

A developmental study of prepositional phrases in Hebrew written text construction

First Language

1–23

© The Author(s) 2016

Reprints and permissions:

sagepub.co.uk/journalsPermissions.nav

DOI: 10.1177/0142723716678130

fla.sagepub.com



Gilad Brandes and Dorit Ravid

Tel Aviv University, Israel

Abstract

Prepositional phrases (PPs) are considered an important feature of mature written expression. However, little is known about the development of PPs during the school years. The study examined the use of PPs in 160 narrative and expository texts, written by Hebrew-users in grades 4, 7, and 11, and adults. PPs were identified, counted, and classified according to their syntactic roles. Statistical analyses were carried out to probe the effects of age and genre on the overall prevalence of PPs, and the prevalence of each role. Results show that PPs become more prevalent and functionally more diversified with age: PP prevalence increased significantly after grade 7 in both genres, and continued to rise after grade 11 in expositives. Grade 4 PPs had a limited set of roles, the majority serving as arguments. In the older age groups the proportion of arguments decreased, concomitantly with an increase in the prevalence of other roles – most markedly verb-adjuncts and noun-modifiers – and the emergence of new PP roles.

Keywords

Expository, Hebrew, later language development, narrative, prepositional phrases, syntax, writing

Introduction

Domain of inquiry

The current study traces the developmental path of prepositional phrases (e.g. *in my office; at risk*) in the context of written text construction in Hebrew across the school years. Putting the focus on phrase-level constructions, this research is aimed at

Corresponding author:

Dorit Ravid, School of Education and the Department of Communication Disorders, Tel Aviv University, Tel Aviv 69978, Israel.

Email: doritr@post.tau.ac.il

advancing our knowledge of the development of complex syntax, from a point of view of the internal structuring of single clauses (Beers & Nagy, 2009; Ravid & Berman, 2010), as opposed to the construction of complex sentences by clause-combining (Berman, in press; Nippold, Hesketh, Duthie, & Mansfield, 2005). The internal structure of clauses undergoes significant change throughout adolescence, as revealed by research into the development of text construction abilities (Berman, 2008; Berman & Ravid, 2009). Specifically, texts produced by older and more experienced language-users contain significantly longer clauses, made up of numerous elaborated phrases, that tightly pack in large amounts of information (Ravid & Zilberbuch, 2003; Scott, 1988).

Prepositional phrases (PPs) in particular are thought to play an important role in the construction of structurally elaborate and informatively dense clauses, and a widespread use of PPs is frequently pointed to as a key feature of a mature, literate style of expression, especially characteristic of academic writing (Biber & Gray, 2010; Chafe & Danielwicz, 1987; Nagy & Townsend, 2012). Consider, for example, the following excerpt, translated from the Hebrew narrative of an adult writer:

- (1) *Madam Aharoni was famous (i) around the neighborhood (ii) for her fondness (iii) of throwing garbage (iv) from the third floor (v) through the clotheslines and (vi) straight to the yard.*

This long clause contains six PPs, which, playing different syntactic and semantic roles, carry the bulk of its content. The first two PPs relate to the adjective *famous*, specifying (i) *among whom* the notorious Madam Aharoni was famous, and (ii) *what* she was famous *for*; (ii) hosts inside itself the remaining four PPs – a complement of the noun *fondness* (iii), which, in turn, hosts three successive spatial-adverbial complements of the gerund *throwing* (iv–vi). This kind of elaborateness of structure and content is generally reserved to literate adults, and lies beyond the reach of younger writers. The PPs in the above clause clearly play an important role in achieving its elaborate nature, and creating its literate register.

Despite the importance of PPs to writing proficiency, little research has been devoted to investigating the path to mastery of PPs in the course of writing development. A marked exception is Hunt's classic research on English-speaking students' written texts (Hunt, 1965), which revealed an age-related increase in the prevalence of noun-modifying PPs (e.g. *kids in my class*), adjective-modifying PPs (e.g. *good at her job*), and manner-adverbial PPs (e.g. *handle with care*) between the 4th and 11th grades.

Against this background, the purpose of the current study was to investigate the use of PPs by Hebrew writers from pre-adolescence to adulthood, in the context of producing written narrative and expository discourse. The following section discusses the nature and functioning of PPs, relating to some of the unique characteristics of Hebrew prepositions. The introduction then proceeds to present the framework in which the current study is situated, in terms of three underlying motifs – later language development, form–function relations, and usage-based research – and lay out the study hypotheses.

Prepositional phrases

Structure and syntactic roles. Traditionally, PPs have been viewed as a kind of case marker, or realizations of features on NPs (Fillmore, 1968; Schachter & Shopen, 2007).

The current study is based on a different view, where prepositions are considered heads of syntactic phrases (Jackendoff, 1973), and PPs are treated as unified functional wholes, with their own structural characteristics, and their own unique set of roles (Halliday & Matthiessen, 2004).

Structurally, a PP consists of the head preposition, followed by a complement. English as well as Hebrew prepositions are most typically complemented by NPs, but other complements are found as well, including adverbs and adjectives (Huddleston & Pullum, 2002; Ravid & Shlesinger, 2000), e.g. *until recently*; *me-xadash* ‘from-new.SG.MASC = anew’.¹ Testifying to the intimate relationship between prepositions and their complements is the fact that PPs are prone to undergo fusion and grammaticalization processes, whereby they transform from compositional expressions to semantically bleached, opaque closed-class items (Nir & Berman, 2010), e.g. *le-yad* ‘to-hand = beside’.

Hebrew prepositions are structurally unique in three major respects. First, the four basic Hebrew prepositions – *be*, *ke*, *le*, and *me* (roughly corresponding to English *in*, *as*, *to*, *from* respectively) – are bound ‘wordlettes’, that attach to the word following them as prefixes, often with morpho-phonological consequences (Ravid, 2012), e.g. *be* ‘in’ + *kavana* ‘intention’ = *be-xavana* ‘intentionally’. Second, in cases where these prepositions (with the exception of *me*) are followed by a definite noun or adjective, they incorporate the definite article, which is indicated by a vowel change, e.g. *le* ‘to’ + *ha-yam* ‘the-sea’ = *la-yam* ‘to-sea.DEF’. Finally, all Hebrew prepositions, when followed by a pronoun, incorporate that pronoun as a kind of inflectional suffix (Berman, 1978), e.g. *be* ‘in’ + *ani* ‘I’ = *bi* ‘in me’.

Functionally, PPs are extremely versatile constructions. The role most typically associated with PPs is the complementation of verbs as ‘indirect objects’ (Givon, 1993) (cf. ‘arguments’ below). But as was demonstrated above, PPs do much more than just that. Some PPs function as modifiers of various parts of speech, including verbs, nouns, adjectives, and prepositions (Huddleston & Pullum, 2002). Others serve as predicates (Hengeveld, 1992). Still other PPs constitute discourse markers (Maschler, 2009). Examples of the various PP roles are given in Table 1. The current study aimed at mapping the different PP roles in Hebrew, with a developmental, discourse-oriented perspective.

Discourse-embedded functions. PPs are frequently mentioned as a means for achieving a dense and concise style of expression, by allowing speakers – and more often writers – to pack several proposition into a single clause (Beers & Nagy, 2009). This compressing ability seems to be central to the functioning of PPs within discourse. But what is it about PPs that allows them to do that? Halliday and Matthiessen (2004) explain the compressing function of PPs in terms of a grammatical metaphor – that is, a realignment in the mapping pattern of semantic units onto grammatical ones. Specifically, a semantic conflation of two situations (events, states, activities), prototypically expressed by a sequence of clauses, can alternatively be expressed – through grammatical metaphor – with a PP operating in the bounds of a single clause. For instance:

- (2) a. *My client went ahead with the lawsuit even though I advised him otherwise.*
 b. *My client went ahead with the lawsuit **against my advice**.*

Table 1. Syntactic roles of PPs.

Role	Example
Argument	<i>ben^kita sheli paga bi</i> member^class of.1SG hurt.3SG.MASC in.1SG 'A classmate of mine hurt me'
Verb-adjunct	<i>hayinu tsrixim lisbol biglalam</i> was.1PL need.PL.MASC suffer.INF because.3PL.MASC 'we had to suffer because of them '
Noun-modifier	<i>ha-métax beyn xaverot tovot</i> the-tension between friends.FEM good .PL.FEM 'The tension between good friends '
Predicate	<i>hu lo ba-rama shelánu</i> he not in-level of.1PL 'He is not in our level '
Discourse marker	<i>le-mashal</i> to-allegory 'for instance'
Adjective-modifier	<i>de'ot politiyot hafuxot mi-sheli</i> views political.PL.FEM opposite.PL.FEM from-of.1SG 'political views opposite of mine '
PP-modifier	<i>be-érex ba-émtsa</i> in-value in-middle.DEF 'roughly in the middle'

- (3) a. *Take a large spoon and scoop the avocados from their shell.*
 b. *scoop the avocados from their shell **with a large spoon.***

In (2b, 3b), one situation is downgraded, and construed metaphorically as a component part of the other. The choice between clause-combining and clause-internal prepositional modification has to do with the 'weight' that is to be assigned to the alluded-to situation, in terms of its referential content, and its communicative and textual status; a PP, unlike a clause, cannot itself be circumstantially elaborated, and does not constitute a speech act, or carry thematic structure of its own. Instead, it offers informational compression, as well as a tighter integration of situations, and an enhancement of the asymmetry in their respective weights.

Of course, compression of two clauses into one, when looked at from the opposite direction, is actually an expansion of that one clause; PPs often enrich the content of a clause by offering elaboration beyond its basic semantic core – in the form of additional participants and/or surrounding circumstances – while naturally also making it longer and structurally more complex.

In their role as noun-modifiers, PPs are crucial for another common kind of grammatical metaphor, namely nominalization. Here the metaphor involves construing situations as static objects rather than dynamic processes (Halliday, 1993). This – perhaps more than

any other feature – is considered a hallmark of written and academic language (Biber & Gray, 2010; Nagy & Townsend, 2012). The flexible nature of PPs allows them to be inherited from verbs down to their corresponding deverbal nouns, thus preserving information about participant entities and surrounding circumstances of situations, even when they are realized nominally, e.g. *his intrusion into my conversation*.

Research framework

Three interrelated motifs underlie the current developmental investigation of PPs:

Later-language development. The study of language development has traditionally focused on early acquisition stages, during the first few years of life (Ravid & Zilberbuch, 2003). Research done over the past two decades, has broken beyond this age-span, revealing language development to be a protracted process, extending throughout the school years and into adulthood (Berman, 2004a; Nippold, 2007). Concomitantly, the framework of language development research was extended with respect to modality, to include not only spoken, but written language as well, acknowledging that coming to master the unique discourse style of writing is a major aspect of later-language development (Ravid & Tolchinsky, 2002). With respect to PPs in particular, developmental research has focused mainly on the initial emergence of prepositions in toddlers (e.g. Johnston, 1988; Rice, 2003; Tomasello, 1987), leaving later developmental stages generally unexplored. The current study aims at tracing the developmental course of PPs beyond initial emergence and on to mature mastery (Berman, 2004b), focusing on written discourse. It was hypothesized that PPs will become more prevalent with age, reflecting a growth in clause-internal structural and semantic complexity.

Form–function relations. One of the major insights from research into later-language development is that advanced linguistic abilities do not necessarily entail the acquisition of more and more new forms, but rather the establishment of new form–function relations, as already existing forms are recruited for designating new functions (Berman, 2007). PPs typically appear in children’s utterances during the third year of life (Dromi, 1979; Johnston, 1988), and they hence undoubtedly constitute ‘old forms’ by the time school children start producing written discourse. The developmental challenge that remains is not in using the form ‘PP’ in itself, but in flexibly deploying this form for its full range of different potential functions within discourse, e.g. for noun and adjective modification as well as for verbal complementation. Accordingly, it was hypothesized that the set of PP roles will become more diversified with age.

Usage-based approach. Rule-based approaches to language view grammar as the set of rules which govern the construction of grammatical sentences, and language acquisition as the rapid process of learning these rules (Berwick, Pietroski, Yankama, & Chomsky, 2011; Wexler, 1982). In contrast, usage-based approaches perceive grammar as a set of resources for achieving communicative goals within social contexts, and language development as the lifelong process whereby generalized representations emerge out of individual usage-events of language production and comprehension (Bybee, 2006; Lieven, 2016; Tomasello, 2003). Usage-based approaches naturally give rise to empirical

research designs, which consider language use within real-life discourse, rather than relying on decontextualized, structured experiments or constructed examples (Chafe, 1994; Hickmann, 2003; Ravid & Berman, 2010). Adopting a usage-based approach, the current study aims to examine how Hebrew speaker-writers' use of PPs in the service of extended discourse production is affected by age and the accumulation of linguistic experience, as well as by different contexts of discourse production.

Two central factors in determining the communicative context within which discourse is produced are modality and genre, and these are predicted to affect the text's syntactic features including the use of PPs. Regarding modality, concern here is with writing, a mode of communication marked by the detachment between addresser and addressee (Olson, 1994). Writing prevents the use of paralinguistic and non-linguistic means of expression, forcing writers to rely on purely linguistic devices, while at the same time enabling the recruitment of greater linguistic complexity, by not posing any immediate-processing demands (Ravid & Tolchinsky, 2002). PPs were found to be more prevalent in writing versus speech (Chafe & Danielwicz, 1987).

Regarding genre, the current study focuses on narrative and expository discourse. While narratives concern agents in a chronologically-unfolding sequence of events (Berman & Slobin, 1994), expository essays present a logically-arranged network of abstract concepts and arguments (Britton, 1994). With respect to the topic at hand, narratives were expected to have a relatively high prevalence of verb-modifying circumstantial PPs, for qualifying surrounding aspects of the narrative events, whereas expository discourse was expected to induce a frequent use of noun-modifying PPs, accompanying nominalizations, and qualifying complex concepts realized in heavy NPs.

Method

Participants

Participants were 80 Hebrew speakers in four age-schooling groups: grade 4 (ages 9–10), grade 7 (12–13), grade 11 (16–17) and graduate university students (25–30). Each group consisted of 10 females and 10 males. All participants were native, monolingual Hebrew speakers, and had no known learning disabilities. Participants were recruited from schools which were ranked as serving a high SES population according to the 'support index' used by the Israeli Ministry of Education. This index, used for guiding the distribution of additional support resources among schools in the country, is based on several measures, including percentage of families with low incomes in school, percentage of parents with low education levels, and percentage of recent immigrants (Ministry of Education, 2002).

Text elicitation procedures

The texts analyzed in the current study are a subset of a corpus collected in the framework of a large-scale cross-linguistic project (Berman & Verhoeven, 2002).² Participants were first shown a three-minute-long wordless film depicting different conflict situations in a school setting. Each participant then produced four texts in two

genres: one spoken and one written personal-experience narratives, and one spoken and one written expository discussions – all on the topic of ‘problems between people’. To elicit narratives, participants were instructed to write about an incident in which they themselves had experienced a situation of ‘problems between people’. In contrast, to elicit expository essays, participants were asked to discuss their ideas and thoughts about the topic of ‘problems between people’, and were explicitly instructed not to write a story, but an essay. For school children, text elicitation extended over two sessions held one to three days apart. Adults produced all four texts in one session. Elicitation order for the four text types was randomly balanced. For further details, see Berman and Katzenberger (2004).

Categories of analysis

PP prevalence. All PPs were identified and counted. Each preposition, along with the phrase or phrases forming its complement, was considered one PP. PPs found inside another PP were also counted, e.g.

(4)	<i>sixsux</i>	[<i>beyn</i>	<i>ha-banot</i>	[<i>ba-kita</i>]]
	conflict	[between	the-girls	[in-class.DEF]]
	‘A conflict	[between	the girls	[in the class]]’

For identifying prepositions, and distinguishing them from other word classes (Schachter & Shopen, 2007), general and Hebrew-specific distributional, functional, and morphological criteria were set: distributionally, prepositions can take NPs as their complements, and verbs as their ‘external arguments’ (Rauh, 2002); functionally, prepositions head phrases which can serve as verb complements and/or adjuncts; and morphologically, Hebrew prepositions inflect for number, person, and gender (Shlesinger, 2000). Applying these criteria lead to the identification of 45 different Hebrew prepositions in the study texts.

Naturally, this set of Hebrew prepositions does not fully coincide with corresponding categories in other languages. Thus, some function words considered prepositions in English were not considered as such in the present analysis – and vice versa, based on the Hebrew-specific criteria presented above. An example of exclusion is the function word *shel*, equivalent to English *of* in such expressions as *types of people*; this was precluded from the present analysis since it never complements or modifies verbs, and serves only to modify nouns (Berman, 1978; Ravid & Assulin Tzabar, in press) – thus failing to satisfy our distributional and functional criteria. An example of inclusion is the word *biglal*, corresponding in meaning to English *because*. While *because* does not function as a preposition in English, but as an adverbial subordinator, *biglal* satisfies all three criteria, and thus was considered a preposition (as in other accounts, e.g. Glinert, 1989), and consequently included in the analysis (see second example in Table 1).

The Hebrew accusative case marker *et* was the only item precluded from analysis despite satisfying our criteria. Accusative *et* is different from all of the items which were identified as prepositions in that it *obligatorily* precedes any definite direct object, while failing to precede non-definite direct objects (Berman, 1978).

Syntactic roles. Each PP was classified in one of seven syntactic roles. The different roles are presented in Table 1, with examples from the study texts. The first two roles – argument and adjunct – are both verb-related. The distinction between the two is notoriously problematic: rather than being dichotomous categories, they define the two ends of a continuum, along which numerous kinds of intermediate entities are found (Givon, 1993; Hopper & Thompson, 1980). A more fine-grained categorization of verb-related PPs can be found in Brandes (2015, in Hebrew). For the purposes of this report, however, all verb-related PPs were classified as either arguments or adjuncts. Assignment to these categories was based on semantic, rather than grammatical considerations (Fillmore, 1994); arguments were defined as PPs which designate participants – that is, entities and concepts taking part in the scenario defined by the verb – regardless of the extent they are obligatorily ‘licensed’ by that verb. Adjuncts, on the other hand, designate surrounding circumstances of scenarios, relating to such aspects as time, place, cause, and manner.

Discourse markers are non-referential elements, which rather than referring to things in the ‘real world’, relate to the textual or interpersonal structure of the discourse itself (Maschler, 2009). PP-modifiers are specifiers like English *straight* in *straight through the wall*, which in Hebrew typically take the form of fused, semi-grammaticalized PPs.

Reliability

The texts were coded by the first author, in close consultation with the second author. To test reliability, a second coder, who was instructed about the different categories of analysis, independently coded 20% of the texts. For this portion of the study texts, inter-coder agreement kappa scores of .72 or above were obtained for the different coded variables.

Statistical analysis

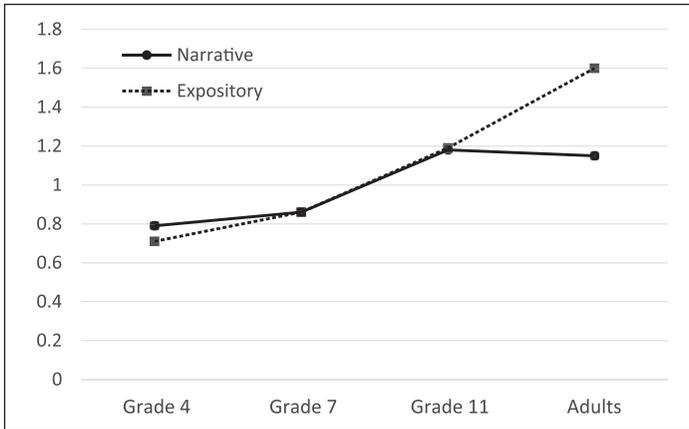
Statistical analyses were carried out in order to probe the effects of age and genre on PPs in general and on each of the PP roles independently. For overall PPs, the mean number of PPs per clause was used as the dependent variable, rather than raw numbers, in order to prevent text-length differences from skewing the results. To this end, a clause was defined as a unified predicate expressing a single situation (Berman & Slobin, 1994). For PP roles, two complementary dependent variables were used: (1) the mean number of PPs with each role per clause, and (2) the proportion of PPs with each role respective to the total number of PPs.

The Generalized Estimating Equations (GEE) modeling technique was used, which allows several non-normal distributions as dependent variables (Hardin & Hilbe, 2013). In our case, the over-dispersed variables indicated a negative binomial distribution. The GEE allows for that non-normal distribution, while testing for both age and genre, as well as their interaction effect.

Effect sizes are provided as the exponent of the regression estimates, similar to a binomial model. There is no way to align these effects with the known effect-size, but they are comparable across estimates. Exponent values (β) are indicated in cases of a

Table 2. Mean number and standard deviations of clauses per text by age group and genre.

Age group	Narrative	Expository
Grade 4	7.35 (7.23)	7.25 (7.88)
Grade 7	15.1 (9.95)	13.5 (10.23)
Grade 11	12.55 (6.61)	15.58 (9.62)
Adults	17.95 (10.23)	20.5 (18.24)

**Figure 1.** Mean number of PPs per clause: interaction of age group and genre.

significant effect for each level of the dependent variable respective of a reference level (the adult group for age, and expository texts for genre). These values represent the ratio between the probability of a given value being higher on the scale respective of the reference value, and the probability of it being lower. For instance, a beta value of 1.5 means 1.5 times greater odds of being higher than lower.

Results

PP prevalence

Table 2 presents the mean number of clauses per text by age group and genre. The mean number of PPs per clause in each age group by genre is presented in Table 3. The analysis yielded a significant effect of age on the mean number of PPs per clause ($\chi^2(3) = 41.39, p < .001$; grade 4 vs. adults: $\beta = 0.41, p < .001$; grade 7 vs. adults: $\beta = 0.48, p < .001$; grade 11 vs. adults: $\beta = 0.66, p < .05$), but no genre effect. Additionally, an interaction of age and genre emerged ($\chi^2(3) = 10.77, p < .05$; grade 4 vs. adults: $\beta = 1.46, p < .01$; grade 7 vs. adults: $\beta = 1.36, p < .05$; grade 11 vs. adults: $\beta = 1.39, p < .01$), depicted in Figure 1. A post-hoc least significant difference (LSD) test revealed that in both genres, the mean number of PPs per clause was lower in grades 4 and 7 compared with grade 11 and adults. There were fewer PPs per clause in 11th-grade texts compared with adults, in

Table 3. Mean number and standard deviations of PPs per clause by age group and genre.

Age group	Narrative	Expository
Grade 4	0.79 (0.39)	0.71 (0.50)
Grade 7	0.86 (0.39)	0.86 (0.40)
Grade 11	1.18 (0.62)	1.19 (0.47)
Adults	1.15 (0.37)	1.60 (0.57)

expositives only. The two genres did not differ, except in the adult group, where there were more PPs per clause in expositives compared with narratives.

PP roles

Table 4 presents the mean tokens per clause of the different PP roles by age group and genre. An effect of genre was found on the mean number of arguments per clause ($\chi^2(1) = 11$, $p = .001$; Nar. vs. Exp: $\beta = 1.1$, $p > .05$), with these PPs being more prevalent in narratives. No age effect was found. With respect to verb-adjuncts, the analysis yielded an age effect ($\chi^2(3) = 31.14$, $p < .001$; grade 4 vs. adults: $\beta = 0.81$, $p < .05$; grade 7 vs. adults: $\beta = 0.81$, $p < .001$; grade 11 vs. adults: $\beta = 0.99$, $p > .05$) – with a significant increase after 7th grade – but no genre effect. With respect to noun-modifying PPs, there was an age effect ($\chi^2(3) = 24.51$, $p < .001$; grade 4 vs. adults: $\beta = 0.62$, $p < .001$; grade 7 vs. adults: $\beta = 0.7$, $p < .01$; grade 11 vs. adults: $\beta = 0.74$, $p < .01$), a genre effect ($\chi^2(1) = 14.36$, $p < .001$; Nar. vs. Exp: $\beta = 1.08$, $p > .05$), and an interaction ($\chi^2(3) = 10.67$, $p < .05$; grade 4 vs. adults: $\beta = 1.46$, $p < .01$; grade 7 vs. adults: $\beta = 1.36$, $p < .05$; grade 11 vs. adults: $\beta = 1.39$, $p > .01$). In narratives, these PPs were more prevalent in adults compared with grade 4. In expositives, they were more prevalent in adults compared with all other age groups, as well as in grade 11 compared with grade 4. The two genres did not differ in the number of noun-modifiers per clause, except in the adult group, where they were more prevalent in expositives. Inferential analyses were not carried out on predicates, discourse markers, adjective-modifiers, and PP-modifiers, due to the small numbers of tokens in these categories.

The mean percentages of the different PP roles out of the total number of PPs as a function of age and genre are presented in Table 5. Analyses yielded the following effects. The proportion of arguments decreased with age ($\chi^2(3) = 45.36$, $p < .001$; grade 4 vs. adults: $\beta = 3.64$, $p < .001$; grade 7 vs. adults: $\beta = 1.76$, $p < .001$; grade 11 vs. adults: $\beta = 1.26$, $p > .05$), with cut-off points after grade 4 and after grade 7. Additionally, it was greater in narratives compared with expositives ($\chi^2(1) = 26.98$, $p < .001$; Nar. vs. Exp: $\beta = 1.85$, $p < .001$). The proportion of adjuncts was also greater in narratives ($\chi^2(1) = 6.61$, $p = .01$; Nar. vs. Exp: $\beta = 1.34$, $p < .05$). The proportion of noun-modifying PPs increased with age ($\chi^2(3) = 21.6$, $p < .001$; grade 4 vs. adults: $\beta = 0.3$, $p < .001$; grade 7 vs. adults: $\beta = 0.63$, $p < .05$; grade 11 vs. adults: $\beta = 0.77$, $p > .05$). It was greater in the three older age groups compared with grade 4, and in adults compared with grade 7. Additionally, there was a greater proportion of noun-modifiers in expositives ($\chi^2(1) = 35.34$, $p < .001$; Nar. vs. Exp: $\beta = 0.47$, $p < .001$). Inferential analyses were not carried out on predicates, discourse markers, adjective-modifiers, and PP-modifiers.

Table 4. Mean tokens per clause and standard deviations of PPs in each role by age group and genre.

Role	Grade 4		Grade 7		Grade 11		Adults	
	Nar.	Exp.	Nar.	Exp.	Nar.	Exp.	Nar.	Exp.
Argument	0.48 (0.30)	0.37 (0.41)	0.44 (0.20)	0.28 (0.16)	0.46 (0.25)	0.29 (0.16)	0.41 (0.18)	0.31 (0.20)
Verb-adjunct	0.18 (0.22)	0.19 (0.41)	0.24 (0.18)	0.18 (0.14)	0.44 (0.28)	0.38 (0.31)	0.47 (0.28)	0.39 (0.22)
Noun-modifier	0.09 (0.15)	0.11 (0.25)	0.13 (0.22)	0.22 (0.24)	0.21 (0.26)	0.28 (0.24)	0.18 (0.14)	0.58 (0.44)
Predicate	0.03 (0.08)	0.01 (0.06)	0.03 (0.05)	0.03 (0.06)	0.02 (0.04)	0.03 (0.05)	0.01 (0.03)	0.03 (0.06)
Discourse marker	0	0.03 (0.07)	0.02 (0.04)	0.11 (0.15)	0.03 (0.05)	0.14 (0.11)	0.04 (0.05)	0.12 (0.11)
Adjective-modifier	0	0	0.001 (0.005)	0.03 (0.07)	0.02 (0.05)	0.05 (0.07)	0.04 (0.06)	0.12 (0.1)
PP-modifier	0	0	0.01 (0.02)	0.002 (0.009)	0.01 (0.05)	0.02 (0.04)	0.004 (0.02)	0.05 (0.11)

Table 5. Mean percentages and standard deviations of the different PPs roles out of all PP tokens by age group and genre.

Role	Grade 4		Grade 7		Grade 11		Adults	
	Nar.	Exp.	Nar.	Exp.	Nar.	Exp.	Nar.	Exp.
Argument	66.00 (30.54)	55.37 (37.90)	53.37 (16.25)	32.78 (18.07)	42.76 (21.30)	27.91 (17.25)	36.85 (16.82)	20.33 (10.80)
Verb-adjunct	21.29 (22.72)	23.38 (33.24)	26.78 (18.41)	28.05 (25.87)	36.50 (15.66)	31.14 (23.79)	38.29 (17.76)	26.53 (14.16)
Noun-modifier	8.73 (12.36)	16.79 (34.19)	12.78 (14.92)	21.50 (16.60)	15.11 (16.58)	20.98 (15.58)	16.18 (13.84)	34.38 (15.20)
Predicate	3.98 (8.07)	0.79 (3.37)	4.07 (6.54)	4.22 (7.38)	1.46 (3.88)	3.35 (5.32)	1.41 (3.40)	1.74 (3.19)
Discourse marker	0	3.67 (8.04)	2.20 (4.56)	8.63 (10.73)	2.64 (4.23)	10.54 (7.10)	3.14 (4.28)	7.64 (5.60)
Adjective-modifier	0	0	0.13 (0.56)	4.59 (9.47)	1.01 (2.65)	4.88 (7.03)	3.91 (6.06)	7.21 (5.20)
PP-modifier	0	0	0.68 (1.98)	0.25 (1.12)	0.51 (1.59)	1.21 (3.03)	0.22 (0.97)	2.17 (4.47)

Discussion

PP prevalence

The current study traced the use of PPs in narrative and expository texts written by Hebrew speakers in four age groups, from grade-school to adulthood. This investigation was motivated by findings pointing to clause-internal complexity as a major aspect of later-syntactic development (Berman & Ravid, 2009), concurrent with the view that PPs in particular play an important role in creating the syntactic texture characteristic of mature written expression (Nagy & Townsend, 2012). Accordingly, it was hypothesized that PPs will become more prevalent with age and schooling.

The results reported above support this hypothesis. Particularly, Hebrew-speaking adults and high-schoolers used PPs more frequently than junior-high and grade-school students, in both genres. To illustrate, the mean number of PPs per clause in grade 4 was 0.75 – an average of three PPs per every four clauses. This figure nearly doubled in adults, reaching 1.4 PPs per clause, or three PPs in little over two clauses on average. Results point to a developmental boost in the use of PPs occurring at a rather late period – between grades 7 and 11 – during which writers come to recruit PPs more often, in ways that serve both narrative and expository discourse.

But while for narratives this seemed to be the end of the developmental story, mastering PPs in the context of expository writing emerged as a more protracted process. The mean number of PPs per clause in adult expositives was 1.6 – greater than in any of the younger groups, including grade 11. These results suggest that even after high school, Hebrew-users are still developing their skill in using PPs in the service of expository expression – a very late development indeed.

The rate of 1.6 PPs per clause in adult expositives stands out even compared with adult narratives, which had a mean of only 1.15 PPs per clause. This is in line with findings from English showing that PPs are especially prevalent in academic writing (Chafe & Danielwicz, 1987). Unlike adults, the prevalence of PPs did not differentiate the two genres in any of the younger age groups. This is at odds with other linguistic features, like the amount of verbs versus nouns, that were found to differentiate narrative and non-narrative discourse from as early as preschool (Sandbank, 2002). This, once again, points to a heightened prevalence of PPs as a late-consolidating feature of expository discourse.

Using more PPs inevitably means constructing longer clauses that are structurally more elaborate and semantically richer. Thus, the reported results highlight the specific contribution made by PPs to the development of clause-internal syntactic complexity, and the consolidation of a maturely-dense discourse texture. Given PPs' functional heterogeneity, the obvious question that remains to be answered is which particular kinds of PPs are those that distinguish the different age groups and genres.

PP roles

The results regarding PPs' syntactic roles offer further insight into the general developmental process outlined so far. Notice first the initial dominance of argument PPs – verb complements representing participants of situations – and their subsequent decline. In

grade 4, arguments alone constituted over 50% of all PPs in both genres (two thirds in narratives and little over a half in expositives), agreeing with the view of verb complementation as the most basic, prototypical role of PPs (Givon, 1993). However, the proportion of arguments dropped sharply with age, reaching in adulthood a low of little over a third of all PPs in narratives, and just one fifth in expositives.

The decrease in the proportion of arguments was not accompanied by a significant decrease in prevalence – in terms of mean tokens per clause – showing that it was generated by a growth in the prevalence of other, less typical PP roles – some of which were already existing, others completely new. The various roles did not grow at the expense of, but additionally to the more basic argument role – driving the increase in overall PP prevalence.

From a point of view of form–function relations, these results reveal growing flexibility, with older and more experienced writers gradually employing PPs for more varied, and less typical purposes, as indeed was hypothesized. This is true for both genres, but more markedly for expositives, where at the end of the age-span investigated, the great majority of PPs were used for purposes other than verb complementation.

The two major non-argument PP roles in the sample were *verb-adjunct* and *noun-modifier*. These roles were already found in grade 4 texts, but still relatively rarely: one adjunct in every 5.5 clauses, and one noun-modifier in every 10 clauses, compared with a rate of arguments nearing one in every two clauses on average in the older groups. The prevalence of adjuncts and noun-modifiers increased substantially, reaching in adults average rates of almost one per three clauses and one per four clauses respectively. Thus, while novice writers in grade-school are already familiar with the use of PPs for circumstantially enhancing verbs, and for qualifying nouns, they do not employ PPs for these purposes as frequently as adults do.

Discourse markers were another type of PP whose prevalence increased with age. Notably, discourse markers were restricted in grade 4 to expositives alone, and first appeared in narratives only in grade 7 – pointing to a developmental growth not only in the prevalence of these PPs, but also in the scope of their communicative environments.

But perhaps the most salient expression of the functional diversification of PPs is the emergence of two entirely new PP roles in grade 7 – namely, *adjective-modifier* and *PP-modifier*. Nine- to 10-year-old 4th graders – very old in traditional terms of language development – are apparently not yet able to employ PPs for these roles, revealing the process of gaining full command of the functional scope of Hebrew PPs to be a protracted one, completed only in the second decade of life.

Predicative PPs were rare in all age groups and in both genres, and are thus not discussed further. The two following sections discuss in more detail the two developmentally most significant PP roles: verb-adjuncts and noun-modifiers. This is followed by a briefer discussion of some of the other, less common roles.

Verb-adjuncts. Adjuncts are verb-modifying PPs that introduce additional circumstantial information into a clause, thus enriching its content, and making it longer and structurally more elaborate. As such, they constitute important contributors to the kind of clause-level complexity characteristic of mature expression. Concomitantly, adjuncts promote overall informational compression and density, by packing entire propositions as component parts of other clauses.

Unsurprisingly, adjuncts became more prevalent with age, being used twice as frequently by adults and high-schoolers compared with junior-high and grade-school students. The mean number of adjuncts per clause increased from just 0.18 in grade 4 to 0.43 in adults – from less than one in every five clauses to more than one in every 2.5.

The proportion of adjuncts out of all PP tokens increased from about 20% in grade 4 to roughly 30% in adults – nearly one in every three PPs. However, this difference was not statistically significant. The reason is that alongside adjuncts, there was an increase in the prevalence of other types of PPs, so that their relative place in the overall picture was retained.

Recall that adjuncts were hypothesized to be more prevalent in narratives than in expositorys, since the kind of concrete events comprising the plot of a narrative were thought to be more readily enhanced circumstantially compared with the abstract concepts dealt with in expositorys. However, the two genres did not differ in the prevalence of adjuncts, suggesting that these PPs serve equally important purposes in expository discourse as they do in narratives. The proportion of adjuncts was indeed greater in narratives, likely due to a greater prevalence in expositorys of other types of PPs, such as noun-modifiers and discourse markers.

The adjuncts found in the sample were of four main semantic types – place, time, cause, and manner – of which the first two were by far the most common, in both genres. In narratives they indicated specific times and locations, serving three main functions; some designated spatial and temporal aspects of specific events in the plot-line, e.g.

- (5) *hem tsa'aku et ze ba-kita*
 they.MASC shouted.3PL ACC this **in-class.DEF**
 'The shouted it **in the classroom**'

Quite a few others appeared within the opening segment, establishing the settings for the entire story, e.g.

- (6) *be-sof kita tet asiti mesiba etsli ba-báyit*
in-end grade nine did.1SG party **at.1SG in-house.DEF**
 'At the end of ninth grade I threw a party at my house'

A third common function of (preposed) time adjuncts was to mark the start of a new episode, locating it along the narrative's temporal axis, e.g.

- (7) *axarey kama dakot báti lehikanes la-xéder*
after few minutes came.1SG enter.INF to-room.DEF
 'After a few minutes I went to go into the room'

Time and place adjuncts were commonly used in expositorys as well. In accordance with the nature of the genre, they were not specific, but rather expressed generic times and places, typically indicating the scope of abstract phenomena, e.g.

- (8) *lo neyaxasim le-xax maspik xashivut ba-xevra*
 not ascribe.PL.MASC to-thus enough importance **in-society**.DEF
ha-visra'elit
the-Israeli
 'It is not ascribed enough importance **in Israeli society**'

While time and place adjuncts were common in all age groups, some developmental trends were apparent, relating to the emergence of a wider variety of complex temporal relations, e.g.

- (9) *le-órex kol ha-bikur*
 to-length all the-visit
 'throughout the visit'

of abstract locations, e.g.

- (10) *ba-xevra*
 in-society.DEF
 'in society'

and of high-register expressions, e.g.

- (11) *im xazarato*
 with return.3SG.MASC
 'upon his return'

A discussion of the other semantic types of adjuncts is beyond the scope of this article. For a detailed discussion of manner adjuncts, see Brandes and Ravid (2016).

Noun-modifiers. Learning to construct and use heavy NPs to provide rich descriptions of entities and abstract concepts is a major aspect of later syntactic development, and especially in Hebrew (Ravid & Berman, 2010). Previous studies have traced the development of various noun-modifying devices such as adjectives, relative clauses, and N-N compounds (Nippold et al., 2005; Ravid & Levie, 2010; Ravid & Zilberbuch, 2003), to which this study adds the PP, highlighting its role as another important strategy for NP expansion.

In grade 4 texts, noun-modifying PPs were still uncommon, appearing only once in every 10 clauses on average. However, their prevalence nearly quadrupled during the age-span investigated, reaching in adults a mean of 0.38 per clause – one noun-modifier in every 2.6 clauses. The proportion of noun-modifiers also increased, from just 12% in grade 4 to a quarter of all PPs in adults – showing that noun modification gradually became one of the major uses for PPs. These results suggest that PPs play an important part in the process of developing NP complexity in written Hebrew.

Using PPs as noun-modifiers is a marked option, since PPs are most basically verb-related, while nouns are typically modified by adjectives. Thus, an increased prevalence

of noun-modifying PPs reveals increased linguistic flexibility, expressing the kind of realignment of form–function relations characteristic of later-language development (Berman, 2007).

The results for narratives point to a slowly progressing increase in the prevalence of noun-modifiers, with the only significant difference emerging between grade 4 and adults. In expositives, noun-modifiers already became significantly more prevalent in high school, and continued to rise even after that point; adult expositives had a mean of 0.58 noun-modifiers per clause – more than one in every two clauses – compared with just 0.28 in high-school expositives. In fact, noun-modifiers were the only type of PP that significantly increased after high school – thus emerging as the major contributors to the growth in overall PP prevalence during that period.

It was hypothesized that noun-modifiers would be more prevalent in expositives – which rely heavily on reference to complex concepts – compared with narratives. This hypothesis was partially corroborated. The proportion of noun-modifiers out of all PPs was indeed greater in expositives. In terms of tokens per clause, however, the only significant genre effect was obtained in the adult group. That is, only in adulthood did expository discourse become a preferred context for employing PPs for the purpose of noun modification.

Recall that participants were instructed to write about ‘problems between people’ – which contains a noun-modifying PP. It is possible that this led to a greater prevalence of noun-modifiers than would have been found otherwise, since this wording was echoed in some of the texts. However, the use of PPs as noun-modifiers was a wide phenomenon, far from being restricted to this specific expression.

A qualitative examination of noun-modifying PPs reveals some further interesting trends. These PPs initially had very restricted uses: in 4th-grade narratives they were almost exclusively recruited to provide simple qualifications of people, e.g.

- (12) *ye'led me-ha-kita sheli*
 boy from-the-class of.1SG
 ‘a boy **from my class**’

while in expositives, there were mostly juvenile anaphoric expressions including a sequence of the preposition *ke* ‘as’ + demonstrative, e.g.

- (13) *lo lignov ve-dvarim ka-éle*
 not steal.INF and-things as-these
 ‘not to steal and things like that’

Starting from grade 7, noun-modifiers began to be used with much more sophistication, for qualifying people as well as inanimate objects and abstract concepts from various perspectives, e.g.

- (14) *nórmot le-hitnahagut xevratit*
 norms to-behavior social.SG.FEM
 ‘norms **for social behavior**’

- (15) *be'aya im axat me-ha-xaverot sheli*
 problem **with** **one.FEM** **from-the-frienrds.FEM** **of.1SG**
 'a problem with one of my friends'

An especially important use of noun-modifying PPs is the modification of nominalized forms. Nominalization – the construal of situations as static entities – is the bread and butter of expository discourse, which deals with general phenomena rather than the unfolding of specific events, but is also a hallmark of mature narration, which typically adopts a detached, abstract stance (Berman, 2005; Ravid & Cahana-Amitay, 2005). From grade 7 on, but most markedly in adults, PPs supported the use of nominalizations by designating related participants and circumstances, thus maintaining a full event structure around them – in expositories, e.g.

- (16) *muda'ut le-be'ayot*
 awareness **to-problems**
 'awareness **of problems**'

- (17) *vikuxim ba-kvish*
 disputes **on-road.DEF**
 'disputes **on the road**'

as well as in narratives, e.g.

- (18) *ha-sin'a beyn shtey ha-kvutsot hayta*
 the-hatred **between** **two.FEM.GEN** **the-groups** was.SG.FEM
hadadit
 mutual.SG.FEM
 'The hatred **between the two groups** was mutual'

Other roles. *Discourse markers* are PPs serving a procedural function, referring to the discourse itself. In expositories, discourse markers were mostly of the form *le-da'ati* 'to-opinion.1SG = in my opinion', or else – mostly in adults – served to provide 'structure-building instructions' (Britton, 1994), guiding the reader through the process of constructing the intended network of ideas, e.g.

- (19) *mi-tsad sheni*
 from-side second.SG.MASC
 'on the other hand'

In narratives, discourse markers first appeared in grade 7, mostly providing interpersonal evaluatory cues, e.g.

- (20) *hi lo hayta muxana lehakshiv bi-xlal*
 she not was.3SG.FEM prepared.SG.FEM listen.INF **in-all**
 'She wasn't willing to listen **at all**'

Adjective-modifiers and *PP-modifiers* are the two types of PPs which first emerged in grade 7. Common to both these roles is a tertiary function, as modifiers of modifiers – either adjectives or (mostly verb-adjunct) PPs – allowing the construction of elaborated modifying expressions. PP-modifiers are the least common type in the sample, remaining rare in all age groups. Adjective-modifiers grew in prevalence throughout the age-span investigated, and were generally more prevalent in expositives, where there are simply more adjectives (Ravid & Levie, 2010). Adjective-modifiers mostly conveyed an intensifying meaning, e.g.

- (21) *xashuv* *be-yoter*
 important **in-more**
 ‘very important’

or else served to delimit the attributive scope of an adjective, e.g.

- (22) *kashe* *le-fitron*
 hard **to-solution**
 ‘hard to solve’

Conclusion

PPs have long been a topic of investigation in general linguistics (e.g. Halliday & Matthiessen, 2004; Jackendoff, 1973), as well as in usage-oriented research – focusing on early acquisition on the one hand (e.g. Rice, 2003; Tomasello, 1987), and on adult discourse on the other (e.g. Chafe & Danielwicz, 1987; Nagy & Townsend, 2012). The current Hebrew-based work extends the framework of the study of PPs to include the period of later-language development, offering new insight into the path to mastery of PPs, as part of the process of developing linguistic literacy during the school years.

Hebrew PPs were revealed to be a later-consolidating device, whose development extends throughout the adolescent years and into adulthood. It was shown that PPs are recruited significantly more frequently with age, taking part in driving the process of developing clause-internal syntactic complexity, and achieving a dense and concise style of expression.

Beyond mere quantity, Hebrew PPs were shown to become functionally diversified with age – undergoing a developmental shift ‘from dichotomy to divergence’ (Berman, 2008) – as increasing numbers of PPs are employed for purposes other than the most typical, and initially prevailing argument role. Most markedly, development brings about substantial growth in the use of PPs as verb-adjuncts and noun-modifiers, as well as the emergence of adjective and PP modification as two completely new PP roles.

Studying naturalistic extended discourse has made it possible to examine the ways in which the use of PPs in Hebrew is accommodated under the contrasting communicative contexts of producing narrative and expository discourse. While narratives – typically dynamic and concrete in nature – had a greater proportion of verb-related PPs designating participants and circumstances of events, the more abstract expositives induced a wider use of PPs as noun-modifiers, adjective-modifiers, and discourse markers. A close examination of PPs in context revealed how items with even the same syntactic role are recruited to serve different semantic and discursal purposes in each genre and in each age group.

In sum, PPs were studied as an aspect of later syntactic development in written Hebrew. Examining the use of PPs in context, we have shown that with age, schooling, and growing experience, Hebrew users learn to employ these constructions more frequently, as well as more flexibly, in ways specifically suited to the needs arising in different communicative contexts. The study provides evidence that syntactic abilities continue to evolve into late adolescence, well beyond the period targeted in traditional developmental research, demonstrating the benefits of a usage-based approach to understanding the nature of these later stages of language development.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by a Chief Scientist (Education Ministry) Grant No. 0607015371 to Dorit Ravid.

Notes

1. *x* represents the voiceless velar fricative. A hyphen marks elements that are attached in Hebrew but separate in English. Word-stress is ultimate unless marked otherwise. The glottal stop and the voiced pharyngeal fricative, which are often omitted in casual speech, are marked with an apostrophe only in word-middle position.
2. Data collection was funded by a major research grant from the Spencer Foundation, Chicago, for the study of ‘Developing Literacy across Different Text Types, Ages, and Languages’ (1997–2000), Ruth Berman, PI.

References

- Beers, S. F., & Nagy, W. E. (2009). Syntactic complexity as a predictor of adolescent writing quality: Which measures? Which genre? *Reading and Writing*, 22, 185–200.
- Berman, R. A. (1978). *Modern Hebrew structure*. Tel Aviv, Israel: University Publishing Projects.
- Berman, R. A. (Ed.). (2004a). *Language development across childhood and adolescence*. Amsterdam, The Netherlands: John Benjamins.
- Berman, R. A. (2004b). Between emergence and mastery: The long development route of language acquisition. In R. A. Berman (Ed.), *Language development across childhood and adolescence* (pp. 9–34). Amsterdam, The Netherlands: John Benjamins.
- Berman, R. A. (2005). Introduction: Developing discourse stance in different text types and languages. *Journal of Pragmatics*, 37, 105–124.
- Berman, R. A. (2007). Developing linguistic knowledge and use across adolescence. In E. Hoff, & M. Shatz (Eds.), *Blackwell handbook of language development* (pp. 347–367). Oxford, UK: Blackwell.
- Berman, R. A. (2008). The psycholinguistics of texts construction. *Journal of Child Language*, 35, 1–37.
- Berman, R. A. (in press). Development of complex syntax: From early clause- combining to text-embedded syntactic packaging. In A. Bar-On, & D. Ravid (Eds.), *Handbook of communication disorders*. Berlin, Germany: Mouton de Gruyter.

- Berman, R. A., & Katzenberger, O. (2004). Form and function in introducing narrative and expository texts: A developmental perspective. *Discourse Processes*, 38, 57–94.
- Berman, R. A., & Ravid, D. (2009). Becoming a literate language user: Oral and written text construction across adolescence. In D. R. Olson, & N. Torrance (Eds.), *The Cambridge handbook of literacy* (pp. 92–111). Cambridge, UK: Cambridge University Press.
- Berman, R. A., & Slobin, D. I. (1994). *Relating events in narrative: A crosslinguistic developmental study*. Hillsdale, NJ: Lawrence Erlbaum.
- Berman, R. A., & Verhoeven, L. (2002). Developing text production abilities in speech and writing. *Written Languages & Literacy*, 5, 1–22.
- Berwick, R. C., Pietroski, P., Yankama, B., & Chomsky, N. (2011). Poverty of the stimulus revisited. *Cognitive Science*, 35, 1207–1242.
- Biber, D., & Gray, B. (2010). Challenging stereotypes about academic writing: Complexity, elaboration, explicitness. *Journal of English for Academic Purposes*, 9, 2–20.
- Brandes, G. (2015). *Prepositional phrases as manner adverbs in the development of Hebrew written discourse syntax* (Master's thesis). Tel Aviv University, Tel Aviv, Israel (in Hebrew).
- Brandes, G., & Ravid, D. (2016). Prepositional phrases as manner adverbials in the development of Hebrew L1 text production. In L. Ortega, A. E. Tyler, H. I. Park, & M. Uno (Eds.), *The usage-based study of language learning and multilingualism* (pp. 55–73). Washington, DC: Georgetown University Press.
- Britton, B. K. (1994). Understanding expository text: Building mental structure to induce insights. In M. A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 641–674). New York, NY: Academic Press.
- Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 82, 711–733.
- Chafe, W. (1994). *Discourse, consciousness, and time: The flow and displacement of conscious experience in speaking and writing*. Chicago, IL: The University of Chicago Press.
- Chafe, W., & Danielwicz, J. (1987). Properties of spoken and written language. In R. Horowitz, & J. Samuels (Eds.), *Comprehending oral and written language* (pp. 83–113). New York, NY: Academic Press.
- Dromi, E. (1979). More on the acquisition of locative prepositions: An analysis of Hebrew data. *Journal of Child Language*, 6, 547–562.
- Fillmore, C. J. (1968). The case for case. In E. Bach, & R. Harms (Eds.), *Universals in linguistic theory* (pp. 1–90). New York, NY: Holt, Rinehart and Winston.
- Fillmore, C. J. (1994). Under the circumstances (place, time, manner, etc.). In *Proceedings of the twentieth annual meeting of the Berkeley linguistics society: General session dedicated to the contributions of Charles J. Fillmore* (pp. 158–172). Berkeley, CA: Berkeley Linguistics Society.
- Givon, T. (1993). *English grammar: A function-based introduction* (Vol. 1). Amsterdam, The Netherlands: John Benjamins.
- Glinert, L. (1989). *The grammar of modern Hebrew*. Cambridge, UK: Cambridge University Press.
- Halliday, M. A. K. (1993). Towards a language-based theory of learning. *Linguistics and Education*, 5, 93–116.
- Halliday, M. A. K., & Matthiessen, C. M. (2004). *An introduction to functional grammar*. London, England: Edward Arnold.
- Hardin, J. W., & Hilbe, J. M. (2013). *Generalized estimating equations* (2nd ed). Boca Raton, FL: Chapman & Hall/CRC Press.
- Hengeveld, K. (1992). *Non-verbal predication: Theory, typology, diachrony*. Berlin, Germany: Mouton de Gruyter.
- Hickmann, M. (2003). *Children's discourse: Person, space, and time across languages*. Cambridge, UK: Cambridge University Press.

- Hopper, P. J., & Thompson, S. A. (1980). Transitivity in grammar and discourse. *Language*, 56, 251–299.
- Huddleston, R., & Pullum, G. K. (2002). *The Cambridge grammar of the English language*. Cambridge, UK: Cambridge University Press.
- Hunt, K. W. (1965). *Grammatical structures written at three grade levels* (Research Rep. No. 3). Urbana, IL: National Council of Teachers of English.
- Jackendoff, R. S. (1973). The base rules for prepositional phrases. In S. Anderson, & P. Kiparsky (Eds.), *A festschrift for Morris Halle* (pp. 345–356). New York, NY: Holt, Rinehart and Winston.
- Johnston, J. J. (1988). Children's verbal representation of spatial location. In J. Stiles-Davis, M. Kritchevsky, & U. Bellugi (Eds.), *Spatial cognition: Brain bases and development* (pp. 195–205). Hillsdale, NJ: Lawrence Erlbaum.
- Lieven, E. (2016). Usage-based approaches to language development: Where do we go from here? *Language and Cognition*, 8, 346–368.
- Maschler, Y. (2009). *Metalanguage in interaction: Hebrew discourse markers*. Amsterdam, The Netherlands: John Benjamins.
- Ministry of Education. (2002). *Ma'arexet haxinux bir'i hayishuvim* [The educational system through the window of the settlements] (in Hebrew). Jerusalem, Israel: Author.
- Nagy, W. E., & Townsend, D. (2012). Words as tools: Learning academic vocabulary as language acquisition. *Reading Research Quarterly*, 47, 91–108.
- Nippold, M. A. (2007). *Later language development: School-age children, adolescents and young adults* (3rd ed.). Austin, TX: Pro-Ed.
- Nippold, M. A., Hesketh, L. J., Duthie, J. K., & Mansfield, T. C. (2005). Conversational versus expository discourse: A study of syntactic development in children, adolescents, and adults. *Journal of Speech, Language, and Hearing Research*, 48, 1048–1064.
- Nir, B., & Berman, R. A. (2010). Parts of speech as constructions: The case of Hebrew 'adverbs'. *Constructions and Frames*, 2, 242–274.
- Olson, D. R. (1994). *The world on paper*. Cambridge, UK: Cambridge University Press.
- Rauh, G. (2002). Prepositions, features, and projections. In C. Hubert, & G. Radden (Eds.), *Perspectives on prepositions* (pp. 3–23). Tübingen, Germany: Niemeyer.
- Ravid, D. (2012). *Spelling morphology: The psycholinguistics of Hebrew spelling*. New York, NY: Springer.
- Ravid, D., & Assulin Tzabar, D. (in press). Compounding in early child speech: Hebrew peer talk 2–8. In W. U. Dressler, F. N. Ketz, & M. K. Schoch (Eds.), *Nominal compound acquisition*. Amsterdam, The Netherlands: John Benjamins.
- Ravid, D., & Berman, R. A. (2010). Developing noun phrase complexity at school age: A text-embedded cross-linguistic analysis. *First Language*, 30, 3–26.
- Ravid, D., & Cahana-Amitay, D. (2005). Verbal and nominal expressions in narrating conflict situations in Hebrew. *Journal of Pragmatics*, 37, 157–183.
- Ravid, D., & Levie, R. (2010). Hebrew adjectives in later language text production. *First Language*, 30, 27–55.
- Ravid, D., & Shlesinger, Y. (2000). Modern Hebrew adverbials: Between syntactic class and lexical category. In E. Contini-Morava, & Y. Tobin (Eds.), *Between grammar and lexicon* (pp. 333–351). Amsterdam, The Netherlands: John Benjamins.
- Ravid, D., & Tolchinsky, L. (2002). Developing linguistic literacy: A comprehensive model. *Journal of Child Language*, 29, 419–448.
- Ravid, D., & Zilberbuch, S. (2003). The development of complex nominals in expert and non-expert writing: A comparative study. *Pragmatics and Cognition*, 11, 267–296.

- Rice, S. (2003). Growth of a lexical network: Nine English prepositions in acquisition. In H. Cuyckens, R. Dirven, & J. R. Taylor (Eds.), *Cognitive approaches to lexical semantics* (pp. 243–280). Berlin, Germany: Mouton de Gruyter.
- Sandbank, A. (2002). On the interplay between the written language and writing conventions in writing texts. In L. Tolchinsky (Ed.), *Developmental aspects of learning to write* (pp. 55–76). Dordrecht, The Netherlands: Kluwer.
- Schachter, P., & Shopen, T. (2007). Parts-of-speech systems. In T. Shopen (Ed.), *Language typology and syntactic description* (Vol. 1, 2nd ed.) (pp. 1–60). Cambridge, UK: Cambridge University Press.
- Scott, C. M. (1988). Spoken and written syntax. In M. A. Nippold (Ed.), *Later language development: Ages nine through nineteen* (pp. 39–95). Austin, TX: Pro-Ed.
- Shlesinger, Y. (2000). *The languages of journalism*. Be'er Sheva, Israel: Ben Gurion University Press.
- Tomasello, M. (1987). Learning to use prepositions: A case study. *Journal of Child Language*, *14*, 79–98.
- Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition*. Cambridge, MA: Harvard University Press.
- Wexler, K. (1982). A principle theory of language acquisition. In E. Wanner, & L. R. Gleitman (Eds.), *Language acquisition, the state of the art* (pp. 288–319). Cambridge, UK: Cambridge University Press.