifier expressions in Hebrew (compare the compound noun-noun string *staxat telefon* 'conversation-telephone = phone conversation' with the noun-adjective string *telefonti* 'telephonic conversation', or the noun-demonstrative string *staxat* 'this conversation', *staxa shel* 'my conversation'). Nonetheless, children avoid these constructions until well beyond age 4, in contrast to their English-speaking peers (Clark & Berman, 1984). The reason lies in language usage rather than linguistic form. Colloquial Hebrew, which forms the input and output for children's acquisition, possesses other, equally productive alternatives for expressing noun-noun relations, using the genitive particle *shef* for possession of other prepositions for relations of containment, partitivity, and so on (Berman, 1987a). Compounding as a "productive" syntactic means for combining nouns is restricted to more normative literary usage and to formal expository style, of the kind largely irrelevant to children's construals of the language. And as a means for new

noun formation, children like adults consistently prefer the morphological device of affixation to a consonantal root or bound stem rather than by juxtaposing two nouns as is common in Germanic languages.

An even later acquisition are action nominals, which correspond to both gerundive *breaking* and derived *breakage*, both *arriving* and *arrival* in English. Children age 5 and 7 years often appeared to understand sentences with these constructions, but they produced them in fewer than one third of the elicitation contexts, compared with 9-year-olds and 11-year-old sixth-graders, who gave 70% and 93% correct responses (Mayroz, 1988). In terms of form, these nominals are constructed by a quite regular set of derivational processes relating to the *binyan* membership of their source verbs. Yet they are consistently avoided by children, who can and do use other devices to express the same ideas: finite clauses subordinated by the Hebrew *that* formative; nonfinite infinitivals; or prepositional phrases. These latter options are more analytically transparent than the corresponding nominalizations (compare *hu shavar* 'he broke' vs. *shvatat-o* 'breaking-his', *hem big'u* 'they arrived + PL vs. *bigat-am* 'arrival-their'); and they are typically preferred in everyday spoken Hebrew, the input language most relevant to children well on through school-age.

The third, most pertinent, example is the avoidance of verbal or syntactic passives by Hebrew-speaking children, in contrast to the early acquisition of corresponding constructions in Sesotho (Demuth, 1988) or Quiche Mayan (Pye & Poz, 1988). Hebrew passive formation is structurally almost entirely productive for verbs that are semantically active, and that syntactically govern accusative case. And it is morphologically productive through the *binyan* system: P1 verbs like those for *give*, *push*, *steal* change to P2; P3 verbs change to the passive *pu'al* pattern (e.g., *hakar* 'was-mended', *ye-hufar* 'will-be-burtoned'); and P5 change to their passive *bofal* counterpart (e.g., *buram* 'was lifted', *yu-kal* 'will-be-recorded'). But in current Hebrew, syntactic passives occur mainly in the expository style of academic discourse and more formal media usage. Not only are syntactic passives relatively rare in colloquial Hebrew, it is hard to elicit them from young children by experimental procedures. Second-graders, age 7 to 8, gave passive-form responses to follow-up questions asking "What happened . . . ?" less than one third of the time, compared with around two thirds such answers from seventh-graders (age 13- to 14), and 75% from adults (Shani, 1990). And on a sentence-completion task, toward the end of first grade (age 6;8 to 7;6) children avoided using the *pu'al* and *bofal* passive *binyan* forms almost entirely, compared with extensive use of these forms by both 12-year-old sixth-graders and adults: Total passive forms provided in obligatory contexts came to 97% of the responses from older children and adults, as against only 14% from-

6-year-olds, and nearly all of the latter were in the *nifal* P2 form, and not in the two strictly passive binyanim (Kenan, Nirpaz, & Dekel, 1988). This cannot be attributed to avoidance of *binyan* alternations, because on the same test, the 6-year-olds produced *causative* P5 *hifil* verbs as required in 65% of their responses (12-year-olds and adults provided causatives to the same high extent as passives, in almost all obligatory contexts). Nor is this avoidance due to formal difficulty of morphological patterns with the uniquely passive-marking [u]element. As noted, children use passive [u]-marked participles (e.g., P1 *shavur* 'broken', P3 *metukan* 'fixed', P5 *muram* 'raised, heightened') in adjectival or lexical passive forms, to express the notion of resultant endstate, from an early age (around half the required responses from 3-year-olds and nearly 70% from 5-year-olds; Berman & Clark, 1992). Rather, passives are *marked* constructions in Hebrew, not only in morphosyntactic terms, but also in terms of rhetorical-bias and usage preferences. Again, Hebrew speakers have several *alternative* ways of achieving the pragmatic discourse functions typical of passives: downgrading of the agent and topicalized focusing on the patient-undergoer element. One such option, common in Hebrew 2-year-old input and output, are subjectless impersonal constructions with third-person plural verbs (e.g., impersonal *lakexu ot* 'took + PL me' = 'I got-taken' versus passive *nifkax-uf*). Speakers can also use dative-affectee constructions for agency downgrading (section 1.2); and patient or undergoer thematic roles can be focused on by simple fronting operations or by use of middle-voice achievement predicates in P2 or P4. These options, favored in colloquial Hebrew, are accessible in both the input and output of 2- and 3-year-olds. It is not surprising, then, that they forego passive constructions well on through school-age.

The developmental route sketched here involves two complementary facets of the form/function relationship in language acquisition. Order of development across time (as with the English *-ing* forms in the preceding section) is determined by the development of more functions for a single form. Order of emergence (this section) is determined by the development of new forms for a particular function.

4.4. The Developmental-Challenge: A Confluence of Cues

What emerges is that generalizations concerning order of acquisition will be typologically constrained by the particular target language from two points-of-view: structural and rhetorical. Certain construction types may emerge early or late in different languages depending on their typological "weight" in that language—for example, early emergence of lexicalized causatives and resultatives compared with verbal passives in Hebrew,

and early emergence of passives in Sesotho and Quiche Mayan compared with English or Hebrew; perfect aspect in American versus British English (Slobin, 1987) and nominalizations or relative clauses in Turkish compared with European or Semitic languages (Slobin, 1988, 1991).

There is obviously a close correlation between frequency of input occurrence and both rate and order of language acquisition and language development. But input frequency alone does not explain children's *selectivity*. After all, young children do encounter instances of other usages, including Hebrew compound nouns, nominalized forms, and syntactic passives, as well as VS word order. Children from middle-class backgrounds, like those who provided the database for our studies, have considerable exposure to the rather formal and archaic style of much children's literature from as early as age 2. Rather, as Slobin (1987) pointed out, "frequency reflects function," in the sense that children are sensitive to the preferred options for expressing particular semantic content and discourse functions from an early age. The fact that certain forms are favored in everyday usage defines the particular dialect to which children are initially peculiarly attuned, prior to the addition of more specialized varieties, such as narrative or academic discourse. The latter are critically affected by factors such as linguistic convention, literacy, and formal study, and they are thus particularly suited to school-age acquisition and usage.

Finally, this chapter has noted several factors involved in the multiple bootstrapping at emergence, and confluence of cues in development, of verb transitivity in Hebrew. The challenge for a theory of language development is to articulate precisely how these and other factors interact with one another, in relation to different subsystems of different target languages. This can be illustrated by a topic relevant to acquisition of transitivity distinctions, not as yet analyzed for Hebrew (or, as far as I know, for other languages): What constitutes a "basic form"? The question is still open as to which form of a given predicate children initially prefer, transitive or intransitive, activity or achievement. Nor is it clear what motivates the choice of early verbs from these points of view. Different explanations might be sought which, in keeping with the general thrust of this chapter, I would consider to be interactive rather than mutually exclusive. Relevant factors might include: (a) formal morphophonological simplicity, although this tends to account more for accuracy rather than extent of production (Clark & Berman, 1987); (b) input frequency, which as noted is at best a partial explanation, because some motivation must exist for why some forms are more common in input than others; and adults probably use alternating forms of the same verbs from the time children are very young; (c) the pragmatics of "prototypical activity scenes" (Slobin, 1985), such that certain situations are basically viewed

and hence described in early child language input and output as change-of-state events, and so would initially favor P2 or P4 intransitive predicates, whereas others might be prototypically actor-activity-type events, favoring P1 intransitive or P3 intransitive activity verbs with animate subjects; whereas (d) the impact of discourse constraints, such as appropriate alternating of perspectives on a given scene, may constitute a later development in general (Berman, 1993a).

This chapter has aimed at pointing to some directions that might profitably be pursued in the interests of formulating an integrative theory of both the emergence and development of knowledge, of both linguistic structure and language use. Attempts to isolate out one specific variable of the many involved in such a task may provide strongly predictive theories. But they run the risk of not accounting for many of the facts.

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APPENDIX

EXAMPLES OF "NEUTRALIZATION" = TRANSITIVITY MISASSIGNMENTS

(1) STRUCTURED ELICITATION TEST (Berman, 1993b)

P1 Intransitive *ipv* P3: *ipov* = in place of:

1. <i>aba soxe oto</i>	- Daddy swims him	[Guy 2:6]	- NOVEL
2. <i>soxe oto</i>	- swims him	[Moran 2:7]	- NOVEL
3. <i>soxe et bayam</i>	- swims OM the sea	[Rokem 2:7]	- NOVEL
4. <i>aba colot oto</i>	- Daddy dives him	[Guy 2:6]	- NOVEL
5. <i>aba colot oto</i>	- Daddy dives him	[Yasmin 3:6]	- NOVEL
6. <i>aba colot oto</i>	- Daddy dives him	[Liat 3:7]	- NOVEL
7. <i>colot et bayeled</i>	- dives OM the boy	[Liat 7:9]	- NOVEL
8. <i>zaxlet oto</i>	- crawls + fem him	[Rokem 2:7]	- NOVEL
9. <i>zaxlet et bayeled</i>	- crawls OM the boy	[Liat 7:9]	- NOVEL
10. <i>yosbener et bayelod</i>	- sleeps OM the baby	[Liat, 7:9]	- NOVEL
P4 Intransitive <i>ipov</i> P3			
11. <i>miftovev oto</i>	- turns - itself him	[Hila 2:9]	
12. <i>miftovevet oto</i>	- washes + herself him	[Hila 2:9]	
13. <i>miftovevet oto</i>	- washes + herself him	[Moran 3:6]	
14. <i>mifpoce et bayelod</i>	- busses - fem OM the balloon	[Moran 3:6]	
15. <i>aba mifgabeb et bayeled</i>	- Daddy slides - Intr OM the boy	[Lita 2:6]	- NOVEL

(Continued)

APPENDIX
(Continued)P2 Intransitive *ipv* P1

16. *nitabar et ba'ac* - got-broken OM the tree [Hila 2:9]
 17. *mibpax et bakaze* - got-spilt OM that thing [Mazan 3:0]
- P3 Transitive *ipv* P4:
18. *bakadar megrigel* - the ball rolls + Trans. [Yasmin 3:0]
 19. *ze megabec fevad* - it itons alone = by itself [Yasmin 3:0]

(2) SPONTANEOUS SPEECH DATABASE—DIARY RECORDS AND LONGITUDINAL SAMPLES:

3) INTRANSITIVE FORMS [P1] USED IN PLACE OF REQUIRED TRANSITIVE [P3]

3.1 P1 Intr. Usually Intransitive Activity) *ipv* P5 Causative:

1. *151 - Miryam operet et kol hadaplun - cf. *mal'azira* [Smadar 2:3]
 2. *199 - ani reket ota et hasofer. - cf. *ma'ala* [Roni 3:0]
 3. *200 - hem yarzu et ze krav. - cf. *borida* [Asaf 3:0]
 4. *208 - im matay kvar ya'axla otl - cf. *ya'axla* [Asaf 3:3]
 5. *214 - efbax *kefkanes* kan bubol. - cf. *lebasim* [Asaf 3:3]
 6. *225 - aba yitbasu li pilama. - cf. *yaibib* [Amiram 2:10]
 7. *203 - at takum ot. - cf. *tebim* [Nir 4:6]
 8. *173 - ima, tin'ot ot. - cf. *tan'it* [Hagar 2:8]
 9. *176 - ani esber oto. - cf. *osib* [Hagar 2:8]
 10. *403 - ima teber oto. - cf. *teber* [Hagar 2:9]
 11. *174 - at nofer ot kaza. - cf. *mapila* [Hagar 2:8]
 12. *505 - hu nafal oto. - cf. *bipil* [Hagar 2:8]
 13. *405 - ima kaza nafal otl - cf. *bipar* [Hagar 2:9]
 14. *406 - aba fevad otl. - cf. *torid* [Hagar 2:9]
 15. *407 - sazari ota. - cf. *bizarri* [Hagar 2:9]
 16. *447 - ra'it et bacayurim le aba - cf. *ber'et* [Shelly 2:7]
 17. *510 - er'e lax mash'chta, tov? - cf. *ar'e* [Shelly 2:8]
 18. *448 - Lidya, ima oxlet ot hayom - cf. *ma'axla* [Shelly 2:6]
 19. *911 - she aba yozat ot axabay - cf. *ya'axel* [Shelly 2:10]
 20. *449 - ima, *zaxel* li et bakise - cf. *zaxel* [Zavit 3:2]
 21. *509 - ani epol oxax. - cf. *epil* [Leor 2:9]
 22. *217 - sazari et bacaxax shelax. - cf. *karzi* [Ginat 4:7]
 23. *229 - yozat ot [sic] - cf. *berzari et acim* [Ginat 4:7]

**Hagar 2:10-2:11: Gives no evidence of either this type of misassignment or of productive causatives, uses P5 verbs *lebar* 'bring', *lebasita* 'light', *lebar'ot* 'show', which have intransitive alternants, also *lebazamin* 'invite', Hagar age 3:3 has more P5 verbs, e.g., *lebarin*, *lebarin*, and very advanced syntax, but shows no evidence of productive causatives.

3.2 P2 Intr. (Unaccusative) *ipv* P5 Causative:

1. *196 - kandi oti at [-Activity] - cf. *razari* [Sivan 3:9]
 2. *204 - yeladim ra'im ze'otnu et bacayurim - cf. *be'otnu* [Asaf 2:6]
 3. *223 - teber'ari et ze kan. - cf. *teber'ari* [Ginat 4:7]

(Continued)

APPENDIX
(Continued)

SUMMARY DATABASE NEUTRALIZATIONS

	Smad	Hag	Leo	Asa	Sly	Shel	Gina	Oth	Tot
Trans > Intr	P1	ipv	P5	1	8	1	4	2	4
	P2	ipv	P5				1	1	3
	P3	ipv	P3				1	1	2
	P4	ipv	P3		2	1	2	1	2
Intr > Trans	P1	ipv	P2		2	2	2	1	3
	P3	ipv	P4					3	2
	P5	ipv	P2					1	1

Out of total 516 unconventional lexical usages:

V > V: NZ = "neutralization" 39 + 17 = 55

PM = "pattern mixing" 95 [excluding 20 Resultatives] = 75

GA = "gap filling" 33 [including OM, EX] = 33

N > V: = denomination = 70

Total innovative, unconventional verb forms = 233

NZ accounts for about one quarter of the unconventional verb forms recorded

APPENDIX
(Continued)

1.3 P1 Intr. ipv P3 Causative - Transitive Activity:

- *206 - carix *ligelot* oto *besade*. - cf. *legadel* [Sivan 3:7]
- *202 - ma, ni *yode* ai *lilmod* *lison*? - cf. *lelmed* [Asaf 4:0]

1.4 P4 Intr [Unaccusative or Reflexive] ipv P3 [or P1 - P5] Transitive Activity:

- *198 - le'an hem *heksim* *kshe* hu *mitgeresh* *oram*? - cf. *megarash* [Sivan 3:7]
- *209 - ani lo *roca* she *yitapru* *oti* - cf. *yesharu* [Sivan 4:4]
- *310 - *bol* *bol* *nistorot* *otax* *axshav* - cf. *nesaret* [Leor 2:9]
- *303 - ani *bistarakti* *oto* - cf. *strakti* [Hagar 2:9]
- *409 - hine *bistarakti* *oto*. - cf. *strakti* [Hagar 2:10]
- *450 - *anaxnu* lo *mishtafim* *ota* *bamizak* - cf. *meshtafim* [Dalit 3:9]
- *451 - *bol* *litnadent* *oti* *axshav* - cf. *tenadent* [Shelly 2:11]
- *221 - *itraraci* *oti* *lma*? - cf. P1 *itract* [Ginat 4:7]
- *203 - *lma* *titalabti* *oti*? - cf. P5 *talabti* [Ziva 3:6]

2. TRANSITIVE FORMS [P<] USED IN PLACE OF REQUIRED INTRANSITIVE [P<]

2.1 P1 Transitive [Activity] ipv P2 Intransitive [Unaccusative, Passive]

- *452 - *uri* ex *kol* *haxalay* *shapax* - cf. *nishpax* [Shelly 2:11]
- *453 - *lami* *hadelet* lo *potaxat*? - cf. *nifxaxat* [Orl Degan 2:4]
- *197 - *lama* *shamnu* *ei* *hadelet* *potaxat* [Asaf 3:11]
- *207 - *ze* lo *lo* 'es *oti* [sic] - cf. *nif'as li* [Asaf 2:7]
- *212 - *eyx* *osim* *acuvim*? - cf. *na'asim* [Sivan 3:10]
- *218 - *hem* *yihyu* *gilborim* lo *olan* *ve* *bamitzamot* lo *yebargu* *alppam* - cf. *yebargu* [Sivan 5:6]
- *23 - *kol* *hanyar* *zarak* *lasa* - cf. *nizrak* [Uri K. 2:5]
- *20 - *haybay*, *ganzar* *ner* - cf. *nigmar* [Leor 2:0]
- *156 - *haxaseta* *shabar* [sic] - cf. *nishbar(a)* [Leor 2:5]
- *198 - *hagvina* *marax* [sic] *ai* *haricpa* - cf. *nimrax(a)* [Or 2:6]
- *224 - *hapcaot* *ganru* *li* - cf. *nigmara* [Ginat 4:6]

2.2 P3 Transitive [Activity] ipv P4 Intransitive [Unaccusative, Reflexive]

- *189 - *hem* *mizaxavot* *levak* - cf. *mifxaxavot* [Rama 3:6]
- *193 - *ze* lo *mitader* - cf. *mitader* [Varda 2:2]
- *219 - *ze* *mekammet* *kaxa* - cf. *mifkarmet* [Ginat 4:7]
- *222 - *hacumid* *mitnadent* *li* - cf. *mitnadent* [Ginat 4:7]
- *47 - *hu* *yedabek* *kaxa* - cf. *yitdabek* [Ginat 4:6]

2.3 P5 Transitive [Causative] ipv P2 Intransitive [Unaccusative]

- *482 - *ze* lo *madbta* *levak* - cf. *nadbak* [Nazma 2:5]

(Continued)