The acquisition of Hebrew tense

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1. Introduction

The acquisition of tense in morphologically rich languages has been shown to be relatively error-free and early (e.g. Italian: Hyams, 1986; Spanish: Torrens 1992). Similar patterns have been found for Hebrew (e.g. Armon-Lotem & Berman, 2003; Berman, 1985, 2004). However, these data come primarily from spontaneous speech, which, in early child language, tends to be restricted to the here-and-now, i.e. the present tense (e.g. Brown, 1973, Sachs, 1983, Eisenberg, 1985, Huang, 2000). Furthermore, in spontaneous speech tense errors may be noted less, since tense forms likely to be in error may simply be avoided, while conversational flow is unaffected (cf. Friedmann and Grodzinsky, 2000).

By contrast, at least for Hebrew, the current study shows that the use of controlled experiments reveals a clear delay in the acquisition of tense. These errors are usually the extension of the present tense forms to all tenses. We propose that children acquiring languages with rich verbal morphology do not go through a robust Root or Optional Infinitive Stage (Wexler, 1992; 1994; Hyams, 1994; 1996), but that they rely on other non-finite verb forms in their language as long as grammatical tense has not been firmly established yet (cf. Hyams, 2005; 2007). In Hebrew the non-finite verb form in question is the so-called '*benoni'*, which is used to represent present tense, but has non-finite properties as well.

2. Background

2.1 Previous findings regarding Tense in child language

Children acquiring Germanic languages, and possibly also French proceed through a stage (until at least age 3) in which they produce infinitives instead of a finite, tensed verb (Weverink, 1989; Pierce, 1989; Jordens, 1991; Wexler, 1992; 1994; Hyams, 1994; 1996). This stage is referred to as the Root, or Optional Infinitive Stage (henceforth OIS). On the other hand, Romance child languages do not display an OIS, nor does Japanese or Greek child language (Schaeffer, 1990; Guasti, 1994; Grinstead, 1994; Torrens, 1992; Sano, 1995, Varlokosta, Vainikka, & Rohrbacher, 1998). Yet, it has been reported that these child languages employ other non-finite forms, such as participles, imperatives, or 3r person singular present forms (Hyams, 2002; 2005; Salustri & Hyams, 2003; Ferdinand, 1996; Grinstead, 1998). Interestingly, an OIS has been reported for Russian (Bar-Shalom & Snyder, 1998; Brun et al., 1999) and Hebrew (Schaeffer & Ben Shalom, 2004), but only extremely early, before the age of 2. The question is what happens to Tense in these languages between ages 2 and 3, a period during which children acquiring other languages often still seem to avoid tensed verb forms in spontaneous speech.

2.2 Verb morphology in adult Hebrew

Adult Hebrew verb morphology involves a complex morphophonology where consonantal verb roots are inflected with prefixes, infixes and affixes in one of seven verb patterns ('*binyanim'*) for person, number, gender, and tense. Examples of the various *binyanim* are shown in Table1.

Table 1. Examples of inflection in the seven *binyanim*[1]

Root	Pattern	Verb	Translation
S-v-r	*pa'al*	*Savarta*	'you (sg) broke'
S-v-r	*Pi'el*	*Siberta*	'you (sg) shattered'
k-t-v	*hif'il*	*hixtavta*	'you (sg) dictated'
k-t-v	*hitpa'el*	*hitkatavta*	'you (sg) corresponded'
S-v-r	*nif'al*	*niSbarta*	'you (sg) were broken'
S-v-r	*pu'al*	*Subarta*	'you (sg) were shattered'
S-m-a	*huf'al*	*huSmata*	'you (sg) were broadcast'

Historically, Hebrew morphology explicitly marked nearly all verb forms for Gender, Person and Number in the past and future tense. Modern Hebrew has lost some of these distinctions. Feminine plural forms in the future and past tenses are no longer in common use. These forms are generally replaced by the masculine forms

[1] The binyanim are exemplified in the 2nd person, singular, masculine Past tense forms.

having the same number and person. In Tables 2-4, we illustrate the morphophonological patterns for the four most productive patterns: *pa'al*, *pi'el*, *hif'il*, *hitpa'el*.

Table 2. Illustration of the Hebrew past tense verbal paradigm

			***binyan* ('verb pattern')**			
			pa'al (*k-t-v* 'write')	*pi'el* (*t-p-s* 'climb')	*hif'il* (*l-b-S* 'dress')	*hitpa'el* (*k-d-m* 'progress')
Singular	1st		*katavti*	*tipasti*	*hilbaSti*	*hitkadamti*
	2nd	fem	*katavt*	*tipast*	*hilbaSt*	*htikadamt*
		masc	*katavta*	*tipasta*	*hilbaSta*	*hitkadamta*
	3rd	fem	*katva*	*tipsa*	*hilbiSa*	*hitkadma*
		masc	*katav*	*tipes*	*hilbiS*	*hitkadem*
Plural	1st		*katavnu*	*tipasnu*	*hilbaSnu*	*hitkadamnu*
	2nd		*katavtem*	*tipastem*	*hilbaStem*	*htikadamtem*
	3rd		*katvu*	*tipsu*	*hilbiSu*	*hitkadmu*

Table 3. Illustration of the Hebrew present tense verbal paradigm

			***binyan* ('verb pattern')**			
			pa'al (*k-t-v* 'write')	*pi'el* (*t-p-s* 'climb')	*hif'il* (*l-b-S* 'dress')	*hitpa'el* (*k-d-m* 'progress')
Singular	1st	fem	*kotevet*	*metapeset*	*malbiSet*	*mitkademet*
	2nd	masc	*kotev*	*metapes*	*malbiS*	*mitkadem*
	3rd					
Plural	1st					
	2nd	fem	*kotvot*	*metapsot*	*malbiSot*	*mitkadotm*
	3rd	masc	*kotvim*	*metapsim*	*malbiSim*	*mitkadmim*

Table 4. Illustration of the Hebrew future tense verbal paradigm

			***binyan* ('verb pattern')**			
			pa'al (*k-t-v* 'write')	*pi'el* (*t-p-s* 'climb')	*hif'il* (*l-b-S* 'dress')	*hitpa'el* (*k-d-m* 'progress')
Singular	1st		*extov*	*etapes*	*albiS*	*etkadem*
	2nd	fem	*tixtevi*	*titapsi*	*talbiSi*	*titkadmi*
		masc	*tixtov*	*tetapes*	*talbiS*	*titkadem*
	3rd	fem	*tixtov*	*tetapes*	*talbiS*	*titkadem*
		masc	*jixtov*	*jetapes*	*yalbiS*	*jitkadem*
Plural	1st		*nixtov*	*netapes*	*nalbiS*	*nitkadem*
	2nd		*tixtevu*	*tetapsu*	*talbiSu*	*titkadmu*
	3rd		*jixtevu*	*yetapsu*	*yalbiSu*	*jitkadmu*

2.3 Tense valuation in adult language and the *benoni* form in adult Hebrew

Tense is a feature on the verb that needs to be valuated. According to Minimalist theory tense valuation is achieved by an Agree relationship between V and T (Chomsky, 2000). In adult Hebrew, past and future tense are licensed this way. For the Hebrew present tense, however, the situation is ambiguous.

Hebrew present tense, reflecting gender and number, but not person, is often referred to as *benoni* ('middle') because its morphophonological pattern is shared by the verbal and nominal systems (Berman, 1978). This is illustrated in Table 5.

Table 5. Examples of the shared morpho-phonological patterns of *benoni* and nominal forms

Verb Root	*binyan*	*benoni*	Verbal Gloss	Nominal Gloss
S-m-r	*pa'al*	*Somer*	'I/you/he watche(s)'	'guard'
n-h-l	*pi'el*	*menahel*	'I/you/he direct(s)'	'principal/director'
ts-v-a	*hif'il*	*matsbia*	'I/you/he point(s)/vote(s)'	'voter'
p-k-d	*hitpa'el*	*mitpaked*	'I/you/he enlist(s)'	'enlistees'

Following Berman (1978), Shlonsky (1997) argues that the Hebrew present tense has non-finite or participial properties. For example, the *benoni* can appear following temporal (past or future) adverbs, particularly in small clauses. This is exemplified in (1).

(1) *etmol/maxar rainu/nire et hajeladim mesaxakim baxol*
yesterday/tomorrow saw/see-fut-1pl et the-children play-plmasc in-the-sand
'Yesterday/tomorrow, we saw/will see the children playing in the sand'

Shlonsky proposes that in this case the *benoni* behaves just like other participles: it lacks Tense features and checks Agreement features only below T, in the AGRPart Phrase.

Yet, there are also examples of grammatical sentences where the *benoni* appears to behave as a fully tensed matrix verb, as shown in (2).

(2) *maxar anaxnu holxim lajam*
tomorrow we go-plmasc to-the-sea
'Tomorrow we are going to the sea'

Shlonsky argues that in this case there there is a (finite) null auxiliary before the verb, so that (2) may be better represented as (3).

(3) *maxar anaxnu ∅ holxim lajam*
tomorrow we ∅ go-plmasc to-the-sea
'Tomorrow we are going to the sea'

In (3) the *benoni* incorporates into the null auxiliary and as a single unit they move to check T features, as do other tensed verbs. Shlonsky refers to this as the *benoni* 'piggybacking' on the auxiliary. He thus summarizes the *benoni* as a hybrid which acts both as a non-finite, non-tensed participial and as a finite tensed verb. Yet, to be precise, even in Shlonsky's analysis, the *benoni* form itself is always a non-finite, non-tensed participial; even in those instances where it appears to act as a matrix verb, since in the latter case finiteness results from the auxiliary.

Aside from the *benoni*, Hebrew has two other non-finite verbal options, namely the infinitive and the imperative. Yet, only the use of the *benoni* in the position of a matrix verb results in a grammatical declarative sentence. This is shown in 0.

(4) *Dani holex/*lalexet/*lex lajam*[2]
Danny goes/*go-inf/*go-imp to-the sea
'Danny is going/*to go/*go to the sea'

[2] Note that the imperative verb form is ungrammatical in a declarative sentence but would be perfectly grammatical in a command. Similarly, infinitives in matrix position yield grammatical sentences in certain, restricted pragmatic contexts, such as in *lasim et ha begadim bakvisa*? ('Shall I put the clothes in the washing machine?').

The question is what finiteness means, and why matrix declarative sentences are required to be finite in adult language. Hoekstra & Hyams (1998), following Gue(ron & Hoekstra (1988) roughly define finiteness as anchoring of the event described by the predicate in the temporal discourse. Morphosyntactically, finiteness is expressed as a Tense chain which is overtly marked by different languages with different morphological devices, for instance for Dutch present tense Number morphology, for Japanese Tense morphology. Since all three of the Hebrew non-finite verbs (infinitive, imperative and *benoni*) lack morphological marking of Person, it could be argued that for Hebrew it is Person that makes the Tense-chain visible (cf. also Schaeffer & Ben-Shalom, 2004; to appear), resulting in temporal anchoring of the event. Non-finite predicates, lacking the Person feature, are not temporally anchored, and therefore have no specific temporal interpretation.

3. Hypothesis and prediction for Hebrew child language

Given previous findings that the acquisition of tense is delayed in several languages we hypothesize that the acquisition of tense is delayed in Hebrew too. When children have difficulty with tense, we expect that they will opt for a non-finite verb form available in their language. We group Hebrew together with other morphologically rich languages, such as Romance, in hypothesizing that the tense delay is not expressed via an OIS after age 2, thus eliminating the choice of the infinitive as the non-finite option. Combining this hypothesis with the Hebrew-particular fact that the present tense (*benoni*), although having non-finite properties, can act as the matrix verb in declarative sentences (in conjunction with a null auxiliary à la Shlonsky, 1997), we predict that young Hebrew-acquiring children recognize the *benoni* as non-finite by its (lack of) person morphology and will employ the *benoni* as the non-finite form of their choice, extending its use to past and future contexts.

4. Methodology

3.1 Participants

57 Typically Developing (TD) monolingual Hebrew speaking children (age 4;2-12;9) and 9 Hebrew speaking adults participated in the study. The child participants were divided into nine age groups: 4 (n=7), 5(n=3), 6 (n=7), 7 (n=2), 8 (n=11), 9 (n=11), 10 (n=11), 11 (n=2) and 12 (n=3) year olds. Children who were unable to do the task and/or to modify their tense morphology according to the adverbs during the training session were excluded from the analysis.

3.2 Task and materials

The task was an elicited production/completion task. The task was administered to the children individually in their school or kindergarten setting. Sessions were video-recorded for verification. Presentation to adult participants was also individual. Participants were presented with twenty nine present tense descriptions of action pictures. The (mainly color) pictures were printed on A4 sheets and bound in a plastic folder. The pictures were divided into two groups. Twenty were in the third-person and nine were in the first-person. The third person items were balanced for Number, Gender and the four most productive Hebrew Verb Patterns, namely *pa'al*, *pi'el*, *hitpa'el*, and *hif'il*. There were 6 each of the *pa'al*, *pi'el*, and *hif'il* verb patterns and 2 of the *hitpael* pattern. The first person items were balanced for Number and Gender (3 each of feminine singular, masculine singular and plural).[3] Two training items preceded each group. The pictures were presented one at time. A description of the action picture in Present tense was provided by the experimenter for each picture. The description was preceded by the adverb *axSav*/'now'. Participants were then asked to provide past tense and future tense descriptions of the same action pictures. In order to elicit the target tense form, a lead in phrase including a temporal adverb was provided. The adverb *kodem*/'before' was used to elicit the past tense, while *axar kax*/'later' was used to elicit the future tense. In both cases the adverb was preceded by the word *gam*/'also', to encourage the participants to use the same verb root. Examples of target items for the past and future tense appear in (5). The task instruction required the explicit manipulation of Tense. Information on children's knowledge of Agreement and *binyan* was assessed based on the children's retention of these features in their responses.

[3] Note that the *hitpa'el* pattern was tested in the 3rd person only in the feminine singular. This is because the 3rd person singular and the plural forms are phonetically indistinguishable in Modern Hebrew. This was the motivation for developing the 1st person items to assess knowledge of this pattern.

(5) Examples of target items

3rd person target items

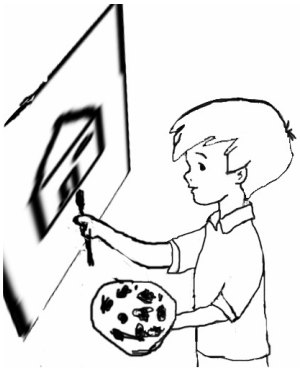
i. Stimulus Picture

Present tense *pa'al* stimulus: *axshav dana xoveshet kova.*
now Dana wear-sgf hat
'Now Dana is wearing a hat.'

Past tense lead-in (and target): *gam kodem dana* (*xavSa kova*)
also before Dana (wore-sgf hat)
'Also, before Dana (wore a hat)'

Future tense lead-in (and target): *gam axar kax dana* (*taxvoS kova*)
also later Dana (wear-futsgf hat)
'Also later Dana will wear a hat'

ii. Picture stimulus



Present tense *pi'el* stimulus: *axshav tomer metsajer bayt*
now tomer draw-sgm house
'Now Tomer is drawing a house.'

Past tense lead-in (and target): *gam kodem tomer* (*tsijer bajt*).
also before tomer (drew-sgm house)
'Also before Tomer (drew a house).'

Future tense lead-in (and target): *gam axar kax tomer* (*jetsajer bayt*)
also later tomer (draw-futsgm house)
'Also later Tomer will draw a house.'

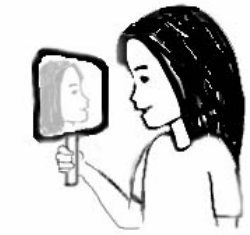
iii. Picture stimulus

iv. Present tense *hif'il* stimulus: *axshav hashamaim maxshixim.*
now the-sky darken-plm
'Now the skies are darkening.'

Past tense lead-in (and target): *gam kotem hashamaim* (*hixSixu*)
also before the-sky darkened-plm
'Also before the skies darkened'

Future tense lead-in (and target): *gam axarkax hashamaim* (*jaxSixu*)
also later the-sky darken-futplm
'Also later the skies will darken'

v. Picture stimulus



Present tense *hitpa'el* stimulus: *axshav keren mistakelet bamar'a.*
now Keren look-sgf in-the-mirror
'Now Keren is looking in the mirror.'

Past tense lead-in (and target): *gam kodem keren* (*histakla bamar'a*)
also before Keren looked-sgf in-the-mirror
'Also before Keren looked in the mirror.'

Future tense lead-in (and target): *gam axar kax keren* (*tistakel bamar'a*)
also later Keren look-futsgf in-the-mirror
'Also later Keren will look in the mirror.'

(b) 1st person target items

i. Picture stimulus

Present tense *hitpa'el* stimulus: *dani omer: axshav ani miShta'el.*
Danny say-sgm: now I cough-sgm
'Danny says: now I'm coughing.'

Past tense lead-in (and target): *dani omer: gam kodem ani* (*hiSta'alti*)
Danny say-sgm: also before I coughed-sgm
'Danny says: also before I coughed'

Future tense lead-in (and target): *dani omer: gam axar kax ani* (*eSta'el*)
Danny say-sgm: also later I cough-futsgm
'Danny says: also before I coughed'

ii. Picture stimulus

Present tense *pa'al* stimulus: *meital omeret: axshav ani mitlabetet*
Meital say-sgf: now I deliberate-sgf
'Meital says: now I'm deliberating.'

Past tense lead –in (and target): *meital omeret: gam kodem ani hitlabateti*.
Meital says-sgf: also before I deliberated
'Meital says: Also before I deliberated.'

Future tenselead-in (and target): *meital omeret: gam axar kax ani etlabet*
Meital say-sgf: also later I deliberate-futsgf
'Meital says: also later I will deliberate.'

4. Results

4.1 Tense

Children from the age of 7 years exhibited adultlike inflection of both past and future tense forms. Children younger than 7 years exhibited non-adultlike performance. Overall the children substituted present for the past and future tenses 27% of the total responses. There was minimal substitution (2% of total responses) of future

for past and slightly more substitution of past for future (9% of total responses). Sample tense errors are shown in (6) and (7).

(6) Sample Tense error (aged 6;3)
Past tense Target: *hismik* 'blushed'
Response: *masmik* 'blushing'

(7) Sample Tense error (aged 7;4)
Future tense Target: *yexaixu* 'smile-fut'
Response: *mexaixim* 'smiling'

Results for the past and future tense items in each age group are depicted in Figures 1 and 2, respectively.

Figure 1. Children's knowledge of past tense inflection

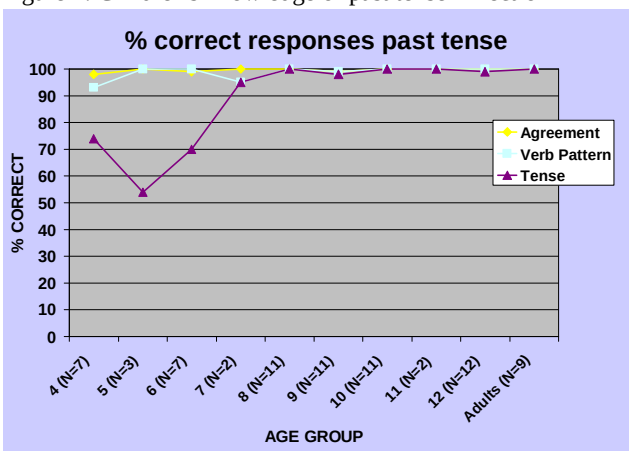
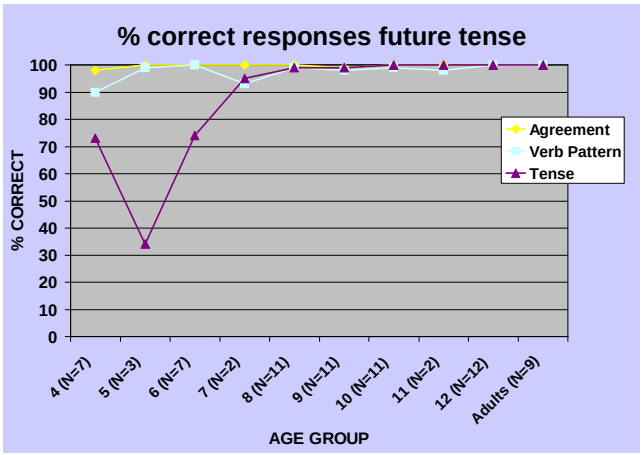
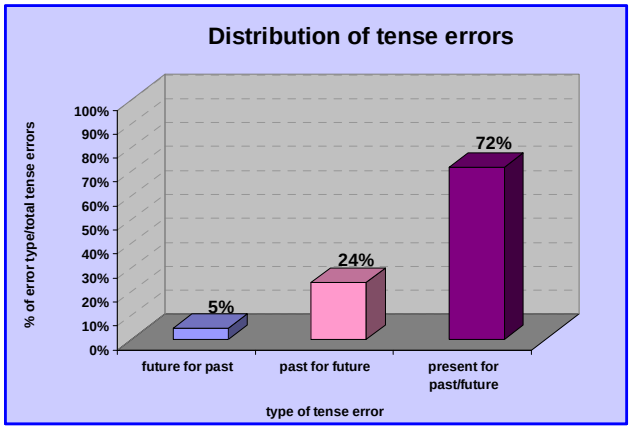


Figure 2. . Children's knowledge of future tense inflection



The 4-6 year olds produce appropriate (past and future) tense morphology only 63% of the time. A more detailed analysis of the 322 tense errors shows that the majority consist of substitutions of Present tense forms for Past or Future (72% of the tense errors). The remaining errors comprise substitutions of past for future (24% of the tense errors), and some substitutions of future for past (< 5% of the tense errors). This error break-down is similar for the 4, 5, and 6 year olds. Furthermore, the tense errors are evenly distributed over all four verb patterns. By age 6;9 the tense errors have virtually disappeared. In Figure 3, we show the distribution of tense errors.

Figure 3. Distribution of tense errors



4.2 Verb Pattern

All the children demonstrated relatively consistent knowledge of verb pattern (over 90% correct). However, there were some errors. This is illustrated in (8)and (9).

(8) Sample Past tense Verb pattern error (aged 5;2)
Target: *ti'la* 'strolled' (*pi'el*)
Response: *alxa* 'walked' (pa'al)

(9) Sample Future tense Verb Pattern error (aged 5;2)
Target: *tidkor* 'stab' (*pa'al*)
Response: *tidaker* 'get-stabbed'

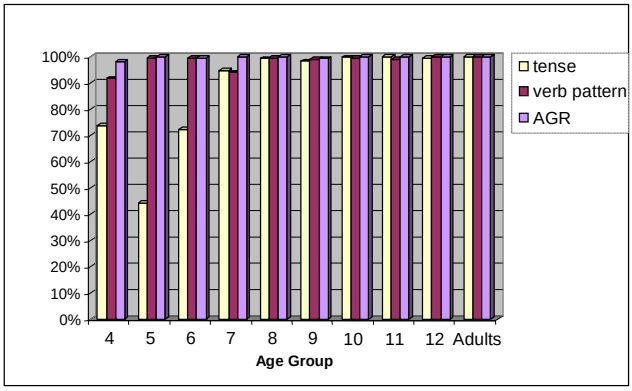
4.3 Agreement

All children are (nearly) adultlike in their retention of agreement morphology (over 98% correct) for both Past and Future tense items.

4.4 Summary of results

As can be seen from Figure 4, children of all ages reached near 100% adultlike accuracy for Agreement and verb pattern, while tense morphology continued to be non-adultlike, until age 7.

Figure 4. Verbal morphology breakdown[4]



5. Discussion

Despite the early appearance of tensed sentences in spontaneous child Hebrew, the experimental picture is somewhat different. The results of our sentence completion task indicate that Hebrew-speaking children up until the age of 7 often fail to correctly produce past or future tense forms. Interestingly, the most frequent error type is substitution of the *benoni* for both past and future tense forms (72% of the tense errors). This confirms our prediction that Hebrew-speaking children beyond age 2 will choose the non-finite *benoni* when they have difficulty producing a finite past or future tense verb. Since non-finite verbs, including the *benoni*, are not temporally anchored, their temporal interpretation is free. Corroborating evidence comes from Dromi, Leonard and Shteiman (1993), who found that Hebrew-speaking pre-schoolers produced appropriate present tense constructions close to 80% of the time, while their past tense productions were correct only 30% of the time.

Children's failure to produce past/future inflection cannot be attributed to a general difficulty with Hebrew's rich morphophonology since they did not produce errors in agreement morphophonology and only minimal errors in Verb-Pattern morphology. These features were adultlike already from the age of 4 years. The persistent difficulty with Tense morphology must therefore be attributed to Tense and not morphophonological complexity.

Similar to Wexler (1994), we propose that Tense in the grammar of young children is underspecified: they do not distinguish between its features [past] and [non-past]. This implies that they do not always succeed in mapping the time concept of past or non-past (including present and future) to the correct tense morphology. When 4, 5, and 6 year olds do not succeed in this mapping, they look for a non-finite substitute. Of the three choices available to them, the *benoni*, the infinitive and the imperative, they prefer the *benoni*.[5] An explanation for the preference for the *benoni* over the other non-finite choices lies in the nature of the Hebrew *benoni*. As opposed to the infinitive and the imperative, only the *benoni* results in a grammatical sentence (see (4) above). Therefore, the Hebrew children's tense errors are an overextension of non-present use of the *benoni*. Since the temporal interpretation of non-finite verbs is free, children can use the *benoni* in past, present, and future contexts.

The Hebrew *benoni* form appears to correspond to "default" present forms in French (Ferdinand, 1996), Catalan and Spanish (Grinstead, 1998), and Greek (Varlokosta et al, 1998. Evidence for children's use of inflected "default" present forms is also observed in other morphologically rich languages (e.g. Catalan and Spanish: Grinstead, 1998; Greek: Varlokosta et al, 1998; Catalan: Davidson & Goldrick, 2003). This raises the question whether these default present tense forms could be considered non-finite as well. Further research into the relevant languages is necessary to answer this question.

A small number of errors involved the substitution of Past for Future (24%). Although we do not emphasize the theoretical implications of this error type, we suggest that these substitutions reflect the irrealis nature of Future as opposed to the realis nature of Past (cf. e.g. Hoekstra & Hyams, 1998; Hyams, 2005). When children

[4] The disproportionately poor performance of the 5 year olds may be due to the low number of participants in this age group (3).

[5] It may be argued that the present tense performance is a perseveration of the stimulus form, since this is given in present tense. However, as tense errors carried over to instances where the children changed the target root, this seems unlikely.

do use tense morphology, they are more inclined to use a morpheme that represents realis than irrealis, because irrealis can also be expressed with a non-finite form.

Several questions remain. First, the proposed developmental stage of underspecified Tense in the current study seems to be longer than Wexler originally proposed (i.e. up until age 3). Our Hebrew experimental data indicate that it lasts at least up until the age of 6. More experimental research into the development of Tense in other child languages is needed to resolve this discrepancy. Second, principles of Universal Grammar require that matrix clauses are temporally interpreted. This raises the question as to how non-finite matrix clauses get anchored (and thus temporally interpreted) if they cannot be temporally anchored via a Tense chain. Hyams (2007) proposes that some non-finite predicates can be aspectually anchored. However, this mechanism is restricted to telic verbs. Following Higginbotham (2000) she argues that telic verbs have a second event variable representing the end state or telos, which constitutes a kind of 'escape hatch', anchoring the sentence to Utterance Time. A prediction following from this account is that Hebrew-speaking children should not substitute the *benoni* for past or future forms of non-telic predicates. We intend to test this prediction in future research.

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