The acquisition of Hebrew idioms: Stages and theoretical implications
Julie Fadlon[1], Julia Horvath[1], Tal Siloni[1,2], and Ken Wexler[3]
[1]Tel Aviv University, [2]UCL, and [3]MIT

1. Aims
 (I) Stages of acquisition
(II) Effects of internal structure: see variables manipulated below.
(III) Consequences for idiom storage

Variables manipulated
(1) full/gapped idiom
- a.   A full constituent
        shoot the breeze
- b.   A gapped idiom
        cut x some slack

(2) decomposable/non-decomposable idiom
Is the idiom isomorphic with its meaning, i.e. does each of its constituents correspond to an element of its meaning (Nunberg, Sag & Wasow 1994) or not?
- a.   decomposable idioms
        [*kill*] [*two birds*] [*with one stone*]
        '[achieve] [two goals] [with one action]'
- b.   nondecomposable idioms
        shoot the breeze
        'chat'

2. Experiment I: Idiom acquisition in Hebrew: comprehension

2.1 Participants, stimuli and design

Participants
90 Hebrew speaking, monolingual children with no known linguistic or cognitive impairments; 30 first graders (age range: 6-7, mean age: 6.23), 30 second graders (age range: 7-8, mean age: 7.67) and 30 third graders (age range: 8-9.5, mean age: 8.5).

Stimuli
20 Hebrew phrasal idioms having a possible literal meaning, composed of V.TRANS NP PP:
● 5 full and decomposable, 5 full and non-decomposable, 5 gapped and decomposable and 5 gapped and non-decomposable.
● Gap was the pre-final XP.
● Idioms' meaning was not transparent.
● Frequency controlled following the method used in Levorato and Cacciari (1995), Cacciari and Levorato (2009): 68 adult Hebrew speakers (age range: 19-44, mean age: 22) were asked to rate the frequency of 55 idiomatic phrases on a five point scale. Only phrases whose median ratings ranged between 3 and 5 were included in the research. Frequency was counterbalanced across gapped and full, decomposable and non-decomposable idioms.

Design
20 illustrated short stories providing the appropriate setting without revealing the meaning of the idioms were individually read out to participants. Each story ended with an idiom, and

was followed by a multiple-choice question. Stories and tasks were pseudo-randomly ordered. Subjects were asked to choose the correct interpretation among: (i) the correct idiomatic meaning; (ii) a literal, contextually inappropriate meaning; (iii) a contextually appropriate invented idiomatic meaning. To make sure participants were paying attention, they were presented with simple, multiple choice content questions once every 2-3 items.
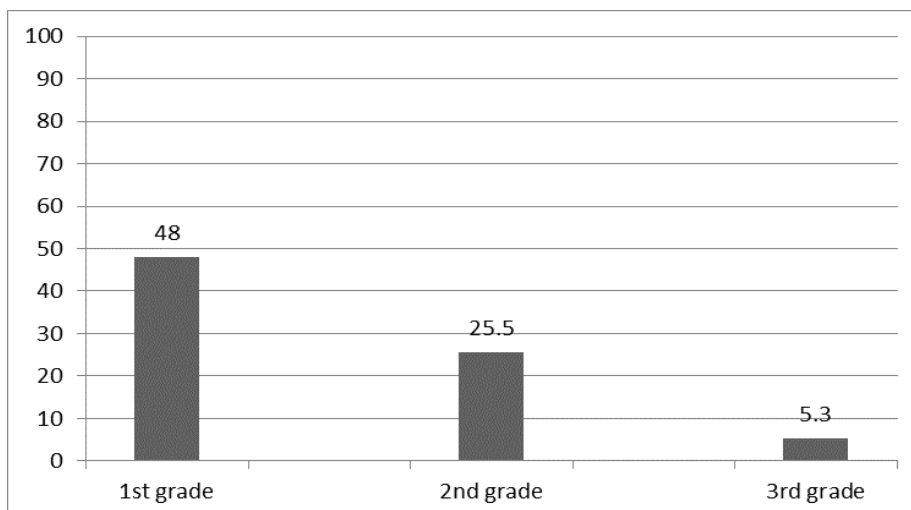
2.2. Results

● Linear effect for age: Second graders performed significantly better than first graders and third graders performed significantly better than second graders.

Chart 1: Percentage of correct responses per grade
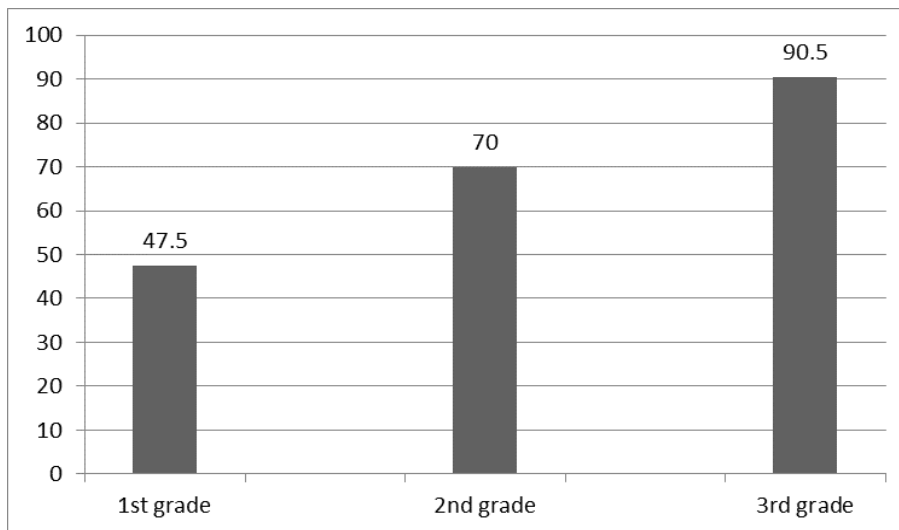
● The percentage of literal errors decreases.

Chart 2: Percentage of literal errors (out of all errors) per grade

2.3. Interim Discussion

● A gradual decrease in the rate of literal errors which coincides with a gradual increase in the rate of correct responses. This is consistent (i) with findings wrt Italian, French and English (Levorato & Cacciari 1999, Levorato, Nesi & Cacciari 2004, Laval 2003, Ackerman 1982), (ii) studies showing that children's knowledge of metaphors and similes matures gradually over early school years in tandem with the decrease in tendency to attribute literal interpretations to figurative phrases (Vosniadou 1987, Winner 1988).

● The existence of a gap and decomposability are irrelevant to idiom comprehension, as neither had an effect on children's performance.

3. Experiment II: production (completion)

3.1 Participants, stimuli and design

Participants
90 Hebrew speaking, mono-lingual children with no known linguistic or cognitive impairments that did not take part in experiment 1: 30 first graders (age range: 6-7, mean age: 6.41), 30 second graders (age range: 7-8, mean age: 7.64) and 30 third graders (age range: 8-9.5, mean age: 8.61)

Stimuli
The same as in Experiment 1.

Design
20 illustrated short stories providing the appropriate setting for the use of each idiomatic phrase were individually read out to participants. Each story ended with its respective idiom in an incomplete form, which allowed the recognition of the idiom but not a correct guess.[1] Subjects were asked to complete the idioms. To make sure participants were paying attention, they were presented with a content question structurally similar to the target task once every 2-3 items. Items were pseudo-randomly ordered. Context stories provided the meanings of the idiom in order to facilitate its retrieval.

3.2 Results

3.2.1 Data coding and types of errors

● Distribution of responses according to types differ across the 3 groups.

---

[1] The omitted part was chosen on the basis of the following criteria: (i) not the numeral *one*, which may allow a correct guess; (ii) not a constituent more easily completed based on the context (e.g. not *table* in *put one's cards on the table*; (iii) not a word that recurred in a few idioms (e.g., *katan/ktana* 'small.MS/FM). The position of the missing element was either the first or second constituent to match the mentioned criteria.

Table 1: Classification of errors

| Error type	Definition	Example
1. Literal	the contextually established literal correlate of the target word	*classes* instead of *eggs* Story was about classes.
2. inappropriate literal	an error triggered by an irrelevant detail in the story/illustration	*book* instead of *back/nape* Story was about refusal to lend a book.
3. guess	an incorrect guess triggered by the lexical items in idiom	*flies, roaches, mice* instead of *birds*
4. explanation	a correct explanation of the idioms' interpretation	"*she wanted the girl to win so she decided they should compete in swimming instead of running*" instead of *bin*
5. highly figurative lexical item	a lexical item with a high figurative capacity	head, etc.
6. irrelevant idiom	a lexical item from an irrelevant idiom the child was familiar with	*kankan ('jar)* from another idiom
7. don't know		

Charts 3: Percentage of answers by types, first grade
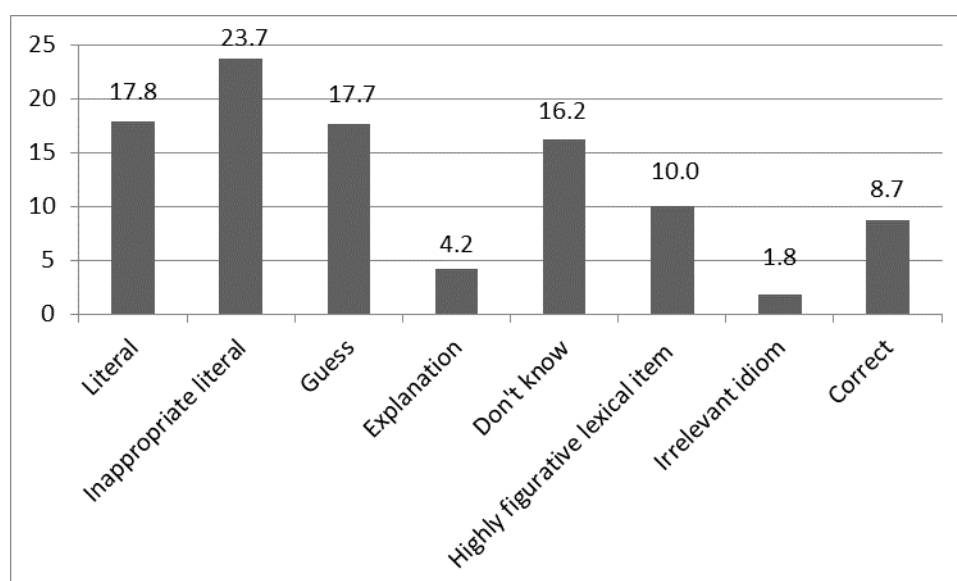
Charts 4: Percentage of answers by types, second grade
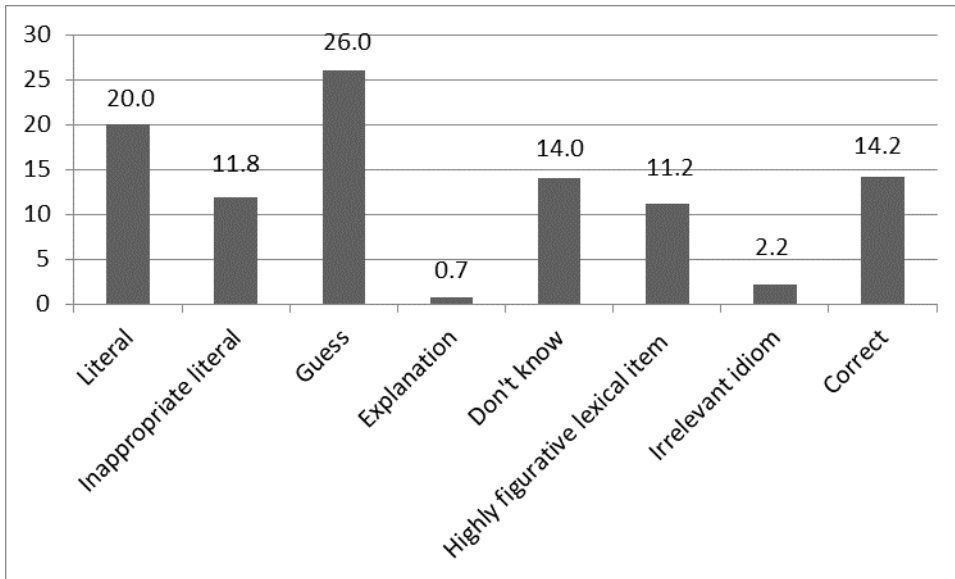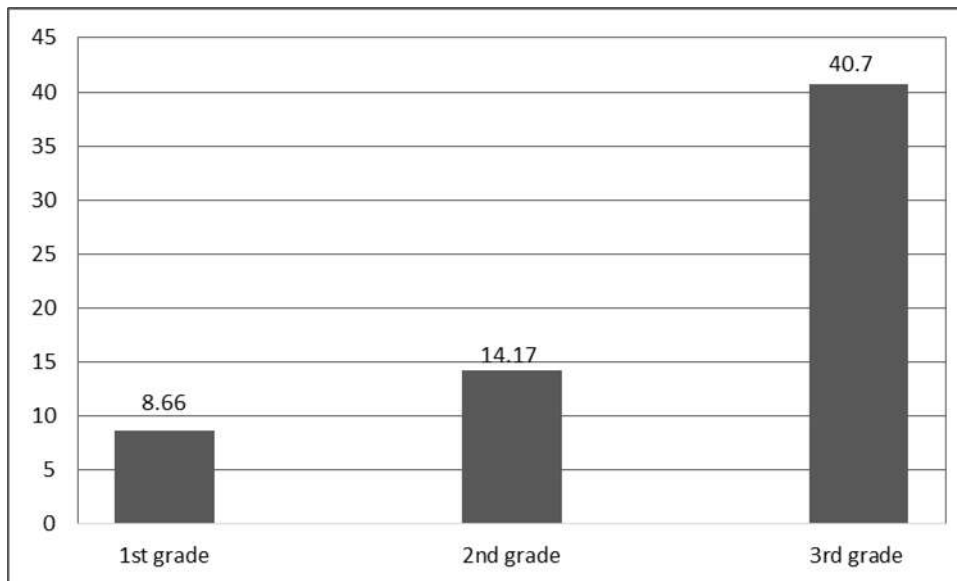

Charts 5: Percentage of answers by types, third grade
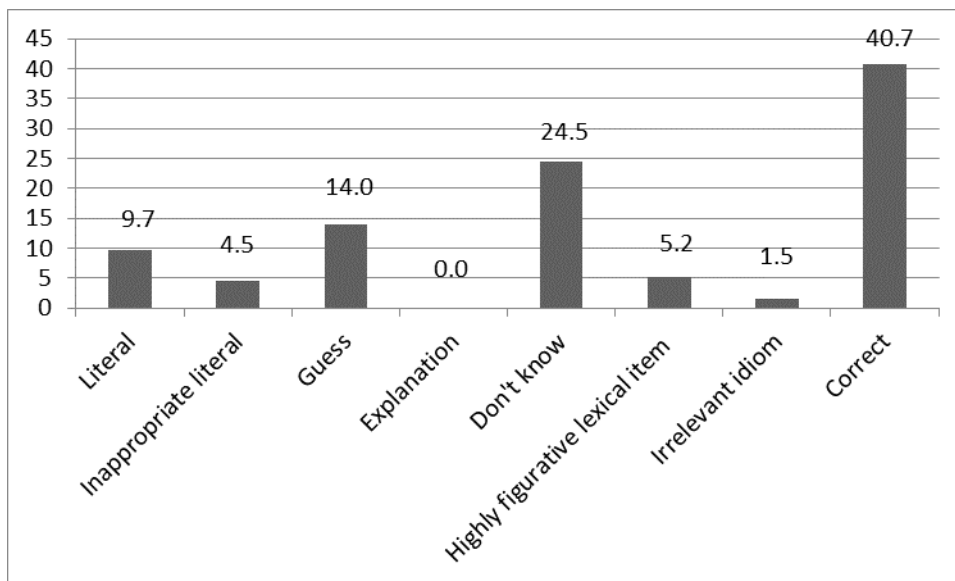
3.2.2 Statistical Analysis

● Linear effect for age: Second graders performed significantly better than first graders, and third graders performed significantly better than second graders.

Chart 6: percentage of correct completions per grade

Decomposability vs. nondecomposability

● For all age groups, performance with nondecomposable idioms was significantly better than performance with decomposable idioms.

● For third graders exclusively, nondecomposable full idioms are not significantly better than decomposable full ones.

Full vs. Gapped

● Both second and third graders: For nondecomposable (unlike for decomposable) idioms, gapped ones significantly better than full ones.

● Third graders: For decomposable (unlike for nondecomposable) idioms, full ones significantly better than gapped ones.

3.3 Discussion

Decomposability vs. nondecomposability

(Non)decomposability played a role in production across age groups: Significantly superior scores for nondecomposable idioms in the production task were found across all age groups.

Account

Proposal
(i) Nondecomposable phrasal idioms are stored in children's (1st-3rd graders') lexicon as independent big units, while decomposable ones are stored as subentries of their lexical head.
(ii) Retrieval of independently stored entries is easier than retrieval of subentries, as the latter requires composition of the idiom (from subparts).
(iii) Comprehension is easier than production, hence the effects are not attested in Exp. 1.

Table 2: Decomposable vs. nondecomposable idioms – children

Decomposable	Nondecomposable
[*spill*] [*the beans*] [divulge] [the secret]	*shoot the breeze* [chat]
Subentry storage (SPILL') SPILL <Ag> <Th> 'cause/let flow' SPILL' <Ag> <Th → beans: N_{PL+DEF} > 'divulge the secret'	**Independent** storage 'shoot the breeze' 'chat'

Question: Fixed or transitory property?

Is the 'independent' storage strategy suggested for nondecomposable idioms
(a) a property of the adult grammar (as suggested on other grounds by Nunberg, Sag & Wasow 1994), or
(b) a transitory stage in acquisition and adults store decomposable and nondecomposable alike (both as subentries, as suggested by Horvath & Siloni 2009, 2014)?

Response: A transitory stage in acquisition.

Evidence
• An experiment examining the relevance of the property of decomposability via a completion task of decomposable vs. nondecomposable idioms in adults reveals: As opposed to the pattern observed in the child population, a statistical analysis across both items and participants revealed significantly better performance with decomposable idioms (Fadlon, Horvath & Siloni 2014).

• A pattern of change regarding nondecomposable idioms is observed for third graders: While for first and second graders, nondecomposable full idioms are significantly better than decomposable full ones, for third graders, nondecomposable full idioms are not significantly better than decomposable full ones (see results).

Table 3: Decomposable and nondecomposable idioms – adults

Decomposable	Nondecomposable
[*spill*] [*the beans*] [divulge] [the secret]	*shoot the breeze* [chat]

Subentry storage (SPILL')
SPILL <Ag> <Th> 'cause/let flow'
SPILL' <Ag> <Th → beans: N_{PL+DEF} >
                      'divulge the secret'
	Subentry storage (SHOOT')
	SHOOT <Ag> <Th>
	                      'eject by a sudden release'
	SHOOT' <Ag> <Th → breeze: N_{SG+DEF} >
	                      'chat'

The two (related) abilities that gradually mature at the same stage are:
(a) the ability to discern the constituent structure of nondecomposable idioms;
(b) the ability to retrieve idioms by composition

Explanation
• Both decomposable and nondecomposable verb phrase idioms are uniformly stored in the adult lexicon as subentries. Decomposable, unlike nondecomposable, idioms can be retrieved

by semantic composition of the figurative pieces. For adults semantic composition is the standard strategy. Hence, they are better at producing decomposable than nondecomposable idioms.

• During acquisition, children store nondecomposable verb phrase idioms (in contrast to decomposable ones) as independent entries (unlike adults) due to their inability to discern their constituent structure (ability a).

3 questions come to mind:

(a) Does this mean that the child's lexical component is different in structure from the mature grammar or has devices unavailable in the mature grammar?

Response: By no means – storage of idioms as independent entries is available in the mature grammar too, mainly for clausal idioms, and idioms without recognizable internal structure (Horvath and Siloni 2014, tomorrow's talk).

(b) Why should there be such a difference in idiom storage between children and adults?

Response: Children fail to discern the internal structure of nondecomposable phrasal idioms (ability a); and hence store them as independent entries (on a par with "structureless" idioms). For decomposable idioms, children's ability to recognize the lexical head (aided by the isomorphism between syntactic structure and meaning) renders storage as subentry automatic; thus resort to independent storage is not an option.

(c) What causes the changing pattern in third graders' performance?

Response: Third graders' performance on nondecomposable full idioms is no longer significantly better than their performance on full decomposable ones because the full ones, we suggest, are the first to be transferred to subentry storage. This is so because it is easier to discern their constituents structure than that of gapped ones (ability a). After transfer to subentry storage, there is no significant difference between performance on nondecomposable full idioms and decomposable ones as both are retrieved by composition.

Full vs. Gapped

Account

• First graders: performance is too low to detect differences.

• Second and third graders: The gap facilitated retrieval of nondecomposable idioms, which these 2nd and 3rd graders store as independent units, since these idioms uniformly involve fewer constituents with fixed lexical material than the full ones:
Gapped idioms: V plus only one lexically fixed phrase (in addition to the gap).
Full idioms: V plus two additional lexically fixed phrases

• Third graders: Full decomposable idioms (unlike nondecomposable ones) are significantly better than gapped ones. Possibly, this shows an increasing ability to assign a precise compositional analysis to the lexically fixed subparts of decomposable idioms (aided by the isomorphism between syntactic structure and meaning) (ability b). The existence of a mix of lexically fixed elements and gaps makes the representation of the idiom subentry less uniform and harder to retrieve by (semantic) composition (ability b).

Thus, gapped idioms constitute the source of difficulty underlying the two seemingly unrelated findings wrt third graders' idiom production (completion) as it evolves towards adult behavior:

(i) The presence of a gap in the idiom interferes with third graders' retrieval of the idiom by composition (ability (b) is not at adult level yet); hence their performance on full decomposable idioms is better than on gapped decomposable ones.

(ii) The gap in idioms renders discerning constituent structure more difficult than it is without a gap (that is, in full idioms). This is what underlies the finding that third graders' performance on full nondecomposable idioms is no longer significantly better than their performance on full decomposable ones (as it is for first and second graders'). Specifically, on our account this change follows from the transfer of full nondecomposable idioms from independent storage to (the adult-like) subentry storage, which precedes the transfer of gapped idioms, as it is easier at this stage to discern the constituent structure of full ones than that of gapped ones (ability (a) is not yet at adult stage). Once transferred, nondecomposable full idioms are retrieved by composition on a par with their decomposable counterparts; hence, there is no significant difference in their score.

No information available as to the effect of gaps on idiom completion in adults.

Appendix

Experiment 1 (comprehension): translated example of story and task

Every Monday afternoon Mary takes dance lessons and every Thursday afternoon she goes to computer class. Mary is successful at both activities and enjoys them both. Last week, Mary's dance teacher told her that if she comes to the studio on Thursdays too, she could become a ballerina when she grows up. Mary thanked her teacher for the compliment but refused the kind offer. She decided not to go to dance lessons on Thursdays because she didn't want to put all the eggs in one basket.

In the story, what does it mean 'to put all the eggs in one basket'?
1. To invest in one thing and give up the other   (correct idiomatic)
2. To buy a lot of eggs and put them all in a basket   (literal)
3. To be very successful at something   (invented idiomatic)

Experiment 2 (production-completion): translated example of story and task

Every Monday afternoon Mary takes dance lessons and every Thursday afternoon she goes to computer class. Mary is successful at both activities and enjoys them both. Last week, Mary's dance teacher told her that if she comes to the studio on Thursdays too, she could become a ballerina when she grows up. Mary thanked her teacher for the compliment but refused the kind offer. She was afraid that if she went to dance lessons on Thursdays she won't be able to make it to computer class as well. Mary isn't sure whether she wants to be a ballerina or to work with computers when she grows up, so she is trying not to put all the ___ in one basket.