# Where's ellipsis? Whether and why there are missing arguments in Hebrew child language*

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*Abstract*

*This paper concerns subject and object ellipsis in Hebrew child language from two perspectives: the conditions that govern subject versus object ellipsis and the distinction between early and late omissions. We propose that in Hebrew child language (and possibly in early child language in general), subject ellipsis is initially motivated mainly by pragmatic factors, which are subsequently supplemented by morphosyntactic rules of the grammar. Object ellipsis, in contrast, is motivated only by pragmatic or semantic factors, not grammatically. It is a robust phenomenon, but far less widespread than subject ellipsis in both child and adult Hebrew.*

*To demonstrate these claims, longitudinal data are analyzed for four Hebrew-speaking children between the ages 1;5 and 2;4, from their first word combinations to partial command of simple clause structure, supplemented by less systematic data from four other children. The analysis focuses on simple clause structure as the stage when verb argument structure (VAS) first emerges. Also, this period in children's language development allows for comparison with other studies on acquisition of null subjects and of VAS.*

## 1. Introduction

As background, we define and illustrate argument ellipsis in Hebrew child language (section 1.1), different types of licensing conditions for missing arguments (section 1.2), and previous accounts of the topic (section 1.3) as a basis for the analysis we propose (section 1.4).

### 1.1. *Argument ellipsis*

The term "argument" is restricted in this discussion to three types of nominal: surface subjects (SBJ) — nominative case, with zero

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case-marking in Hebrew; direct object (DO) — accusative case, marked by the accusative prepositional *et* if definite, by zero elsewhere; and indirect object (IO) — dative case, marked by the dative prepositional *le-* 'to'. Thus, in *Dan natan et ha-sefer le-Miri* 'Dan give-3SG-MS-PAST ACC the book to-DAT Miri' = 'Dan gave the book to Miri', *Dan* is the overt subject, *et ha-sefer* 'ACC the book' is the direct object, and *le-Miri* 'to-DAT Miri' is the indirect object. Governed objects, where the verb requires a specific preposition, are excluded from this analysis, for example Hebrew *ba'at be-* 'kick at = kick', *hirbic le-* 'hit to = hit', *histakel al* 'look on = look at'.[1] The early stages of acquisition considered here include few predicates that take governed or other prepositional objects. For the former, choice of a particular preposition is lexically rather than semantically motivated, so that it is hard to account for them systematically (Berman 1978).[2] Also excluded are locative and other prepositional phrases like *(yashav) al ha-kise* 'sat on the-chair', *(nasa) le-xeyfa* 'went to-Haifa'. The resultant focus on SBJ, DO, and IO makes it possible to compare our findings with research from other languages, since claims concerning the asymmetry between subject and object ellipsis typically concern only direct objects.

The notion of ''missing arguments'' depends on how the term ''ellipsis'' is defined both in general and for a given target language, as detailed in section 1.2 below. Thus, Hebrew manifests several null-subject contexts that can be defined as ''strictly subjectless.'' These are constructions that disallow overt pronoun subjects, such as impersonal constructions with third person plural verbs or epistemic modals that require expletive subjects in languages like English or French (Berman 1980). Further, the term applies to omission of pronouns in what are termed *prodrop* contexts in generative accounts of missing subjects that behave rather differently in Hebrew than in canonic prodrop languages like Italian or Spanish.[3] In Hebrew simple-clause structure, prodrop is confined to 1st and 2nd person, in past and future tense alone (Berman 1990). And, unlike in Italian or Spanish, the position of *pro* can either be filled by a lexical pronoun or be left empty. Compare, for example *ani axalti uga* 'I ate-1SG (a) cake' versus *axalti uga* 'ate-1SG (a) cake', *anaxnu na-vo maxar* 'we come-1PL-FUT tomorrow' versus *na-vo maxar* 'come-1PL-FUT tomorrow. The two versions are equally well formed. That is, the first expression, with both an overt pronoun and a person-marking suffix *-ti* on the verb in the past, or a person–number marking prefix *na-* in the future, is not necessarily more marked or contrastive than the second, which contains only the verb inflected for person (and also number and tense).

Examples (1) to (3) illustrate instances of juvenile, ungrammatical subject, direct object, and indirect object ellipsis in our database of Hebrew-speaking children at the initial phases of their grammatical development. A zero (∅) indicates ellipsis of one or more of the three arguments — SBJ, DO, and IO. The examples in (1) are of subject ellipsis in three children, omitting the pronouns *ata* 'you-2SG-MS', *hu* 'he-3SG-MS', and *ze* 'it', respectively.

(1) *Subject omission*

a. Lior (girl, 1;10;19), hearing her baby brother crying, to her mother:
   shomea? ∅ boxe.
   hear-SG-MS ∅ cry-SG-MS
   'Do you hear? is crying!'
   cf. ata shomea? hu boxe.[4]
   'Do you hear? He is crying.'

b. Hagar (girl, 1;9;21), talking about a picture of a man lying down:
   Mother [to father]: ata yaxol lesaper la et ha-sipur, sipur me'od yafe
   'You can to-tell to-her the story, (a) very nice story.'
   Hagar: *po xum*, ∅ *yashen*, ∅ *yashen*.
   here brown-SG-MS ∅ sleep-SG-MS ∅ sleep-SG-MS
   'Here's brown, he's sleeping, he's sleeping.'
   cf. *po xum, hu yashen, hu yashen*.
   'Here brown, he sleep-SG-MS, he sleep-SG-MS.'

c. Leor (boy, 1;10;3), referring to a fan that is not working:
   Aunt: ma kara?
   'What happened?'
   Leor: ∅ kakel
   ∅ got-broken-3SG-MS
   'broke-down'
   cf. ze. hitkalkel.
   'It got-broken.'

The examples in (2) illustrate omission of direct object pronouns by three children, who leave out *et ze* 'ACC it/this' and *oto* 'ACC him = it'.

(2) *Direct object omission*

a. Naama (girl, 1;11), talking about a notebook she is playing with:

hine ani kishkashti kan. ze shabur. ani shabarti Ø
here I scribble-1SG-PAST here. it broken. I broke Ø.
'Look I scribbled here. It's broken. I broke.'
cf. hine ani kishkashti kan. ze shavur. ani shavarti et ze.
'Here I scribbled here. It's broken. I broke ACC it.'

b. Smadar (girl, 1;11;18), talking about the tape-recorder her mother is using:
tadiki Ø gam kan.
light-2SG-FM Ø also here
'Switch it on here too.'
cf. tadliki oto gam kan.
'Light it here too.'

c. Leor (boy, 2;02), telling his aunt about a radio he likes to play with:
Leor: Ø mekuka.
Ø broken
Aunt: naxon, ze mekulkal.
'Right, it's broken.'
Leor: Saba holex letaken Ø.
grandpa go-MS to-fix Ø
cf. Saba holex letaken oto.
'Grandpa is going to fix it.'

The third group of examples, in (3), illustrates omission of *li* 'to-me' in two different contexts, by one child.

(3) *Indirect object omission*

a. Lior (girl, 1;9;1), holding out her hand to her mother:
tavii Ø yad.
bring-2SG-FM Ø hand
'Let me hold your hand.'
cf. tavi li et ha-yad.
'Give me (your) hand.'

b. Lior (girl, 1;10;11), talking to her mother, wants to color in:
tni Ø daf.
give-2SG-FM Ø page
'Give a piece of paper.'
cf. tni li daf.
'Give me a piece of paper.'

The examples in (1) through (3) demonstrate different levels and types of argument ellipsis, as these are defined below.

### 1.2. *Licensing conditions for missing arguments*

Across languages, three factors play a role in the licensing of argument ellipsis: permissibility, recoverability, and syntactic function. *Permissibility* is defined by how obligatory it is to either retain or delete a given argument. For example, in impersonal constructions, English and French require generic or expletive surface subjects, where Hebrew generally disallows them (Berman 1980). And in coordinate clauses, coreferential subjects may but need not be omitted in English and Hebrew, but they must be in Italian and Spanish and other strongly prodrop languages. *Recoverability* specifies whether the context provides adequate information to ensure that the reference of the missing argument can be reconstructed (Ariel 1991). In such cases, morphosyntactic grammatical cues provide the most reliable source of recoverability, followed by pragmatic cues derived from surrounding discourse, with extralinguistic context the least reliable source of recoverability. *Syntactic function* refers to whether the missing element is a subject, direct object, or indirect object. Here, "subject/object asymmetry" specifies that missing subjects are more readily licensed than missing objects (Hyams 1983, 1986; Hyams and Wexler 1993; Wang et al. 1992). The contexts in which subject and object ellipsis are permissible in Hebrew are specified in Tables 1–3 by type of licensing — grammatical, semantic, or pragmatic — as illustrated by examples from our database.

Hebrew has four main contexts for morphosyntactic licensing of null subjects in simple clauses, shown in Table 1: plural impersonals, 1, root infinitives, 2, imperatives, 3, and prodrop with verbs inflected for number and person, 4.[5]

The only type of "semantic licensing" in our database was with optionally transitive verbs that may but need not take a direct object, as in Table 2.

Finally, we identified three contexts for pragmatic licensing of argument ellipsis, shown in Table 3, which we defined as situational (section 1), conversational (section 2), and textual (section 3).

These examples show that in Hebrew, *subject ellipsis* is grammatically licensed by MORPHOSYNTAX in a range of simple-clause contexts.[7] It is obligatory in strictly subjectless impersonal constructions and with root infinitives used to express irrealis modalities like requests and prohibitions. And it is optional with verbs that are inflected for person, the canonic prodrop contexts in Hebrew, that is, in imperatives, and in 1st and 2nd person of past and future tense.[8] Subject ellipsis is also licensed PRAGMATICALLY by discourse context, most typically (a) in "adjacency pairs" like question/answer sequences, where the missing subject, which

Table 1. *Morphosyntactically licensed null subjects*

| Licensing context | Grammatical subject | Grammatical DO |
|---|---|---|
| 1. Plural impersonals | Ø oxlim et ze?<br>Ø eat-PL it<br>'Can one/you eat it?' | – |
| | Ø cayrim kax.<br>Ø draw-PL so<br>'This is how you/people draw.' | – |
| 2. Root infinitives[6] | la-redet bevakasha.<br>'(I want) to-get-down please.' | – |
| | loh le-daber!<br>(do) not to-talk<br>'Don't talk!' | |
| | la-tet lo?<br>to-give to-him<br>'Should I give it to him?' | – |
| 3. Imperatives | Ø tafsik kvar!<br>Ø stop-2SG-MS-IMP already<br>'Stop it!' | – |
| | Ø bo'i hena!<br>Ø come-2SG FM-IMP here<br>'Come here!' | |
| 4. Prodrop, 1st and 2nd person past tense suffixes, future prefixes | Ø asiti pipi.<br>Ø did-1SG weewee<br>'I peed.' | – |
| | Ø gamarnu<br>Ø finished-1PL-PAST<br>'All done.' | |
| | Ø nigmor kvar.<br>Ø will-finish-1PL already<br>'We'll finish soon.' | |

Table 2. *Semantically licensed object ellipsis*

| Licensing context | Grammatical subject | Grammatical DO |
|---|---|---|
| Optional transitives | | Ron oxel (tapuax).<br>Ron eat-SG-MS (apple)<br>'Ron's eating (an apple).' |
| | | hem kor'im (iton).<br>they read-PL-MS (newspaper)<br>'They're reading (the paper).' |

Table 3. *Pragmatically licensed ellipsis*

| Licensing context | Grammatical subject | Grammatical DO |
|---|---|---|
| 1. Situational context | | Ø ra'ita?<br>Ø see-SG-MS-PAST<br>'Did you see?'<br>[when something fell]<br>Ø tiftax Raz.<br>Ø open-SG-MS-IMP<br>'Open, Raz.'<br>[someone knocks] |
| 2. Conversational "adjacency pairs" | A: ma ata ose sham?<br>what you-MS-SG do-MS-SG there<br>'What are you doing there?' | Raz: ima, Razi roce ta mom R want-SG-MS kufsa.<br>ACC-the box<br>'Mom, R wants the box.' |
| | B: Ø bone bayit.<br>Ø build-MS-SG house<br>'Making (a) house.' | MOT: tov, tiftax Ø.<br>okay open-SG-MS-FI Ø<br>'Okay, so open (it).' |
| | A: eyx at mavala?<br>how you-SG-FM spend-SG-FM time<br>'How (do) you spend your time?' | A: ma kara la-kadur?<br>'what happened to the ball?' |
| | | B: zarakti Ø.<br>threw-1SG Ø<br>'I threw (it).' |
| | B: Ø holexet la-yam.<br>Ø go-SG-FM to the beach<br>'Going to the beach.' | |
| 3. Extended discourse [topic maintenance] | ha-yeled ve ha-kelev hit'oreru. ma Ø hitxilu lexapes Ø baxeder, Ø began-PL to search Ø in the room | Ø ra'u? en cfardea. Ø herimu et ha-mita … Ø lifted-PL ACC the bed |
| | 'The boy and the dog woke-up. What did they see? There was no frog. They began to search, picked up the-bed …' (Berman 1990). | |

is the topic, is mentioned in a previous utterance, and (b) by extra-linguistic context, where the situation provides for recoverability of the missing element. *Object ellipsis*, in contrast, is not grammatically permissible. It is licensed only by SEMANTIC constraints in the case of "optional transitives" (like verbs meaning *eat*, *smoke*, *write* whose object reference is semantically restricted to referents that are eatable, smokable, or write-able) and by pragmatic contexts similar to those that apply to subject ellipsis.

The examples in Tables 1–3 suggest first, that the "subject/object asymmetry" — to the effect that children omit more subjects than objects — can be attributed *a priori* to the conditions that govern ellipsis of these two kinds of arguments in Hebrew (possibly across languages). Second, in simple-clause structures, ELLIPSIS IS LICENSED in a range of contexts in Hebrew (perhaps across languages), where it is predictable, and not specific to child language. UNLICENSED ELLIPSIS as illustrated in the examples in (1) to (3) above, is less predictable and is characteristic of child language.

### 1.3. *Previous studies*

In recent years, work on missing arguments has focused on subject ellipsis, and there have been various proposals to account for the phenomenon, divided here into "grammaticality," "processing," "discourse-based," and "lexicalist" or "input-oriented" approaches, respectively.

*Grammaticality accounts* in a generative framework attempt to explain missing subjects in several ways. Hyams (1983, 1986) originally proposed that the default universal setting for the prodrop parameter is [+Null] and that, as a result, children start with a setting that allows the empty category *pro* in subject position. With time, children acquiring a language like English learn that their language is a non-prodrop language, which leads them to start using overt subjects. Jaeggli and Safir (1989) propose a distinction between morphologically uniform and nonuniform languages to the effect that prodrop languages must be morphologically uniform, whereas non-prodrop languages must be nonuniform.[9] Null subjects are permitted in all and only languages with morphologically uniform inflectional paradigms, and *pro* is identified through either inflection or discourse factors. In a minimalist perspective, Rizzi (1993, 1994) proposes conditions for identification and licensing of *pro*. Speas (1994) relies on the principle of economy in suggesting that languages vary as to whether affixes are generated in the syntax or in the lexicon. In this view, children need to set a parameter for whether inflection in their language is lexical or syntactic so as to decide whether their language allows null subjects. Armon-Lotem (1997), Borer and Wexler (1992), Guifoyle and Noonan (1992), and Radford (1990) relate subject omission to other aspects of early grammar such as the absence of the case filter or of functional categories, or the relaxation of an early requirement that each verbal element must have a unique subject. For example, Hyams (1994), and Sano and Hyams (1994) argue that since functional categories are initially underspecified, the node I may be left underspecified,

and so [SPEC IP] can host PRO, since it is not governed. This would account for children's use of null subjects in a way that differs from adult use of *pro* in a language like Italian (or Hebrew).

In accounting for null objects, most researchers taking a grammar-based perspective rely on the distinction between null-pronominal and null-variable objects (Cole 1987; Huang 1984; Raposo 1986; Rizzi 1986).[10] For example, Hyams (1987) and Jaeggli and Hyams (1988) use this to account for the asymmetry between subject-drop and object-drop in acquisition. They argue that a child learning a language that allows null objects (like Japanese) initially drops only subjects, and null objects appear later, once the child has developed variables. Hyams (1992) uses this to explain why English-speaking children tend to omit subjects in the early stages of acquisition. This analysis of Hyams is contradicted on the basis of data from Wang et al. (1992) for English- and Chinese-speaking children and by Hirakawa (1993) for Japanese.

*Processing accounts* attribute subject and object ellipsis to constraints on the length of utterances (for example, Bloom et al. 1975) or on the number of constituents that children can produce. According to Bloom (1970) certain argument omissions represent reductions of elements present in deep structure, due to children's performance limitations. Bloom (1990) proposes the "VP length criterion," by which children avoid using subjects when the VP is longer (in transitive verbs) due to constraints on memory span. With age, children are able to recall and so produce longer utterances with both subjects and objects. Along similar lines, Pinker (1984) argues that children's processing mechanisms are limited in capacity and so can initially coordinate only a fixed number of lexical items at some stage in the move from communicative intention to actual utterance. Valian (1991) also proposes a processing account for acquisition of null and overt objects by English-speaking children. For her, children do not use a verb unless they know that it subcategorizes for objects. The fact that children provide objects more often for pure transitives than for optional transitive verbs indicates that they recognize the difference between an object that is obligatory and one that is optional. Valian explains the fact that use of optional objects increases between ages 2;1 and 2;5 as due to the relaxation of performance limitations: as children become able to handle longer length, they increase their use of verbs that require objects.

*Discourse-based accounts* explain subject and object ellipsis in terms of principles such as informativeness, to the effect that children omit from their utterances information that is most easily recoverable from context independent of grammatical structure (Greenfield and Smith 1976). Clancy (1993) and Allen and Schröder (i.p.) adopt the discourse-functionalist

notion of preferred argument structure (PAS) proposed by Du Bois (1985, 1987) to account for missing arguments in Korean and Inuktitut child language respectively. Both studies suggest that children consistently produce only one core lexical argument per clause, typically the subject of an intransitive predicate (S) or the direct object of a transitive predicate (O), but not the subject of a transitive predicate (A). This is because only the S and O but not the A position allow new information to be introduced into discourse. Along similar lines, Brown (1998) reports that in Tzeltal (a VOS language that allows free NP ellipsis), the use of both lexical and pronominal arguments corresponds to PAS. Allen's (1997) informativeness account of null objects in Inuktitut child language notes a higher percentage of object positions containing arguments with a given informativeness feature than subject positions containing the same feature, so that object ellipsis is less frequent than subject ellipsis in Inuktitut.

Hyams and Wexler (1993) propose a combined *structuralist plus pragmatic* account of null subjects according to which some languages have a principle of topic-drop (Dutch), others have a principle of null subject (Italian), and still others exhibit a combination of the two (Hebrew). In a topic-drop language, a constituent must be outside the VP to be omitted. On the other hand, in a null-subject language, the prerequisite for grammatical omission of a subject is its identification by "rich" Agr.

An *input-oriented* view of "verb-by-verb" learning treats argument ellipsis as initially due to the acquisition of partial verb-argument clusters for individual verbs. Along these lines, Braine (1976) argued that children start out learning a small number of positional formulae that map meaning components into positions in the surface structure. Bowerman (1990) proposes that the typical mappings between thematic roles and syntactic functions are learned on the basis of linguistic experience with individual verbs and with a particular target language. Tomasello's (1992) "verb island hypothesis" likewise assumes that young children learn verbs as individual lexical items, with the morphological and grammatical structures in which they participate linked uniquely to these particular verbs. According to Clark (1995), in order for children to learn which verbs occur with which configurations of arguments, which kind of argument belongs in each slot, and what meaning is conveyed by each verb frame or construction, children will start out by associating these properties with individual verbs in their repertoire. For Ninio (1997), children acquire the combinatorial rules of grammar by gradually accumulating the relevant information about the syntactic environment in which a given verb may appear along with the list of terms that can appear in a given environment. And along similar lines, Brown (1998) reports that in Tzeltal the acquisition of transitive verbs displays the properties of

"verb islands": they occur only in limited constructions, often only with one particular argument (for example, 'want' occurs only with the first person A).

These studies converge to reveal three central issues in acquisition of null arguments: differences between child and adult use of null arguments; an asymmetry between subject and object omission; and recourse to different modules as a basis for null arguments in different languages (morphosyntax, lexicon, or discourse). However, all the approaches briefly reviewed above (grammaticality, processing, discourse-functionalist, and lexicalist verb-by-verb learning) relate to these issues from a single perspective. The analysis we propose differs in perspective since it aims to integrate various previously isolated lines of explanation into a single multilevel account of null arguments. Our overall orientation is developmental and can be identified as lying somewhere between Hyams and Tomasello. In this view, children do not start out with strictly structural knowledge and learning is required for acquisition. On the other hand, what the child eventually acquires includes purely structure-dependent linguistic knowledge (in this case, of VAS). With respect to the issue of continuity, we also take an intermediate stand between nativist claims for strong continuity and a fully learning-based discontinuity. We assume weak continuity in acquisition in the sense that children's grammar will always be consistent with the grammar of some possible natural language, and with age this comes to increasingly approximate that of the target language.

### 1.4. *A proposed analysis for the licensing of argument ellipsis*

The analysis of ellipsis in Hebrew child language derives from a general model of language acquisition as a stepwise process.[11] As proposed in greater detail in Uziel-Karl (1997, n.d.), acquisition is governed by two distinct developmental criteria: elementary and advanced. *Elementary criteria* meet conditions that are necessary to specify that a child has some knowledge of a particular linguistic item or construction; *advanced criteria* fulfill conditions that are both necessary and sufficient to specify that the child has attained an adultlike level of knowledge.[12] *Necessary* conditions serve mainly to prevent communication breakdown, while *sufficient* conditions prevent ungrammaticality. In the case in point, pragmatic factors provide necessary conditions for ellipsis, and morphosyntactic properties provide sufficient criteria for ellipsis.

In achieving these two levels of knowledge of ellipsis in Hebrew, children exhibit the following pattern of acquisition. Initially, they behave

in a way suited to "null topic" languages, where ellipsis is guided mainly by (necessary) pragmatic considerations such as pragmatically controlled "free anaphora." Subsequently, they show knowledge of Hebrew as a "null-subject" language, with ellipsis licensed by (both necessary and sufficient) morphosyntactic rules, such as prodrop. Eventually, at the most mature phase, children integrate these two types of knowledge, so that they can deploy ellipsis to meet appropriate discourse functions across extended texts (for purposes like thematic connectivity or to distinguish topic maintenance from topic shift in narrative). In this sense, we do not side with either strictly grammatical or discourse-based accounts but suggest instead that both sets of factors play a role. We also argue that the relative weight of each factor on the acquisition of each argument type (e.g. subject, direct object, indirect object) changes in the course of development.

This perspective is in line with other functionally oriented accounts of development, like that of Budwig (1995). She argues that early on, before English-speaking children grasp the morphosyntactic features of pronominalization, they create their own pragmatic and semantic systems, and these change over time. It is also in line with a previous account of null-subject acquisition in Hebrew by the second author. Berman (1990) argues that language typology combines with a confluence of various types of cues to guide children in acquisition of null subjects, and that these may have differential impact at different developmental phases. Thus, in what she terms "the pregrammatical phase," linking speech to the immediate situational context plays a major role. With the onset of structure-dependent production (including tense and agreement inflections, and case-marking in simple clauses), children become more attentive to the particular ways in which pronominal subjects pattern in their native language. Only later will they learn to use the discourse-licensed thematic type of null subject in constructing cohesive stretches of extended text.

Against this background, we predict that as the acquisition of morphosyntactic rules proceeds, the number of missing subjects that are not grammatically licensed will decrease along with an increase in the number of missing subjects that are grammatically licensed (i.e. prodrop contexts). Once acquisition of the inflectional system is achieved, missing subjects will occur primarily when grammatically licensed with few or no instances of unlicensed ellipsis. More specifically, the interaction between inflectional marking of tense/person comes to serve as a good predictor of null subjects. Initially, children will have missing subjects in all tense/person configurations (or, alternatively, use missing subjects at chance level in all tense–person configurations). They will then gradually confine

their use of missing subjects to contexts where they are morphosyntactically licensed in simple clauses — past and future tense in the 1st and 2nd person.

## 2. Description of study

Analysis is based on naturalistic longitudinal data collected on a weekly basis from four Hebrew-speaking children, three girls (Hagar, Smadar, and Lior) and a boy (Leor), from their first word combinations to a point where they start to show command of simple clause structure, aged from 1;5 to 2;4 years. The children were audio-recorded at home during interactions with their parents and siblings. Each child was recorded for approximately one hour a week in a variety of situations, and in more than one session. The three girls were recorded by their mothers, and the boy by his aunt, all graduate students of linguistics. Recorders were instructed to act naturally during the sessions and not to be too directive in elicitation of child speech so as not to bias the conversation, but to comment on the context or meaning of the child's utterance whenever it might be unclear. The data was transcribed and coded using CHILDES (MacWhinney 1995) as adapted to Hebrew. During this period, the transcribers met regularly with the children's parents for clarifications.

The present study analyzed data from transcripts of sessions recorded twice a month, at intervals of ten to 14 days, over a period of approximately six months for each of the four children. This made it possible to trace developmental changes in the children's language over a long-enough period for such changes to take place. Analysis included all utterances that contained a lexical verb, except for direct imitations of a caregiver's utterance, frozen expressions, nursery rhymes, and unintelligible utterances. We also excluded utterances consisting of verbs that required governed or other prepositional (nondative) objects, sentential complements, or adjectival predicates. The database is detailed in Table 4.

Table 4. *Age range and transcripts in database*

| Child's name | Sex | Age range | Number of transcripts |
|---|---|---|---|
| Lior | girl | 1;5–2;0 | 15 |
| Smadar | girl | 1;6–2;4 | 17 |
| Hagar | girl | 1;7–2;0 | 13 |
| Leor | boy | 1;9–2;0 | 9 |

These data were supplemented by diary data from the first author's son Raz aged 1;6–2;0, and by naturalistic longitudinal data analyzed in previous studies for three other Hebrew-speaking children: Assaf, aged 1;11 to 2;5, Naama, aged 1;7 to 2;6 (Berman 1990), and Sivan, aged 2;2 to 5;6 (Lev 1989). The supplementary data consisted of conversational interactions audio-recorded every three or four weeks. Naama was recorded at home in interaction with her mother, the investigator, and the investigator's little boy. Sivan was recorded at home with one or both of her parents, in interaction with her brother Assaf, aged 13 months younger.

The data were coded as follows. Each verb was coded for morphology — tense and agreement (number, gender, and person); initiator — self-initiated or imitation of caretaker's utterance; and discourse function — request, question, reply to a question, etc. Verbs were also coded for their argument structure in the adult language based on previous studies on the acquisition of VAS in Hebrew (e.g. Armon-Lotem 1997) and on the authors' intuitions (the first author is a native speaker, the second has done extensive research on the structure of Israeli Hebrew).

To analyze ellipsis, we extended Brown's (1973) notion of *obligatory contexts* to include *potential contexts*. This yields a subset-to-superset relation, since all obligatory contexts are also potential contexts, but not vice versa. For example, morphosyntactic licensing constitutes an obligatory as well as a potential context for subject omission. In contrast, semantic licensing constitutes only a potential but by no means obligatory context for direct object omission. Comparing potential as against obligatory contexts for null arguments makes it possible to distinguish between subject ellipsis in the case of syncretic forms. For example, in future tense, 2nd person masculine singular verbs have the same form as 3rd person feminine singular; for example, *toxal* means both 'eat-2SG-MS-FI' = 'you will eat' and 'eat-3SG-FM-FUT' = 'she will eat'. However, the two verb forms differ in the licensing of their null subjects. The former item is both a potential and an obligatory context for subject ellipsis, with its subject grammatically licensed (in both indicative and imperative mood). The 3rd person feminine use of the verb provides a potential context for subject ellipsis, being only pragmatically licensed.

Actual and potential contexts for argument ellipsis were coded using two dependent tiers that are adaptations of CHILDES (MacWhinney 1995). The tier *%ept* (ellipsis potential) was used to code all arguments (both missing and overt) for their potential licensing condition(s), and *%elp* (ellipsis) was used to code each occurrence of ellipsis for its actual licensing condition. For example, the verb *axalti* 'eat-1SG-PAST' = 'I ate' was coded on the *%ept* tier for two arguments, subject and direct object.

Here, subject omission is potentially licensed both pragmatically (by context or previous discourse), and morphosyntactically (a canonical prodrop context), and object omission is potentially licensed either pragmatically or semantically, since 'eat' is a verb with optional transitivity. On the *%elp* tier, subject and object omissions are each coded for only one of the potential licensing modules to indicate the actual cause of omission. For example, if *axalti* is a self-initiated utterance in which the child tells his/her caregiver about the activity of eating (e.g. *ima, etmol axalti ba-gan* 'Mommy, yesterday I eat-1SG-PAST in kindergarten' = 'Mommy, yesterday I ate at school'), the potential licensing condition is coded as morphosyntactic for subject omission and as semantic for direct object omission. In contrast, if the child says *axalti* in reply to a question like *Smadari, axalt et ha-tapuax?* 'Smadar eat-3SG-FM-PAST ACC the apple' = 'Smadari, did you eat the apple?' then subject omission is still morphosyntactically licensed, but direct object omission will be pragmatically licensed (by discourse context). Note that unlicensed null arguments as well as overt arguments were coded as such.

## 3. Results

Analysis yielded a total of 2522 ''contexts for argument ellipsis''; that is, contexts where SBJ, DO, and IO could occur. The contexts for subject ellipsis yielded four configurations — SV, SV(O), SVO, and SVOI; for direct object ellipsis three configurations — SV(O), SVO, and SVOI; and for indirect object ellipsis only one configuration — SVOI. This means there was some overlap in the count of total contexts. Table 5 specifies for each child the distribution of ''contexts for ellipsis'' by argument type, the total number of these contexts, and the percentage of each type of context out of that total.

Table 5 shows that all four children reveal very similar patterns in distribution of contexts for subject, direct object, and indirect object

Table 5. *Breakdown of contexts for argument ellipsis by argument type and child*

| | Lior | | Leor | | Hagar | | Smadar | |
|---|---|---|---|---|---|---|---|---|
| Argument type | no. | % | no. | % | no. | % | no. | % |
| SBJ | 182 | 63 | 377 | 55 | 454 | 60 | 481 | 61 |
| DO | 91 | 32 | 281 | 41 | 293 | 39 | 256 | 32 |
| IO | 14 | 5 | 25 | 4 | 12 | 2 | 56 | 7 |
| Total | 287 | | 683 | | 759 | | 793 | |

ellipsis. Their speech provides approximately twice as many contexts for subject ellipsis (55%–63%) as for direct object ellipsis and approximately five to six times more contexts for direct object ellipsis (32%–41%) than for indirect object ellipsis (2%–7%).

Table 6 gives the breakdown of cases of licensed ellipsis that were realized, where ''licensed'' includes morphosyntactic, semantic, and pragmatic licensing, and ''unlicensed'' refers to contexts of argument ellipsis that are neither pragmatically nor grammatically licensed (e.g. missing arguments in bare verb forms or in root infinitives). The figures in the table were calculated for each child out of the total number of elided elements for each argument type (represented by no.).

Table 6 also reveals similar trends for all four children: arguments are rarely omitted in ''unlicensed'' environments and the vast majority of children's early argument ellipsis in simple-clause utterances is licensed. That is, children appear attuned to the licensing conditions for ellipsis in their language from a very early age.

On the other hand, the NATURE of this licensing changes markedly over time, as illustrated in Figure 1 for one of the four children, Smadar. Since the children's overall breakdown of results is so highly similar, we decided to confine detailed figures to one child only. We chose Smadar since, while she is clearly representative of general trends across all the children in our sample, she was precocious in her linguistic development, she demonstrated the clearest transition in MLU levels across time, and she was more talkative than Lior, the only other child for whom systematic longitudinal data is available from as early as 1;5. In Figures 1 to 3, then, data from Smadar is meant to represent developmental patterning of argument ellipsis in Hebrew child language in general.

Figure 1 displays the distribution (in percentages) of null subjects by licensing conditions for Smadar between ages 1;6 and 2;4. Percentage of

Table 6. *Percentage of realized licensed ellipsis by argument type and child*

| Argument type | Lior | Leor | Hagar | Smadar |
|---|---|---|---|---|
| Subject | | | | |
| % | 82 | 94 | 92 | 80 |
| no. | 126 | 305 | 305 | 202 |
| Direct object | | | | |
| % | 83 | 74 | 86 | 87 |
| no. | 43 | 75 | 139 | 109 |
| Indirect object[13] | | | | |
| % | 100 | 100 | – | 92 |
| no. | 4 | 25 | | 11 |

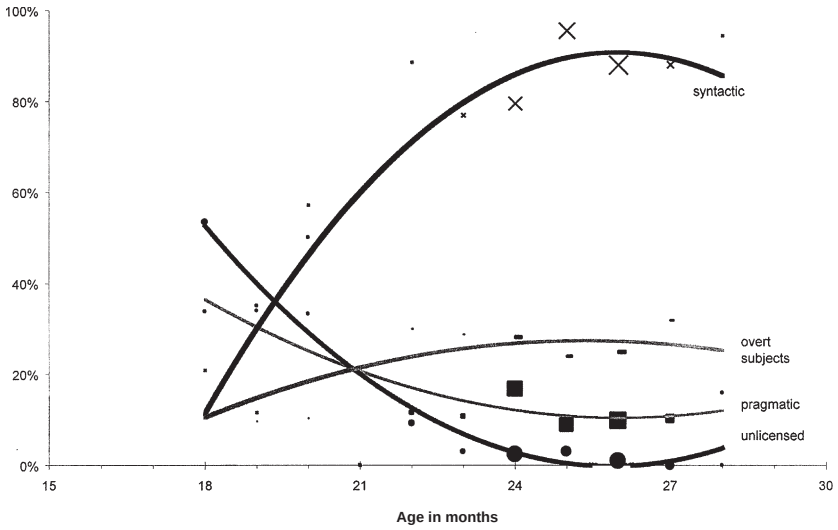


Figure 1. *Development of licensing conditions for null subjects for Smadar [1;6–2;4]*

pragmatically and morphosyntactically licensed null subjects represents the ratio between realized and potential contexts for each licenser. Percentage of overt subjects was calculated out of the total number of contexts for subjects (so excluding, for example, impersonal constructions). Percentage of unlicensed null subjects was calculated out of the total number of contexts for unlicensed ellipsis including, for example, present tense verbs and root infinitives (see the examples in [1] above).

Figure 1 shows that initially there is a large number of unlicensed as well as pragmatically licensed null subjects and that this gradually decreases with age. In contrast, the number of grammatically licensed null subjects rises markedly, while overt subjects increase up to a point where they stabilize.

Figure 2 displays the distribution (in percentages) of licensing conditions for null direct objects. The number of pragmatically and semantically licensed null direct objects was calculated as the ratio between realized and potential contexts for each licenser. Figure 2 shows that the number of pragmatically licensed null direct objects declines slightly and then increases, while semantically licensed null direct objects do the opposite.

Comparison of Figures 1 and 2 reveals that the effect of the various licensing conditions for null subjects and objects changes across development. Initially, both types of null argument are motivated mainly by pragmatic and communicative considerations, and later on, these are supplemented by morphosyntactic or semantic factors.

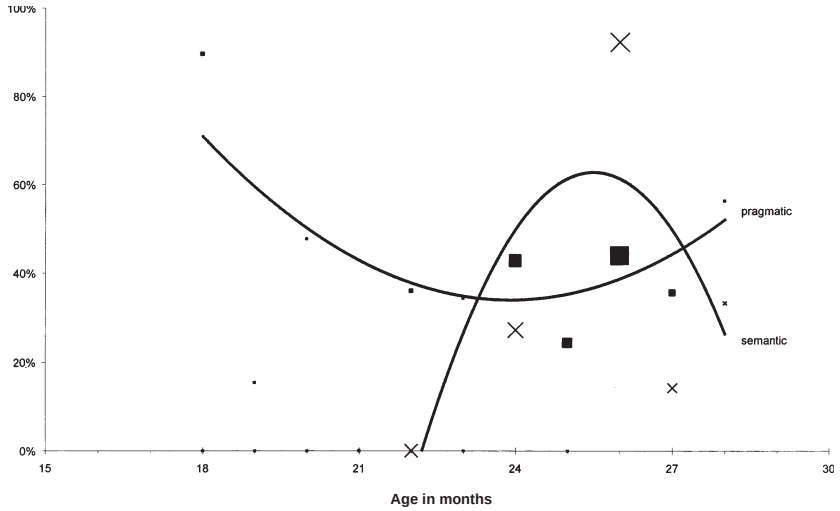


Figure 2. *Development of licensing conditions of null direct objects in Smadar's data [1;6–2;4]*

From Figure 1 it appears that some unlicensed and pragmatically licensed null subjects are gradually replaced by lexical and pronominal subjects. To confirm this, we examined the use of overt subjects with verbs in the present tense and in the 3rd person past tense; since these are both contexts that disallow morphosyntactic licensing of null subjects in Hebrew, any "licensed" occurrence of null subjects must be due to pragmatic factors. Otherwise, an overt subject is required. Figure 3 displays the distribution (in percentages) of overt subjects in present tense and in 3rd person past tense verbs in Smadar's data.

Figure 3 reveals an increase in overt subjects with age, which is more marked for present tense verbs than for 3rd person past tense verbs. That is, more verbs in the 3rd person past tense occur with an overt subject right from the start.

In sum, the data reveal that licensing conditions for subject and object ellipsis vary across development. At first, ellipsis is pragmatically motivated, and this is later augmented by morphosyntactic and/or semantic licensing, with the overall number of overt subjects increasing over time.

## 4. Discussion

In the developmental model proposed earlier, both subject and object ellipsis are initially pragmatically licensed, while subject but not object ellipsis is

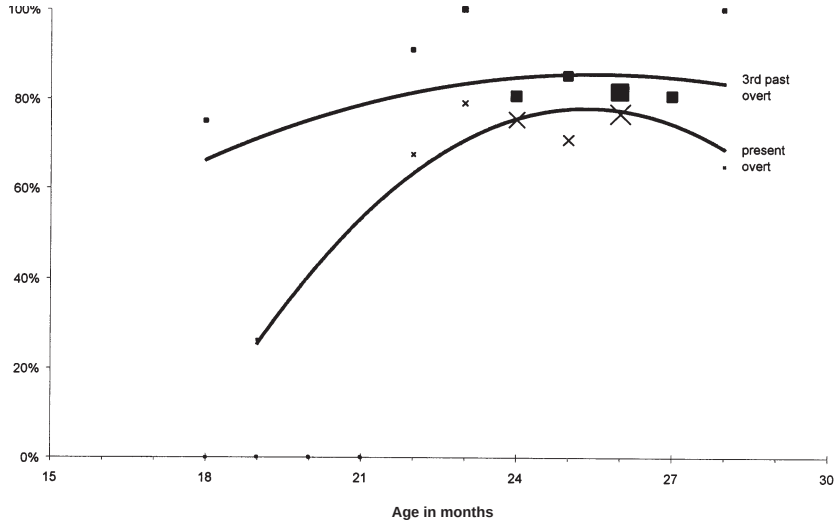


Figure 3. *Distribution (in percentages) of overt subjects in present tense and 3rd person past tense verbs in Smadar's data [1;6–2;4]*

subsequently supplemented by morphosyntactic rules. Two factors combine to promote early pragmatic conditioning in Hebrew. First, it provides the only context for object ellipsis and many permissible contexts for subject ellipsis and, second, the necessary grammatical systems of inflectional marking for tense and agreement on verbs and case on pronouns and prepositionals are not yet commanded. As a result, formal licensing of ellipsis by grammatical rules emerges later than communicative considerations of recoverability.

The developmental pattern of semantically licensed null direct objects suggests that initially children's verb inventories do not include a large number of optional transitive verbs (like those meaning *eat*, *drink*, *draw*, *play*, *write*), which explains the small number of semantically licensed null objects. This changes when children begin to use optional transitive verbs more widely without an overt direct object. Subsequently, children make increasing use of overt direct objects, and this again leads to a drop in semantically licensed null direct objects. This developmental pattern is consistent with the acquisitional pattern of optional transitive verbs reported by Valian (1991). She notes that English-speaking children do not seem to use a verb unless they know it subcategorizes for objects. Consequently, they provide objects much more frequently for pure transitives than for optional transitive verbs, suggesting that they recognize the difference between obligatory and optional object. Valian notes that the use of objects

with optional transitives rises between ages 2;1 and 2;5. Our data reveal a similar trend, with the use of overt direct objects in optional transitive constructions beginning around age 2;1 and increasing from then on.

As noted earlier, the number of overt subjects increases across time, at first with more verbs in non-prodrop contexts in past (3rd person) than in present tense (all persons). This is consistent with the claim for early pragmatic licensing of null arguments. Verbs in the present tense in children's early language use typically relate to the "here and now," so they more readily allow for arguments that are recoverable from the situational context. In contrast, verbs in 3rd person past tense relate to entities that are not present and so require explicit mention of their arguments in order to be grammatical. For example, the modal verb *roce*, *roca* 'want-SG-MS/FM' occurs largely without any overt subject in present tense in adult as well as child Hebrew, rather like English *wanna*. Even though this appears to violate the licensing conditions for prodrop in the language, the subject in 'want' utterances is straightforwardly recoverable from context. In contrast, a verb like *raca* 'want-3SG-MS-PAST' or *halxa* 'go-3SG-FM-PAST' would require an overt subject in lone clauses, since the missing subject in these utterances is not recoverable from the situational context.

Initially, pragmatic considerations like new versus old information also determine whether or not an object is realized. For example, the verb *give* is usually used when child and caretaker interact, with one holding an object that the other wants. Since both child and caretaker usually see the requested object, the recipient of the object is more likely to constitute new information. In Hebrew, the recipient of a bitransitive verb is marked by the indirect object so that the initial argument used with *give* is most likely to be the indirect object, as in *tni li* 'give-2SG-FM-IMP to-me' (Lior 1;9). With *bring*, another bitransitive verb, the object to be transferred is typically out of sight and will most likely constitute new information. Since the transferred object or theme usually takes the form of a direct object, this will be the first to occur with this verb, as in *tavi'i kapit* 'fetch/bring-2SG-FM-IMP teaspoon' (Leor 1;11). In this sense, then, claims for a "verb-by-verb" view of early development — with initial verb-argument structures linked to specific lexical items — reinforce our claims for early pragmatic licensing of null arguments.

In sum, we have used data from Hebrew child language to throw light on the conditions that govern subject versus object ellipsis and on the distinction between early and late omissions. The developmental model proposed here has the advantage of accounting for two distinct processes concurrently — topic omission and subject omission (see, too, Hyams and Wexler 1993; Armon-Lotem 1997). Further, it extends this distinction to account for both subject and object ellipsis by integrating syntactic and

semantic factors with discourse functions and communicative intent in the process of acquisition. In principle, this should make it possible to consider ellipsis in relation to both specific lexical items and specific classes of verbs, on the one hand, and in relation to individual differences between learners, on the other. These are topics that lie beyond the scope of the present analysis but that need in-depth study in order to test claims for "verb-by-verb" learning beyond the initial stages of VAS acquisition.

Alternatively, the acquisition of argument ellipsis could be accounted for by the interaction of two hierarchies across development, as proposed in Uziel (forthcoming) and as expanded and motivated in Uziel (n.d.). One is a universal argument eligibility hierarchy (AEH), along the lines of Comrie and Keenan's (1979) noun-phrase accessibility hierarchy (NPAH) and Berman's (1982) account of prepositional (nondative) objects in Hebrew — *subject* > *direct obj* > *governed obj* > *indirect obj* > *prepositional obj*. The other is a licensing hierarchy that relies on language-specific weighting of linguistic modules — *pragmatic* > *semantic* > *morphosyntactic*. The proposed interaction allows the selection and relative weight of the various licensing modules to vary for different argument types both across languages and across the course of development for particular target languages. To the extent that there is variation across development, then arguments higher on the AEH are expected to move from a less restrictive to a more restrictive licensing module; that is, from pragmatic to morphosyntactic licensing. This proposal would have several advantages over other accounts reviewed in this paper. First, it would take into account the transitions in licensing conditions of null arguments across development. Second, it could account for variation in licensing conditions of different arguments within a given language, possibly across languages. Third, it could account for individual variation in the acquisition of different arguments, in the sense that the higher the argument on the AEH and the more restrictive its licensing conditions, the less susceptible it will be to individual variations. Finally, such an analysis might predict patterns of language change in the sense that arguments higher on the AEH will be more resistant to change than those lower on the hierarchy. However, more research is required to support this developmental model, particularly from typologically different languages and from larger samples, which should include experimental as well as naturalistic data.

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## Notes

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1. Hebrew verbs are cited in the morphologically simple form of past tense, 3rd person masculine singular.
2. Hebrew-speaking children make few errors in choice of prepositions assigned to specific verbs — unlike L2 learners of Hebrew or children from less-educated or nonstandard backgrounds (Berman 1985). They appear to learn governed prepositions as part of the lexical entry for particular verbs.
3. Hyams (1992) argues that in a canonically "prodrop" language like Italian, null subjects are not caused by deletion or substitution for a lexical pronoun, but that *pro* is inserted directly into a phrase marker at D-structure.
4. "Cf." indicates standard adult version.
5. As noted earlier, propositional modals may and typically do occur without any expletive or other surface subject in Hebrew, e.g. *efshar le-havin et ze* 'possible to-understand ACC it' = 'it's understandable', *yitaxen she yavo* 'likely that will-come' = 'he'll probably come', but these hardly ever occurred at the stage under consideration here.
6. The term *root infinitives* (Armon-Lotem 1997; Rizzi 1994; Wexler 1994) refers here to fully articulated main-clause infinitives that occur in main-clause declaratives and in several irrealis contexts. Unlike so-called *root infinitives* in English, this type of verb is often well formed in adult Hebrew to express modalities like requests, orders, prohibitions, and suggestions, as in the examples in 2 in Table 1. Armon-Lotem (1997) notes that in children's Hebrew, root infinitives also occur in declarative contexts (e.g. *lashir dag* 'sing fish' = 'to sing about a fish') — and these are considered ungrammatical in the adult language, but they are few and far between. We adopt the term *bare infinitives* to refer to infinitival forms without the infinitive marker *le-* 'to', e.g. *ftoax* 'open' instead of *li-ftoax* 'to-open' or *sheve(t)* 'sit down' instead of *la-shevet* 'to sit down', similar to what Berman and Armon-Lotem (1996) term "unclear" or "stripped" forms.
7. The occurrence of null subjects in coordinate and embedded clauses is an interesting topic in itself, but this is not relevant to the early stage of acquisition dealt with here.
8. The present tense of the modal verb meaning 'want' seems to be a special case, since it always occurs without a subject and marked for gender in Hebrew child speech, often in adult usage too, e.g. *roca she eten lax od neyar ve ta'asi igul*? 'want-FM that will-give-1SG you more paper and will-make-2FM circle?' = '(Do you) want me to give you some more paper and you'll make a circle?' said to Hagar, aged 1;9, by her grandmother, just a few utterances after she had asked the child *at ro'a meshulash* '(do) you-FM see (a) triangle?'
9. Jaeggli and Safir (1989) define a morphologically uniform language as a language in which the entire verbal paradigm is either inflected (as in Italian) or uninflected (as in Chinese). A morphologically nonuniform language is a language in which only part of the verbal paradigm is inflected (as in English and to a certain extent Hebrew, too).
10. Null pronominal objects refer to empty categories in object position that are instances of *pro*; that is, categories that can be recovered from the morphology of a governing element. Null variable objects, on the other hand, refer to empty categories in object position that are the result of movement to an A-bar position of a base-generated empty object.

11. This model is articulated and motivated by the first author in her dissertation (Uziel n.d.). As explained there, it is consistent in large part with the step-by-step, phase-based model of language acquisition and development proposed by the second author in analyzing a range of domains in Hebrew child language, including inflectional and derivational morphology (Berman 1986, 1993a), syntax (Berman 1987, 1990, 1993b), and narrative/discourse (Berman 1988, 1995).
12. The following example may clarify this point. When Hebrew-speaking children utter something like *aba nini* 'Daddy gimme-2SG-FM-IMP' (cf. normative *aba ten li et ze* 'Daddy give-2SG-MS-IMP to-me ACC it') whenever they point at something that they want, certain NECESSARY conditions are met to show that the child has knowledge of the verb *give* in Hebrew. Even though the utterance lacks correct subject–verb agreement in gender and its direct object is missing, the child uses the verb consistently, with the appropriate illocutionary force, with the imperative form expressing a request for transferring something from the interlocutor to himself as speaker. To meet both the necessary and the sufficient conditions for mastering the argument structure of *give*, the child's utterances must also meet the requirements of gender agreement and direct object specification, as in an utterance like *ima, ni i shokoat* 'mommy-SG-FM give-2SG-FM-IMP to-me chocolate' (cf. normative *ima, tni li shokolad*).
13. The percentage of licensed and unlicensed indirect object ellipsis is based on a very small sample and so cannot be taken as a well-documented phenomenon.

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