The development of English as a heritage language: The role of chronological age and age of onset of bilingualism

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Abstract
This study explores typically developing bilingual children’s performance in their English as a heritage language. The aim of this study is to advance our understanding of heritage language expectations and the role of chronological age and bilingual exposure. A broad range of receptive and expressive linguistic domains are investigated as a function of chronological age and age of onset of bilingualism. English–Hebrew typically developing bilingual children (N = 240), ages 60–77 months, were compared to monolingual norms, using seven subtest standardized scores from the Clinical Evaluation of Language Fundamentals Preschool-2 (CELF-Preschool-2). Descriptive statistics, t-tests, ANCOVAs, multiple regression analysis, and post-hoc comparisons were conducted. English heritage language speakers presented with an asymmetric linguistic system influenced by their chronological age and age of onset of bilingualism. Results demonstrated that performance was more advanced for measures that were less reliant on language-specific skills. Measures dependent on grammatical knowledge were vulnerable to limitations but they were within the monolingual norms. In contrast, the lexicon was heavily influenced by bilingualism. These findings contribute to the literature on bilingual linguistic expectations and will have implications for theories of heritage language acquisition and language acquisition in general.

Keywords
Age of onset of bilingualism, bilingual language development, chronological age, English, heritage language

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Introduction

Globalization and migration have led to an increase in heritage language speakers. Accordingly, the purpose of this study is to advance our knowledge on typical heritage language developmental expectations. This study examines the acquisition of English as a heritage language of English–Hebrew bilingual children in Israel. The influence of both chronological age (CA) and age of onset of bilingualism (AOB) will be explored as they are two variables that make unique contributions to bilingual language development. AOB is used to provide information on the length of exposure to the heritage language before the societal language is introduced. It also intimates effects of the stage of linguistic and maturational development that the child was at when s/he became bilingual. Further, the interaction between CA and AOB informs us of the length of exposure to the societal language. This study illuminates that although CA and AOB interact, their contributions can be teased apart and should both be considered separately in order to define heritage language expectations.

In this study, heritage language outcomes will be examined across a broad range of receptive and expressive linguistic domains. Receptive linguistic domains will be investigated using the CELF-Preschool-2’s (Wiig et al., 2004) Sentence Structure, Concepts and Following Directions and Receptive Word Classes subtests. Expressive linguistic domains will be investigated using the CELF-Preschool-2’s (Wiig et al., 2004) Word Structure, Expressive Vocabulary, Recalling Sentences and Expressive Word Classes subtests.

A heritage language is a minority language that is typically spoken by second generation immigrants at home, during their early years of life either sequentially or simultaneously with the societal language (Montrul, 2018). Heritage language speakers are a unique group of bilingual speakers. They present with different trajectories to monolingual speakers and typically show more advanced outcomes than second language learners (e.g., Chang, 2016). Speakers of heritage languages often present with asymmetric linguistic outcomes (Montrul, 2018). Attainment is variable, greatly influenced by CA (Montrul, 2012) and the age that a child becomes bilingual (Ahn et al., 2017; Cuza & Pérez-Tattam, 2016; Karayayla & Schmid, 2019; Montrul, 2008).

Identifying factors that relate to bilinguals’ language development enhances our understanding of language acquisition and the mechanisms that both constrain and support it (Schmid & Köpke, 2017). A relationship between the amount of linguistic input and rate of acquisition has been established (see Unsworth, 2016 for an overview). However, evidence is drawn heavily from studies focusing on the societal language. Research has now turned its attention to heritage language proficiency as it has implications for children’s educational, social, emotional and cognitive outcomes (Goldberg et al., 2008).

This study contributes to the literature on bilingual linguistic expectations across receptive and expressive linguistic domains and has implications for theories of heritage language acquisition and language acquisition. It contributes to our understanding of the optimal conditions of bilingualism and will be of value to those working with bilingual populations.
Heritage language expectations

Heritage language speakers’ outcomes typically diverge from monolinguals. This is to be expected as their input differs qualitatively and quantitatively. Outcomes are often characterized as incomplete acquisition caused by either arrested development or attrition (Montrul, 2008). Arrested development implies that the heritage language ceases to develop and attrition implies that skills once acquired are lost. There is research supporting both arrested development (e.g. Schaufeli, 1993) and attrition (Lohndal & Westergaard, 2016; Polinsky, 2011). However, critics assert that heritage language outcomes are adequate for the speakers’ needs and thus should not be perceived as incomplete (Kupisch & Rothman, 2018). Rather, outcomes should be viewed as distinct from monolinguals (Rothman & Treffers-Daller, 2014). Studies have shown that heritage language outcomes vary and do not consistently diverge from monolinguals (e.g. Albirini et al., 2011; Kaltsa et al., 2015). It is also possible to prevent a reduction of heritage language proficiency with age by providing formal education in the heritage language (Montrul & Potowski, 2007). The term ‘differential acquisition’ has been offered instead (Kupisch & Rothman, 2018). Accordingly, the change in perspective encourages researchers to focus on fine grained analysis of inter-individual heritage language outcomes, variations between heritage language expectations and monolinguals, and the internal and external factors that account for the observations.

Heritage language outcomes: exploring variations across linguistic domains

Linguistic domains develop asymmetrically in heritage language speakers (Montrul, 2018). The reasons for the asymmetric development are multifaceted, complex and unclear. Language processing requires many areas of the brain to work together (Buchweitz & Prat, 2013). Measures of brain activity indicate that two languages may share representations (Illes et al., 1999). However, the precise processes that each language uses within this unitary system appear to vary, influenced by task complexity, linguistic proficiency and linguistic distance (Buchweitz & Prat, 2013). Similarities across languages may facilitate learning, whilst language-specific knowledge may require more experience in order to achieve proficiency. There may also be an interacting effect as strengths in one area may enable additional resources to be allocated to another area. For instance, verbal short-term memory capacity in a language is associated with children’s vocabulary knowledge in that specific language (Thorn & Gathercole, 1999).

Grammatical systems of heritage languages are found to be similar to monolingual speakers’ systems in many aspects of morphosyntax and syntax, including basic word order and head-directionality (Albirini et al., 2011; Kaltsa et al., 2015). However, differences have been observed. Word order may be restricted, and complex morphological patterns over-regularized (Montrul, 2010). Gaps in grammatical knowledge may be attributed to cross-linguistic influence. For example, heritage Egyptian and Palestinian Arabic speakers in the United States were observed at times using English word order rules when they spoke their heritage language (Albirini et al., 2011). The interaction between the grammatical systems of a Hebrew–English speaking 3-year-old girl has
been observed (Kedar, 2019). It may be expected that the grammatical systems of a herit-
age English-speaking child acquiring societal Hebrew may also interact.

Morphosyntactic abilities are often explored using sentence repetition tasks (e.g.
Meir, 2018). Bilinguals’ performance in the societal language may be within the mono-
lingual range after two years of exposure (Armon-Lotem et al., 2011). Nevertheless, the
effects of language dominance can influence outcomes (Meir, 2018). Outcomes may also
vary in accordance to the language pair investigated. Chiat et al. (2013) report effects
of language exposure for Russian–Hebrew and English–Hebrew bilinguals but not for
Turkish–English bilinguals. It would therefore be erroneous to assume that normative
data for one language pair can be generalized and used for another language pair.

The ability to repeat sentences may tap into other receptive and expressive linguistic
skills (see Regeneration Hypothesis, Lombardi & Potter, 1992). It may also be associated
with memory capacity (see Working Memory model, Baddeley, 2000). Following
instructions of increasing length and complexity also involves working memory. The
effect of bilingualism on working memory remains uncertain (Trevisol & Tomitch,
2017). However, there are researchers who maintain that bilinguals outperform monolin-
guals (Blom et al., 2014; Morales et al., 2013). Thus, heritage speakers may perform
relatively better in these tasks as they can draw on other strengths for support. Following
instructions is also a receptive language task and outcomes may be expected to be more
advanced than expressive language tasks (Altman et al., 2017, 2018). In the case of herit-
age language speakers, a difference of one or more than one standard deviation has been
reported (Keller et al., 2015).

Heritage language outcomes for lexical access and retrieval are expected to differ
from monolingual outcomes as they are affected by bilingualism (Montrul & Foote,
2014). Vocabulary is sensitive to experience and thus heritage language may be restricted
to childhood and home words (Montrul, 2010). In contrast, heritage speakers’ ability to
understand and express relationships between words may be similar to monolinguals’
ability. Bilinguals can create rich semantic networks. Early on they acquire two labels for
the same word, learning that different words can refer to the same concept (Cummins,
2001). Furthermore, they do not differ from their monolingual peers in measures of
semantic relations and phonological representations (Brandeker, 2017). Accordingly,
positive outcomes for generating paradigmatic associations have been illustrated (Sheng
et al., 2006).

The current study will explore the aforementioned receptive and expressive linguistic
domains. To investigate receptive linguistic domains, the understanding of grammatical
structures, following directions of increased length and complexity, and understanding
relationships between words will be examined. To investigate expressive linguistic
domains, the use of morphological rules, labeling, recalling sentences, and the ability to
express relationships between words will be examined.

**Influencing factors**

Defining outcomes can be challenging due to immense individual variation in bilingual
experience. Relevant factors include, inter alia, SES, parental education, family size and
birth order (e.g. Armon-Lotem et al., 2015; Kaltsa et al., 2015; Marini et al., 2019).
Moreover, there are two age-related variables that play an essential role in bilingual development, namely, CA and AOB. The influence of CA on linguistic outcomes can be disentangled from AOB. Children varying in CA may use different learning mechanisms. They may experience differences in the quality of the current language input and be influenced by different social and motivational factors. CA is therefore likely to influence how heritage language outcomes compare to monolingual language outcomes. Heritage language outcomes are also expected to be influenced by AOB. Exploring the influence of AOB on heritage language outcomes provides insight into the ramifications of disrupting monolingual language acquisition with the introduction of a second language. CA and AOB are therefore the focus of this study and discussed hereafter.

**Chronological age and heritage language development**

Linguistic outcomes vary within heritage language speakers and across their lifespan (Benmamoun et al., 2013). The general trend for heritage language development is for children to have strong heritage language abilities in their early years that weaken with chronological age. There is a shift in the functional dimension of the heritage language from the primary language to the secondary language in use. This shift can be considered a shift in dominance (Köpke & Schmid, 2004). It may reflect changes in the language learning environment. Younger children tend to spend more time at home amongst a greater number of heritage language speakers (Bedore et al., 2016). Furthermore, regular interaction with heritage language speakers increases proficiency (Gollan et al., 2015). Older children often spend more time in an education setting amongst societal language speakers, experiencing reduced heritage language input and use (Hoff et al., 2014).

CA is further related to the timing in which different linguistic structures are acquired (Tsimpli, 2014). Heritage language speakers perform more accurately on linguistic constructs that are acquired earlier by monolinguals (e.g. Albirini, 2015; Botwinik et al., 2015). Thus, the performance on constructs that are stabilized in early heritage language development is expected to be similar to monolingual performance (Flores, 2015). Linguistic constructs that are acquired later are more complex and require a greater critical mass of input than simpler linguistic forms, and are expected to differ between the two populations (Gathercole, 2016). That is, together with timing, we can say that CA plays a different role, depending on how early the phenomenon being tested is acquired in monolingual acquisition.

**Age of onset of bilingualism and heritage language development**

Research provides robust evidence on the effect of language exposure on bilingual children’s language acquisition (e.g. Gathercole, 2002; Paradis & Jia, 2016). To date there is no agreed definition or measurement of language exposure (Armon-Lotem, 2017; Carroll, 2017). However, AOB is a dependable, precise measure that is valuable and impacts on language attainment (Meir et al., 2017). AOB is demonstrated to influence heritage language proficiency (e.g. Hammer et al., 2012; Meir et al., 2017). Later AOB is often linked with more advanced heritage language outcomes. The relationship between AOB and heritage language proficiency has been supported in research on Arabic–English speakers
In contrast to the length of exposure, another frequently used measurement of language exposure, AOB distinguishes between types of bilinguals (i.e. simultaneous bilinguals and sequential bilinguals). AOB defines the onset of bilingual exposure which marks a change in the relative quantity experienced in each language as well the quality of input provided to the child. Furthermore, AOB reveals the stage of development a child is going through at the time that bilingualism begins. The context in which each language is experienced is also indicated. For instance, whether both are provided in the home setting, or one is provided within the school system.

AOB is also related to the time of acquisition of linguistic structures. Research exploring outcomes of bilinguals’ societal language indicates that only the development of early acquired linguistic structures can be explained by AOB (Schulz & Grimm, 2019). Accordingly, the rate and accuracy of the development of later acquired linguistic structures may be influenced by other factors, such as complexity (Schulz & Grimm, 2019). In light of this finding, the introduction of the societal language may not have a great impact on early acquired heritage language structures as children have experienced sufficient input to support their development. However, it could disrupt the acquisition of later, more complex properties. Children with a later AOB behave as monolinguals for longer and are given more time to experience the critical mass of input necessary to develop later acquired linguistic forms. Further, by definition, there will be no cross-linguistic influence until the societal language is introduced. Subsequently, in the heritage language, later acquired linguistic forms may be more sensitive to the onset of bilingualism than earlier acquired linguistic forms.

**English as a heritage language**

English as a heritage language is distinct from a societal language or monolingual language due to differences in the language learning environment, including the manner and length of exposure. English as a heritage language also differs from other heritage languages. Heritage languages typically have relatively low prestige. In contrast, English is labeled the global lingua franca and has a high socio-economic status (Crystal, 2003). In Israel, English is not an official language, but it is used throughout the country. English is used in social media and the educational curriculum. It is considered on admission to university and frequently required for employment (Kayam & Hirsch, 2014). English-speaking parents typically regard it as socially valuable and elect to maintain it at home and in their local communities (Armon-Lotem et al., 2014). Unlike other heritage language speakers, children speaking English as a heritage language also experience literacy instruction, often from a young age in private classes and/or at school. This has previously been identified as a key difference between heritage language and societal language learning (Montrul, 2010).

The literature review indicates that heritage languages are expected to develop asymmetrically, influenced by chronological age and AOB. To date, it remains unknown whether English as a heritage language will present with similar outcomes.
The current study

Investigating English as a heritage language makes a unique contribution to understanding the course of typical bilingual development as previous research primarily focuses on English as a societal language.

Three empirical questions are examined in this study:

1. How do heritage English-speaking children perform across various linguistic domains?
2. How does chronological age impact on heritage English-speaking children’s performance?
3. How does age of onset of bilingualism impact on heritage English-speaking children’s performance?

It is predicted that linguistic domains will develop asymmetrically (Montrul, 2018). For instance, weak naming is to be expected (Montrul & Foote, 2014). However, bilinguals’ ability to understand and express semantic relationships will be more advanced than monolinguals as they are able to create rich semantic networks (Cummins, 2001). The gap between heritage language outcomes and monolingual norms is expected to increase with chronological age. Heritage language may become secondary to the societal language as children get older, reflecting changes in the functional need of each language (Montrul, 2012). It is also predicted that AOB will influence English heritage language development. The later the AOB, the longer a child experiences the heritage language as a monolingual and the closer their outcomes will be to their monolingual peers. Earlier AOB is expected to result in a greater reduction of heritage language exposure and the contexts in which it is learned (Flores, 2015).

Method

Participants

Two-hundred-and-forty typically developing English-Hebrew bilingual children (127 female, 113 male) aged 60–77 months ($M = 69.68$, $SD = 3.83$) participated in the study. Of these, 31 were first born and the rest had one (51), two (64), three (51), four (17), five (13) and six (4) older siblings (9 children unknown). All children were born to English-speaking families. The majority were exposed to only English at home ($n = 149$). Children attended preschools which serve the general population where most of the children enrolled came from Hebrew-speaking homes. All the children were exposed to Hebrew for at least 12 months prior to data collection in a Hebrew-speaking preschool ($M = 38.99$, $SD = 13.82$). Most children (87.08%) were from mid-high SES (12% are unknown) and parents of the participants presented with a range of educational backgrounds. The most common occupations for mothers were teachers (37), housewives (23), nurses (8) and lawyers (7). The most common occupations for fathers were high-tech/computers (28), accountants/financial services (25), lawyers (21) and doctors (13).

To ensure children were typically developing, the selection criteria specified that all the children had normal hearing and no other neurological, cognitive, emotional or motor
deficits. Furthermore, their language was indicated to be typically developing in at least one language.

Participants’ linguistic proficiency in Hebrew was tested using the Goralnik Screening Test for Hebrew (Goralnik, 1995). The test includes subtests for vocabulary, sentence repetition, comprehension, oral expression, pronunciation and storytelling. Scores were measured against Altman et al.’s (2016) adjusted bilingual norms. English was evaluated via the Core Language Score from the CELF-Preschool-2 (Wiig et al., 2004), which is often used to quantify English language performance. The cut-off score of 1.25 SD below the mean was applied as it is frequently used to define a language impairment (e.g. Eadie et al., 2014). Parental concern was also taken into consideration as language assessment in isolation is insufficient for bilingual children: they may score below the monolingual norm in both languages and yet not be considered to have a developmental language disorder (Tuller, 2015). This may occur if a child has not yet mastered their societal language and experiences attrition in their heritage language. Nine children presented with low scores in both languages but there were no parental concerns. To prevent underdiagnosis of typically developing bilingual children, language dominance was used to determine whether scores were considered typical, as stipulated in Thordardottir’s (2015) protocol. Accordingly, one child among these was considered typically developing and included in the study.

To obtain information on the AOB, parents were asked which languages are spoken at home, the time and place their child was first exposed to Hebrew, their societal language, and when their child first attended a Hebrew-speaking educational setting. Additional background information, including age, socio-economic status as measured by maternal education, and gender, was collected via detailed parental questionnaires. Children were divided into age groups that were 6 months apart, reflecting the division of ages in the monolingual manual of the CELF-Preschool-2 (Wiig et al., 2004). The division captures differences in expectations of monolingual linguistic outcomes as a function of chronological age. Maintaining the same classification helps to determine whether bilingual children’s linguistic outcomes present with a similar pattern. This yielded the division in Table 1.

Data collection took place over a period of 10 years (2005–2015) as part of the screening procedure for children participating in research in the lab of the first author. To participate in

| Table 1. Demographic data of all participants. |
|-----------------------------------------------|
| Age 5;0–5;5 | Age 5;6–5;11 | Age 6;0–6;5 | All participants |
| N (female) | 29 (15) | 128 (66) | 83 (46) | 240 (127) |
| Chronological age | 62.97 (1.82) | 68.63 (1.81) | 73.65 (1.74) | 69.68 (3.83) |
| Age of onset of bilingualism | 30.25 (15.05) | 23.98 (17.22) | 28.947 (16.34) | 26.24 (16.80) |
| Maternal education | 0–49 | 0–54 | 0–60 | 0–60 |
| | 17.21 (2.38) | 16.57 (1.93) | 17.07 (2.08) | 16.82 (2.05) |
| | 13–24 | 10–22 | 12–26 | 10–26 |

Notes: Scores presented as mean (SD) range. Chronological age and age of onset of bilingualism is in months. Maternal education is in years. Information is missing for 7 children’s AOB and 29 children’s maternal education.
the study, parents’ consent and children’s assent were secured. The study was approved by the university’s Institutional Review Board and by the Israeli Ministry of Education.

Table 1 illustrates that no significant differences were found for AOB, mother’s education in years and gender. The groups significantly differed in CA, $F(2,237) = 432.291, p < .001$. Post-hoc comparisons using the Tukey HSD test indicated that the mean difference between the three groups’ CA is significant at the .001 level.

### Age of onset of bilingualism

There are few AOB methodological guidelines and cut-offs vary in the literature (e.g. Granfeldt et al., 2007; Unsworth et al., 2014). Three groups of AOB were determined, viz. 0–24 months, 25–48 months and 49+ months. Table 2 presents the number of participants in each AOB group. De Houwer (1996) and Schulz and Grimm (2019) use a similar division. It captures the difference between those children learning their languages simultaneously and those learning their language sequentially. After age 2, children are not considered to be learning the two languages simultaneously and have developed considerable linguistic skills in their heritage language (Schulz & Grimm, 2019). Additionally, after age 4, it has been posited that the way language is acquired differs from those with a younger AOB (Unsworth, 2016).

Table 2 illustrates that the subgroup with an AOB of 4;1 years and above is small, potentially impacting on the reliability of results. They were therefore excluded from the study. Independent $t$-tests reveal a significant difference between the two AOB groups in each of the CA groups: $t(25) = 6.87, p < .001$ for the difference between children aged 5;0–5;5 with an AOB of 0–2 years ($M = 11.89, SD = 10.76$) and an AOB of 2;1–4;0 years ($M = 38.39, SD = 5.99$); $t(121) = 21.39, p < .001$ for the difference between children aged 5;6–5;11 with an AOB of 0–2 years ($M = 9.08, SD = 7.99$) and an AOB of 2;1–4;0 years ($M = 38.76, SD = 7.32$); and $t(70) = 11.45, p < .001$ for the difference between children aged 6;0–6;5 with an AOB of 0–2 years ($M = 11.7, SD = 10.54$) and an AOB of 2;1–4;0 years ($M = 36.69, SD = 6.66$).

### Task

A gold standard for assessing heritage language does not exist. Standardized assessments are often used in research as they are repeatable and consistent (Tomblin et al., 1996). They are also widely used for bilingual language assessment, although this is problematic
as they are normed on monolingual populations (Caesar & Kohler, 2007). For the purpose of this study, the CELF-Preschool-2 (Wiig et al., 2004) was administered. Wiig et al. provide evidence that it is a reliable and valid instrument for the purpose of assessing and evaluating English language abilities. Using the CELF-Preschool-2 (Wiig et al., 2004) allows heritage language outcomes to be compared to monolingual normative information that is based on a sample of 800 children. It provides a comprehensive variety of subtests that tap into numerous linguistic skills. Linguistic domains that are, and are not, sensitive to bilingualism can therefore be identified.

The CELF-Preschool-2 (Wiig et al., 2004) tests English language outcomes for children aged 3;0–6;11. It is composed of a variety of subtests, including: Concepts and Following Directions, Word Structure, Expressive Vocabulary, Recalling Sentences, Sentence Structure, and Receptive and Expressive Word Classes. Concepts and Following Directions requires a child to follow directions of increasing length and complexity and understand a range of concepts, e.g. point to the giraffe then the elephant. Sentence Structure assesses comprehension of grammatical structures by giving a child four pictures and asking them to choose the one that best corresponds to the sentence that is heard. The structures increase in complexity, reflecting development. For instance, the subtest assesses a child’s understanding of prepositional phrases, starting with ‘in’ and ‘under’ and later including ‘towards’. Other structures assessed early on include verb condition (is running), modification (big, spotted, black, white), negation (not) and copula (is sleepy). Later structures include passives (is being followed), relative clauses (who is sitting under the big tree) and compound sentences (she is climbing, and he is swinging). Next, Word Structure requires a child to complete sentences, assessing their ability to use morphological rules and pronouns appropriately, e.g. frog/frogs; this/that. Expressive Vocabulary assesses a child’s ability to label illustrations of people, objects and actions. Recalling Sentences requires the repetition of sentences, varying in length and complexity. Finally, Receptive and Expressive Word Classes evaluate the ability to understand and express relationships between words. These subtests require a child to point to two pictures that belong together (receptive) and then explain how they go together (expressive).

Procedure

The seven subtests of the CELF-Preschool-2 (Wiig et al., 2004) were administered according to guidelines and instructions outlined in the Examiner’s Manual, in the order in which they appear in the assessment form. Every child met with the experimenter for 40–50 minutes in which the seven subtests were administered.

Data analysis

Standardized scores from the seven subtests were computed, using monolingual norms. The standard mean for each subtest is 10 \((SD = 3)\). The subtest standardized scores were used to compare heritage language outcomes to monolingual norms. To meet the objectives of the present study, descriptive statistics, multiple regression analysis, \(t\)-tests and one-way ANCOVAs were conducted. Chronological age and AOB were the variables taken into consideration when analyzing the data since they are expected to impact on heritage language development.
Results

Heritage language outcomes

The gap between heritage English-speaking children’s linguistic outcomes and monolingual norms was explored to determine whether it varied according to the linguistic domain investigated. The subtest standard scores were analyzed for the largest age group (5;6–5;11 years old, \( n = 128 \)) (Table 3, middle column). Figure 1 shows the distance from the norm. Subtest data for one child in this age group were missing.

The most advanced outcomes were for Concepts and Following Directions and Receptive and Expressive Word Classes, with 89%, 95.3%, 89% of the participants,
respectively, achieving scores at or above the monolingual normative range. In contrast, the other mean standard scores were below the standard mean. However, except for Expressive Vocabulary, bilinguals were within the monolingual normative boundaries. Expressive Vocabulary had the poorest outcomes with 70.9% of the participants achieving scores below the monolingual average range.

**Chronological age and age of onset of bilingualism as influencing factors on heritage language outcomes**

To explore the ability of CA and AOB to predict heritage speakers’ subtest standard scores, a multiple regression was administered. CA and AOB were considered continuous variables. Table 3 presents the analysis.

The percentage of the variance in the data that can be explained by AOB and CA differed according to the subtest. For instance, they explained 7% of the variance in Expressive Word Classes standard scores but none of the variance in Concepts and Following Directions. Nevertheless, the simultaneous multiple regression analysis confirmed a positive and significant relationship between AOB and the majority of subtest standard scores. Four of the subtests presented with a negative relationship with CA (i.e. Sentence Structure, Expressive Vocabulary, Receptive Word Classes and Expressive Word Classes). The negative relationships between CA and both Receptive Word Classes and Expressive Word Classes were
significant ($B = -0.09, p < .05, B = -0.104, p < .05$, respectively). The regression analysis for these two subtests was repeated with CA as a categorical variable, according to the three age groups. The negative relationships were still found to be significant: Receptive Word Classes ($B = -0.744, p < .001$), Expressive Word Classes ($B = -0.896, p < .001$).

The impact of chronological age

The influence of CA on heritage language outcomes was further explored. Table 4 presents the subtest standard scores for the three age groups. One-way ANCOVAs were conducted to determine statistically significant differences between the three age groups on standard scores for each subtest, controlling for AOB (Table 4, last column).

Table 4 illustrates that younger children had more advanced outcomes in all but one of the subtests. One-way ANCOVAs revealed that there were significant differences between the three groups’ mean standard scores for Sentence Structure ($F(3,323) = 6.66, p < .001, \mu^2 = .080$), Word Structure ($F(3,323) = 4.48, p = .004, \mu^2 = .055$), Expressive Vocabulary ($F(3,323) = 6.94, p < .001$), Recalling Sentences ($F(3,323) = 5.51, p < .001, \mu^2 = .067$), Receptive Word Classes ($F(3,323) = 5.68, p = .001, \mu^2 = .069$) and Expressive Word Classes ($F(3,323) = 7.47, p < .001$).

The impact of age of onset of bilingualism

The impact of AOB on subtest standard scores of children aged 5;6–5;11 ($n = 128$) was explored. Information was missing for one child’s AOB and four children with an AOB
of 4;1 years were excluded from the study. The results are presented in Table 5. Figure 2 shows the distance from the norm.

Figure 2 illustrates that children with a later AOB had more advanced subtest outcomes than children with an earlier AOB. The mean Expressive Vocabulary standard score was the lowest for both groups and was below the standard average range. The mean Sentence Structure, Word Structure and Recalling Sentences standard scores were also below the standard mean but within the standard range for the two groups. Finally, the mean scores from Concepts and Following Directions and Expressive and Receptive Word Classes were above the standard mean for both groups. An independent $t$-test was conducted on each of the standard scores, comparing results as a function of AOB. There was a significant difference between children varying in AOB in all the subtests, except for Word Structure as seen in Table 5. The effect size of AOB on Sentence Structure, Expressive Vocabulary, Recalling Sentences and Expressive Word Classes was medium ($g = .6, .6, .5$ and .6, respectively). In contrast, the effect size of AOB on Concepts and Following Instructions and Receptive Word Classes was small ($g = .4$ for both subtests).

**Discussion**

**Summary of findings**

An analysis by subtests for children, aged 5;6–5;11, demonstrated that heritage language domains develop asymmetrically (see Figure 1). The highest outcomes were observed in Concepts and Following Directions and Receptive and Expressive Word Classes, with
mean standard scores above the monolingual mean. Sentence Structure, Word Structure and Recalling Sentences mean standard scores were below the monolingual mean but within the normal range of variation. The poorest outcome was observed in Expressive Vocabulary as the mean was below the monolingual normal range of variation. The results of the multiple regression indicated that the contribution of AOB and CA varied according to the linguistic domain assessed. In general, younger heritage language speakers had more advanced standard scores than their older peers. There were significant differences between the three age groups’ mean standard scores for Sentence Structure, Word Structure, Expressive Vocabulary, Recalling Sentences, and Expressive and Receptive Word Classes. Analysis for the impact of the AOB showed that there was a significant difference between the two AOB groups in all the subtests, except for Word Structure.

**English heritage language outcomes**

Heritage English speakers’ linguistic outcomes were found to be asymmetrical, indicating that several language skills should be assessed and analyzed separately in order to define outcomes. Studies on heritage Arabic speakers also came to this conclusion (see Albirini, 2015). This suggests that irrespective of the heritage language, an unbalanced...
linguistic system may be expected. Indeed, this may be one of the defining features that distinguishes heritage language speakers from their monolingual peers (Albirini, 2018).

Proficient scores were observed in Concepts and Following Directions. This subtest requires children to understand and remember concepts and order of mention of pictures. Studies have established that receptive heritage language skills may be relatively spared (Keller et al., 2015) and bilinguals outperform monolinguals in working memory (Morales et al., 2013). In contrast, Sentence Structure, Word Structure and Recalling Sentences standard scores were lower. They all require grammatical knowledge that can be language specific and affected by cross-linguistic influence (Hulk & Müller, 2000). However, mean scores were within the monolingual normative range. These findings concur with Hoff and Core (2015) that bilingual children may lag behind their monolingual peers but can still be within the normal range of variation.

Finally, a low level of proficiency was observed in Expressive Vocabulary. This subtest explores the breadth of a child’s vocabulary, assessing the number of words that a child can name. This observation is consistent with the ubiquitous finding that bilingual children’s vocabulary is frequently weaker than their monolingual peers (e.g. Thordardottir et al., 2006). It is understood that the lexicon is heavily influenced by exposure (Schmid & Köpke, 2008). Cultural differences may also influence naming (De Villiers, 2017). For instance, the subtest asks children to name a picture of a trophy. Children in Israel tend to receive medals and are unlikely to have been exposed to the word ‘trophy’. This illustrates the need to consider cultural influences on responses during assessment.

In contrast, depth of vocabulary knowledge, as indicated by the Receptive and Expressive Word Classes subtests, was above the standard mean. Brandeker (2017) also noted a discrepancy between the two measures of lexical development in French–English bilingual school-aged children. Vocabulary depth may be less reliant on language-specific knowledge as conceptual representations of words are shared across languages (Buchweitz & Prat, 2013). They may also involve other processes, such as meta-linguistic skills, executive functioning and lexical organization (Brandeker, 2017).

The findings illustrate that caution must be heeded when making generalizations regarding heritage linguistic outcomes. For instance, whilst some expressive language skills may be negatively influenced by bilingualism (e.g. Expressive Vocabulary), others are not (e.g. Expressive Word Classes). The influence of bilingualism on outcomes is therefore not simply dependent on a single factor (e.g. whether the task taps into expressive or receptive language skills). Rather, it is shaped by multiple interacting factors, such as task complexity, linguistic distance, and the involvement of other non-linguistic processing skills (e.g. memory and executive functioning). Moreover, while a task such as Expressive Word Classes taps into expressive language skills that are perceived as more challenging than receptive language skills, proficient outcomes are expected as the task is less reliant on specific language skills, and other processes can be recruited.

It is necessary to make explicit the limitations of generalizing the outcomes of this study. The study included only children with typical language development. It is essential to find out not only whether heritage language-speaking children reach monolingual norms, but also whether all the subtests are reliable for identifying children with atypical language development.
The role of chronological age on English heritage language outcomes

Monolingual children’s performance on norm-referenced measures does not change with chronological age. In contrast, younger heritage language speakers had more advanced outcomes than their older peers on all subtests. This supports the notion that bilingualism can divert from the typical monolingual developmental path (Bialystok & Feng, 2011). As the AOB was controlled for, the better performance of the younger heritage language speakers could be, at least partially, explained by their shorter bilingual exposure compared to the other groups. There may also have been differences in the quality of input experienced. Younger monolingual children and heritage language speakers may both be experiencing the majority of their language at home. However, older monolingual children will be experiencing formal and academic English at school. Older English–Hebrew speaking bilingual children continue to primarily experience the heritage language within the home setting.

Effects of chronological age may be related to the timing in which the linguistic skills assessed are expected to be acquired. Earlier linguistic forms are simpler, and acquisition may require less input than later-acquired linguistic forms that are more complex. This may offer an explanation as to why the younger heritage language speakers’ outcomes are more comparable to their monolingual peers than older heritage language speakers’ outcomes. Older heritage language speakers may therefore need more time and input in order to maintain the level of progress that is achieved by their younger heritage language speaking peers.

There were significant differences between the three age groups on all the subtests aside from Concepts and Following Directions. The proposed explanation for this observed phenomenon is twofold. Firstly, the subtest relies on the knowledge of concepts that are shared across languages. Children experience input from both languages that supports their ability to succeed in this subtest. Secondly, this subtest engages in cognitive processing skills, such as working memory and attentional control. Bilingualism may yield a cognitive advantage (Bialystok, 2011). Thus, as heritage language speakers get older, they may be able to maintain their level of progress in this subtest. Chronological age may therefore moderate the impact of bilingual exposure. In contrast, the other subtests may be less reliant on (1) the shared conceptual content across both languages, and/or (2) the recruitment of cognitive processes to support their linguistic abilities. For example, Expressive Vocabulary is less reliant on both, Receptive Word Classes is more reliant on the former but not the latter, and Recalling Sentences is less reliant on the former and engages in the latter.

The role of the age of onset of bilingualism on English heritage language outcomes

Later AOB is associated with more advanced heritage language outcomes, corroborating with findings on chronological age. AOB significantly influenced all the linguistic domains aside from Word Structure. Word Structure presented with a relatively large spread of values in both AOB groups. Hence, the subtest’s outcomes are prone to great variability in heritage speakers, reducing the power of the results. Findings also indicate
that the effect of AOB varies according to the subtest under study. The effect size was medium for Sentence Structure, Expressive Vocabulary, Recalling Sentences and Expressive Word Classes. In contrast, the effect size was small for Concepts and Following Directions and Receptive Word Classes. The finding confirms that receptive linguistic domains involving knowledge of concepts that are shared across languages are less influenced by bilingual exposure than other linguistic domains, such as those requiring expressive language skills and/or grammatical knowledge. The influence of AOB may also vary according to the linguistic form within a subtest (Albirini, 2018). Morphemes that are marked, occur infrequently and are restricted in use are more influenced by AOB than unmarked, frequently used and productive morphemes. Future research should therefore include error analysis of the linguistic domains.

**Clinical implications**

This study elucidates the role of the age of onset of bilingualism and chronological age on heritage language outcomes, across a multitude of linguistic domains. It contributes to our understanding of heritage language acquisition and to data available on developmental expectations. It also extends our knowledge on how bilingual children’s scores compare to monolingual norms. For instance, typically developing bilingual children’s ability to follow instructions in their heritage language is expected to be similar to their monolingual peers. In contrast, their ability to label items will be expected to be less proficient. Findings are therefore of importance to practitioners working with bilingual populations, helping them to avoid misinterpretations in terms of deficits. The implications that the findings have for bilingual assessment is also of fundamental importance. It has been demonstrated that assessment must consider the chronological age, AOB and area assessed when analyzing bilingual children’s linguistic outcomes.

Finally, our results determine areas of relative strength and weakness for heritage language speakers. They can be used to indicate the areas of heritage language that may benefit from extra support. Relatively proficient language skills may be employed to support weaknesses. For instance, depth of vocabulary knowledge can be used to develop expressive vocabulary. Furthermore, results illustrate that increased exposure may also improve expressive vocabulary. Thus, this study can be used to guide teaching techniques and parental advice.

**Conclusion**

The present study advances our understanding of heritage language developmental expectations. Bilingualism influences some linguistic domains more than others, resulting in a linguistic system that differs from the monolingual one. It is proposed that the influence of bilingualism on heritage language outcomes is shaped by multiple interacting factors, such as task complexity, linguistic distance, and the involvement of other non-linguistic processing skills. Accordingly, these constructs should be considered when developing models of bilingual language acquisition. Measures of paradigmatic knowledge and semantic networks are typically at or above the monolingual normative range. Subtests that rely on grammatical knowledge are sensitive to
bilingualism, but mean scores are within the monolingual normative boundary. In contrast, outcomes of subtests involving lexical retrieval would be expected to be below the monolingual normative range. The study also reveals that chronological age and AOB impact on linguistic outcomes, helping to explain why heritage language speakers’ linguistic systems vary from their monolingual peers. To develop our understanding of heritage language acquisition further, future research should explore other language pairs. Other influencing factors should also be examined, such as socio-cultural and socio-linguistic factors.

Acknowledgements

We would like to thank Dr Efrat Harel and Dr. Susie Joffe as well as the research assistants at the Language Development Lab for data collection. We would also like to thank the children and parents who agreed to participate in this research.

Author contributions

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Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The collection of the data used in this article was supported by the Israel Science Foundation grants numbers 454/18 and 863/14.

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