

# The Development of the Hebrew Language amongst Arabs and Jews in Bilingual-Binational Schools in Israel

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**How to cite this paper:** Abu-Rabia, S., & Kitany, S. (2022). The Development of the Hebrew Language amongst Arabs and Jews in Bilingual-Binational Schools in Israel. *Creative Education*, 13, 1226-1246. <https://doi.org/10.4236/ce.2022.134076>

**Received:** March 2, 2022

**Accepted:** April 10, 2022

**Published:** April 13, 2022

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## Abstract

The current research examined the acquisition of Hebrew as a second language amongst both Arab students and Jewish students, for whom it is their mother tongue, studying in bilingual schools. Their achievements in Hebrew were compared to their peers' achievements in monolingual schools: Jews were compared to their Jewish peers in Hebrew monolingual schools and Arabs were compared to their peers in Arabic monolingual schools. The students were given various assignments in Hebrew to test words recognition, pseudowords, phonological awareness, orthographic knowledge, morphology, syntax judgment, working memory, spelling and reading comprehension. The data was analyzed by one-way ANOVA and Tukey post hoc test. The results that stand out are that Hebrew as a second language does not come at the expense of birth tongue skills amongst Arab students and that the birth tongue of Jewish students was not impaired either. The consequence was that all students "earned" a second language. This study was compared to other similar researches conducted in other countries with spoken languages, and was discussed in the context of meta-linguistics theories, Cummins theory of mutual threshold, the monolingual facilitation theory and the Structural Sensitivity Hypothesis.

## Keywords

Hebrew, Bilingual Schools, Monolingual Schools, Binational Schools, Transfer of Skills

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## 1. Introduction

This study aims to evaluate multilingual language acquisition by students learn-

ing in bilingual schools. The study's question is whether and how multilingualism, as a cognitive academic ability, is employed by Arab students learning Hebrew as a second language, compared to their Jewish peers, for whom Hebrew is their mother tongue and who study with them in bilingual schools. Such research has not yet been conducted in bilingual schools in Israel and thus it is expected to shed light on the process of the development of Hebrew linguistic skills amongst Arabs and Jews while comparing their acquisition of Hebrew with that of Arabs and Jews studying in monolingual schools.

Most Israeli schools teach in only one language: Arabic in Arab schools and Hebrew in Jewish schools. In the last few years, several bilingual schools were established where Arab and Jewish students study together in mixed classes. In these schools most professions are taught simultaneously in both languages, with each class having an Arab teacher to teach in Arabic and a Jewish teacher to teach in Hebrew.

Jewish students in their natural environment speak Hebrew which is quite similar to the written Hebrew language and to the language taught in the classroom. However, they are also exposed during lessons in bilingual schools to both spoken and written Arabic, which is particularly unfamiliar to them in all linguistic representations.

Cummins (1979, 1981, 1991, 2000) suggests a transfer of the linguistic academic cognitive skills from one language to another occurs, whereas proficiency in the first language predicts proficiency in the second language and vice versa (Da Fontoura & Siegel, 1995). Moreover, studies confirm the claim that the ability to acquire reading and writing abilities in a second language is affected by similarity and diversity between orthographies in birth language and second language (Abu-Rabia, 1997, 2001; Ryan & Meara, 1992).

Therefore, it is the aim of this research to examine how this academic cognitive lingual ability is manifested amongst Arab and Jewish students who learn Hebrew from a very young age in bilingual schools, compared to their peers in monolingual Arab and Jewish schools.

The research question will be examined through tests which will be handed among 3<sup>rd</sup>-grade, 5<sup>th</sup>-grade and 6<sup>th</sup>-grade students, Arabs and Jews, from a bilingual school, an Arab monolingual school and a Hebrew monolingual school. In the bilingual school students study simultaneously in Hebrew and Arabic, whereas in the monolingual Hebrew school and the monolingual Arabic school the teaching language is solely Hebrew or Arabic, accordingly. This comparison will display the level of the development of academic lingual skills in Hebrew amongst Jewish and Arab students who study in a bilingual school, compared to Jewish and Arab students studying at a monolingual school.

## 2. Literature Review

### The linguistic reality in Israel

The Israeli reality is of Jews and Arabs living side by side on a geographically

small area. However, the majority of people in both populations live in different geographic territories, work in different working places and it is usually the Arab population that seeks more institutional and social integration and needs to do most of the linguistic and cultural adjustments (Hertz-Lazarowitz, Azaiza, Peretz, Zelniker, & Sharabany, 2007; Hertz-Lazarowitz & Zelniker, 2007).

In the state of Israel, the Arab population had undergone accelerated social and political changes that are evident, among others, in an increase in the level of education and in bicultural and bilingual levels. However, this process was limited to the individuals and is not reflected in the collective or institutional level; namely, Arab-Israeli citizens could not translate individual changes into integration in national, social, economic or political establishments. According to Amara & Mar'i (2006) the general perception of the Jewish population is that the segregation between Jews and Arabs helps maintain the Jewish-Zionistic Characteristics of the country and prevents it from becoming a binational country.

Most of the Israeli educational system preserves the detachment between Jews and Arabs. For one, schools are nearly all monolingual. Second, even though Arabic is an official language in Israel, Jewish students are scarcely exposed to the Arabic language and Arab culture in general, compared to the Arab students who study the Hebrew language, literature and culture in extensive scope (Amara & Mar'i, 2006). It seems that both Hebrew studying for Arabs and Arabic studying for Jews hardly helps in creating educational equality and enhancement of chances, with the Arab population being the main victim of this situation.

Academic study is in many cases the first opportunity for Jewish and Arabic students to interact and by doing so benefits both missing word personally and by enhancing social interaction and integration. Hence, such bonds between members of both nationalities usually do not occur and the social and cultural detachment between the vast majorities of the two groups is preserved. An alternative to this social, educational and cultural reality may be bilingual education in Israel and developing models for such bilingual schools is one of the most challenging ways to cope with this disturbing reality (Hertz-Lazarowitz, Azaiza, Peretz, Zelniker, & Sharabany, 2007; Hertz-Lazarowitz & Zelniker, 2007).

### **3. Basic Theories in Language Acquisition (Second/Foreign)**

Cummins' (1979, 1981) Hypothesis, known as Linguistic Interdependence Hypothesis (LIH) relates to the dependence between the first language and the second language. Viz. the transfer of linguistic skills from one language to the other occurring automatically regardless of the type of orthography. Intensive exposure to the second language entails rapid bilingual development without negative effects on the first language (Cummins, 1979, 1981). Many studies that examined the transfer of linguistic skills from one language to another referred to LIH (August, Calderon, & Carlo, 2001; Bernhardt & Kamil, 1995; Cisero & Royer, 1995; Geva & Siegel, 2000; Lindsey, Manis, & Bailey, 2003).

Durgunoglu et al. (1993) examined the transfer between languages among bi-

lingual students, Spanish and English speakers, who were tested about phonological awareness, words recognition and pseudowords reading. The results showed a positive connection between Spanish phonological awareness and the reading of English words and pseudowords. Similar results were found by Geva & Siegal (2000) who examined reading skills of bilingual Canadian students, speakers of Hebrew and English. Their results showed distinct correlation between the two languages in words recognition, pseudowords reading, working memory and syntax awareness. The researchers therefore concluded that the transfer of linguistic skills from first language to second occurs regardless of the type of orthography.

One of the hypotheses that relate to the internal causes of the reading difficulties in the second language is the hypothesis that connects between reading and writing in the first language to mastering the second language: the Linguistic Threshold Hypothesis (LTH) by Cummins (1979, 1991). According to LTH reading skills will transfer to the second language only once a sufficient level of basic skills in the foreign language was gained in terms of morphologic, syntax and lexical knowledge. This minimum level is referred to by Cummins (1979, 1991) as the linguistic threshold level. Under this threshold level of linguistic capability, it is not likely that reading skills in the first language will transfer to the second language. Second language students should therefore acquire a basic linguistic level before they are able to read in the second language.

The Script Dependent Hypothesis (SDH) suggests that the efficiency of reading in the second language is a direct function of the type of orthography of the first language. Thus, different orthographies play a key role in the reading process of the second language. Moreover, according to SDH, the development of reading in a certain language is bound to the orthographic characteristics of that language. Therefore, the main focus of SDH is considering the orthographic qualities and characteristics of the first language as part of the learning process of reading in different orthographies in the second language. Various characteristics of the orthography of the first language may act as rules and strategies that obstruct the flow of the learning process in the second language (Lieberman et al., 1974; Lindgren, De Renzi, & Richman, 1985).

Many studies have demonstrated that when the orthography of the first language is different than the orthography of the second language, it may have a negative effect on the process of word deciphering. Orthographic skills of the first language predict the reading ability of that language but do not predict reading ability of other languages. Hence, when orthographies of languages differ, it is important to adjust the learning strategies of the second language to the specific characteristics of the first language to simplify and accelerate the learning process of the second language (Abu-Rabia & Taha, 2004; Gonzalez & Garcia, 1995; Lefrançois & Armand, 2003; van der Leij, Bekebrede, & Kotterink, 2010).

The Orthographic Depth Hypothesis (ODH) suggests that readers adjust their reading strategies according to the orthographic characteristics of the language

(Frost, 1994; Katz & Frost, 1992). In shallow orthographies the level of consistency is high and readers rely on the “sub-lexical” phonological course. On the other hand in deep orthographies the level of consistency is low and readers rely more on the “lexical” orthographic course of recognizing the whole word (Katz & Frost, 1992).

Studies of different types of orthographies have demonstrated that students learning to read languages with consistent orthographies read faster and more accurately than students learning to read languages with an inconsistent orthography (Bruck, Genesee, & Caravolas, 1997; Defior, Martos, & Cary, 2002; Wimmer & Goswami, 1994).

According to the Linguistic Coding Difference Hypothesis (LCDH) linguistic skills of the first language are the basis for learning a second language (L2) and a foreign language (FL). Skills of the first language which include phonology, orthography, syntax and semantics, will be utilized in other languages a child acquires. Difficulties in the grammatical code (especially in phonology, orthography, syntax or semantics) will transfer to the FL and are the basis of individual differences (Sparks & Ganschow, 1991; Sparks, 1995).

A research by Kahn-Horwitz, Shimron, & Sparks (2005) supports LCDH. In this research, variables influencing the acquiring of reading skills in Hebrew (L1) amongst 4<sup>th</sup> grade students were also tested for influence on the acquiring of reading skills in English (EFL). The result demonstrated that Hebrew reading variables—phonologic and morphologic alertness, orthographic knowledge and punctuality and fluency word-reading, also predicted the students’ ability to recognize and name letters, to read pseudowords and to cope with reading comprehension assignments in English as FL. English punctuality and fluency word-reading was predictive for reading comprehension in English.

The Psycholinguistic Grain Size Theory (PGST) by Ziegler & Goswami (2005) suggests that the dramatic difference in reading speed and punctuality is related to the orthography which manifests essential differences in the characteristics of phonological processing and reading strategies. Languages characterized in opaque orthographies force novice readers to cope with an inconsistency problem as orthographic units of such languages have more than one form of pronunciation, and some of its phonological units have more than one way of spelling. The level of inconsistency varies amongst languages according to the characteristics of their orthographies and consequently there are differences in the development of reading between languages. A research by Borgwaldt, Bolger, & Jakab (2010) found that orthographic processing skills and phonologic processing skills contribute differently to the development of reading in languages that vary in the level of orthographic inconsistency.

One of the main principles of PGST is the phonological awareness as predicting reading ability in different inconsistency level orthographies. Many studies examined this issue (Caravolas, Volín, & Hulme, 2005; Castles & Coltheart, 2004; De Jong & Van der Leij, 2003; Durgunoglu & Oney, 1999; Ziegler et al., 2010). These studies were inconclusive in respect to phonological awareness as

predicting reading skills in various orthographies. According to Georgiou, Paviola, Kirby, & Stephenson's (2008) phonological awareness is a strong predictor of reading in languages with inconsistent orthography such as English, whereas fast naming is a strong predictor for reading ability in languages with more consistent orthographies such as Greek or German.

### **Cognitive Retroactive Transfer of Language Skills**

Cognitive Retroactive Transfer of Language Skills or Cognitive Retroactive Transfer (CRT) is the transferring of linguistic skills from the second language to the first language, viz. transferring skills in the "opposite" direction (L2 → L1). CRT suggests that an improvement in linguistic and meta-linguistic skills is bound to entail improvements in the similar skills of the first language (Abu-Rabia, Shakkour, & Siegel, 2013).

A research by Abu-Rabia et al. (2013) examined CRT of linguistic skills amongst bilingual readers of Arab and English. The research tested the effect of an intervention program for improving reading and writing skills in English as a foreign language (FL) for **weak** readers, and those same skills in Arabic as first language (L1). 60 6<sup>th</sup> grade students studying English as foreign language since the 3<sup>th</sup> grade attended the research. The students were defined as **weak** by their teachers and had an average grade of 60 in English and in Arabic. Tests were taken by the experimental group and by the control group before and after the intervention program commenced, to evaluate skills in orthographic knowledge, phonologic alertness, morphologic alertness, syntax alertness, reading punctuality and reading comprehension in Arabic and in English. The tests were identical in content, scale and level of difficulty. The experimental group attended the intervention program in English, but not in Arabic. The results indicated a significant improvement amongst students of the experimental group in all linguistic and meta-linguistic skills in Arabic and English alike following after the intervention program, apart from orthographic knowledge in Arabic. The control group showed no improvement in either language.

### **Transfer of linguistic skills from one language to another**

Only a few studies have tested the transfer of morphologic alertness from one language to another. Schiff & Calif (2007) examined the contribution of morphologic alertness to the acquisition of reading by 5<sup>th</sup> grade students in Israel, in two alphabetic languages: Hebrew (FL), a transparent orthography language, and English (L2), a deep orthography language. Researchers found a strong positive correlation between morphologic alertness in Hebrew to morphologic alertness in English, and morphologic tasks in Hebrew predicted word-reading in English. The conclusion of the analysis of the orthographic and morphologic system of Arabic and English is that alphabetic languages have a diverse level of orthographic and morphologic transparency. On one hand, Arabic has a transparent orthography but on the other hand it is characterized by an opaque morphological system. These linguistic qualities affect the process of recognizing and deciphering words. Hence, it is likely that novice Arabic readers would rely more on phonologic processing than morphologic processing, whereas novice English

readers would rely more on morphologic analysis.

Equal findings were demonstrated in a research by Kahn-Horwitz et al. (2005), who found distinct connection between morphological skills in the first language (Hebrew) and word reading in the second language (English). Moreover, morphologic alertness in Hebrew contributed to reading comprehension in English. Similar results were shown by Bindman (2004) who found that morphological assignments in Hebrew distinctly contributed to better reading and spelling in English.

A two-year research by Kieffer & Lesaux (2008) examined the relation between morphologic alertness and reading comprehension amongst bilingual Spanish children studying English as a second language. The researchers found that the connection between morphologic alertness and reading comprehension was strengthened between 4<sup>th</sup> grade and 5<sup>th</sup> grade. Furthermore, a distinct connection between alertness of Spanish morphologic derivatives and reading comprehension in English was found.

Jarvis & Odlin (2000) tested the relationship between morphological skills and the acquisition of reading amongst bilingual Finnish children studying English as a second language. The results indicated that morphologic alertness in Finnish was a good predictor of word reading in English. Deacon, Wade-Woolley, & Kirby (2009) examined the influence of morphological alertness on reading two languages of deep orthography—English and French. The students of the research were bilingual English students studying French as a second language. Researchers reported a bilateral inter-lingual transfer of morphological skills between the two languages—English and French. Viz. morphologic alertness in English was an important predictor of word reading in French and morphological skills in French predicted word reading in English.

On one hand, the above studies showing inter-lingual transfer of morphologic alertness skills, support Cummins' (1979, 1981) LIH. On the other hand, the fact that morphologic alertness does not transfer from English to languages of shallow orthography support SDPH (Lieberman et al., 1974; Lindgren et al., 1985). Moreover, the studies above have shown a unilateral inter-lingual transfer of morphologic alertness skills from languages of shallow orthography like Arabic, Hebrew, French, Finnish and Korean, while no such transfer occurred from English to these other languages. According to Ramirez et al. (2010), shallow orthographies are usually characterized by complex morphological systems whereas deep orthographies are characterized by simple morphological systems. The inter-lingual transfer of morphologic alertness skills occurs from complex morphologic system to simple morphologic systems, more than the other way around (Ramirez et al., 2010). In the contrary, Deacon et al. (2009) in the research quoted above, indicated a bilateral inter-lingual transfer of morphologic alertness skills between English and French. The researchers claimed that when the morphological systems of the languages are in the same degree of complexity, a bilateral inter-lingual transfer of morphological alertness skills will occur.

Wang et al. (2009) also found that morphologic awareness in Korean as first

language was a strong predictor of both reading comprehension skills in the first language and reading comprehension in English as a second language.

Many studies have come to similar conclusions, reinforcing the supposition that there is a strong connection between skills in the first language and skills in the second language (Palermo, Mikulski, Fabes, Martin, & Hanish, 2017; Siu & Ho, 2015; Melby-Lervag & Lervag, 2011; Chung, Chen, & Deacon, 2017; Singh, Fu, Tay, & Golinkoff, 2017).

Conversely, Verhoeven (2000), who had tested bilingual Turkish children whose second language is Dutch, found that their performance in reading comprehension skills in the second language were weak, compared to their monolingual Dutch peers. The findings were explained as a result of poor vocabulary in Dutch that characterized the Turkish bilingual children compared to their monolingual Dutch peers, despite the fact that both groups displayed an equal level of Dutch word deciphering efficiency. It follows then, that word deciphering does not contribute to reading comprehension in Dutch.

A research by Wang et al. (2006) found that morphological alertness in English did not contribute to reading comprehension skills in Chinese. A research by Akamatsu (2003) found that Chinese and Japanese children of orthographic-logographic background had weak achievements in word processing, reading and reading comprehension tasks in the second language (English) compared to Persian children of alphabetic linguistic background. Following from the studies above is that there is no inter-linguistic transfer of linguistic components that may contribute to the development of second language reading comprehension skills. Thus, these studies support the SDH (Lieberman et al., 1974; Lindgren et al., 1985).

#### **Research question**

How does the Hebrew language develop amongst Arab and Jewish students studying in bilingual schools compared to their peers studying in monolingual schools?

#### **Research hypotheses**

The Arab and Jewish students of the bilingual school would acquire better linguistics skills in Hebrew compared to the Arab and Jewish students of a monolingual school.

## **4. Methodology**

### **Participants**

The research was conducted among 3<sup>rd</sup>-grade, 5<sup>th</sup>-grade and 6<sup>th</sup>-grade students, Arabs and Jews. Students of each age group were randomly selected—30 Arab students and 30 Jewish students. The experimental group consisted of a total of 180 students from bilingual schools. Students of the same age, learning in Arab and Jewish monolingual schools, formed the control group (n = 90). The achievements of these Arab and Jewish students in Arabic were compared to their control peers. Additionally, the achievements of the Jewish students in He-



brew were compared to those of their corresponding peers in the control group.

Students were selected according to the following criteria: age (grade), usage of the same learning materials and residential area (country side). All students participated in this study as part of the control group came from the same socio-economic background as their corresponding experimental students.

#### Tools

**1) Word identification** (Shanny, Lahman, Shalim, Bahat, & Zinger, 2003): The student should read aloud 38 punctuated single words, presented in an ascending level of difficulty.

**2) Pseudowords** (Shanny et al., 2003): Students should read aloud 33 punctuated pseudowords, based on phonological deciphering presented in an ascending level of difficulty.

**3) Phonemic awareness** (Shanny et al., 2003):

**a) Phoneme analysis:** This test assesses the student's ability to break a word into its phonemes. The tester reads the target word and the student is required to repeat the word and break it into its phonemes. This test includes 18 words. The task measures the ratio of precision.

**b) Phoneme synthesis:** This test assesses the student's ability to join phonemes to a whole word. The student hears phonemes and is required to join them to a word. This test includes 8 items with ascending level of difficulty, from three phonemes words to six phonemes words. Each level includes two words. The task measures the ratio of precision.

**c) Phoneme omission:** This test requires the student to omit an initial, a middle or a last phoneme from a word. The student hears a word and is required to pronounce it and then pronounce the remaining sequence.

**4) Orthography** (Shanny et al., 2003): Students were required to read punctuated words and the tester writes down the way it was read.

**5) Morphology** (Shanny et al., 2003): in section A of this test, the student is presented with 9 sentences with a missing word, and is required to complete the most suitable out of four given words. In section B of this test, the student must conjugate a word in the correct form according to a given content.

**6) Syntactic judgment** (Shanny et al., 2003): the student is required to read pairs of sentences and choose the one that is in the correct form.

**7) Working memory** (Shanny et al., 2003): this test is composed of 10 sets of sentences, with each set having additional sentences. All sentences have a missing word, and the student is required to complete the words, and then repeat the words completed in the correct order.

**8) Spelling** (Shanny et al., 2003): the student is required to write down 48 words arranged in an ascending level of difficulty.

**9) Writing template recognition** (Shanny et al., 2003): the student is presented with 20-word pairs with only one word spelled correctly in each pair. The student is required to recognize the word that is spelled correctly according to its template.

**10) Reading comprehension** (Shanny et al., 2003): students were required to

read a text, and then answer 10 multiple choice comprehension questions about it.

## 5. Procedure

The Hebrew tests were given to the experimental group and to the control group. A tester fluent in both languages gave the instructions orally to each group in its mother tongue. The order of the tests was: deciphering tests – phonological awareness, information processing, orthography, morphology, syntax, working memory, and spelling, and a reading comprehension test.

The tests were given to students in bilingual and monolingual schools. For each student, the order of the tests differed to eliminate the effect of fatigue.

## 6. Results

The purpose of the analysis was to test the development of Hebrew skills amongst students. In this case too, the analysis has two aspects. First, it is required to check whether linguistic skills by Jewish students in bilingual school are different from those of students studying in monolingual schools. Second, and thereafter, it is required to check whether the linguistics skills of both groups of students are different than the skills on Arab students in bilingual schools, for whom Hebrew is a second language. A one-way ANOVA analysis was conducted to compare linguistics skills of the groups of students in various age groups as stated below. The analysis of the differences between the various experimental groups was conducted using Tukey post hoc analysis. The experimental groups analyzed are: Jewish students from the monolingual school, Jewish students from bilingual school and Arab students from the bilingual school. For the first two experimental groups, Hebrew in the mother tongue (L1), and for the Arab students Hebrew is a second language. Age-grouped analysis results are presented in **Table 1**.

### Analysis of Skills in Hebrew for 3<sup>rd</sup>-grade students

In general, the results of the analysis regarding 3<sup>rd</sup>-grade students show that in most skills tested, there are no statistically significant differences between scores of Jewish students learning in the bilingual school and Jewish students learning in the monolingual school.

No differences were found in the level of Hebrew skills between Jewish and Arab students learning at the bilingual school, except performance in spelling ( $F(2, 87) = 5.55, p < 0.05$ ). According to the results, Jewish students spelling skills ( $M = 29.87$ ) were better than their Arab peers ( $M = 26.80$ ). Similarly, no differences were found in the level of Hebrew skills between Arab students in the bilingual school, and Jewish students in the monolingual school, apart for distinct differences in three skills – analysis of phonologic awareness ( $F(2, 87) = 3.21, p < 0.05$ ), synthesis of phonologic awareness ( $F(2, 87) = 3.78, p < 0.05$ ) and phonemic awareness omission ( $F(2, 87) = 3.63, p < 0.05$ ). In all cases, it was found that the level of skills of Arab students in the bilingual school is higher than the level of skills Jewish students in the monolingual school.

**Table 1.** A comparison of linguistic skills in mother tongue Hebrew (LI)—(%)—arranged by age groups.

	3 <sup>rd</sup> grade				5 <sup>th</sup> grade				6 <sup>th</sup> grade				F
	Bilingual		Monolingual		Bilingual		Monolingual		Bilingual		Monolingual		
	Jews	Arabs	Jews	Arabs	Jews	Arabs	Jews	Arabs	Jews	Arabs	Jews	Arabs	
Word recognition	39.3	38.23	35.47 <sup>1,2</sup>	31.87	74.33	73.77	73.1	67.97	80.43	79.03	73.33	73.1	19.53**
W punctuation	7.46	8.14	7.6	7.65	4.7	5.47	4.86	6.48	4.28	3.58	4.96	5.77	
Word recognition	33	34.7	31.83	25.67	65.67 <sup>1,2</sup>	66.53	61.57 <sup>2,3</sup>	59.77	73.63	71.53	66.77	66.77	14.33**
W/O punctuation	5.69	8.95	6.96	5.94	5.31	4.8	6.52	6.58	5.03	3.87	4.98	5.96	
Pseudowords	27.37	27.4	27.47	18.37	55.7	52.47 <sup>1,2</sup>	50.8	46.13	64.73	57.2	58.97	49.63	27.82**
	4.95	6.78	6.55	4.66	5.5	9.75	3.91	10.16	3.82	8.52	5.44	7.11	
Phonemic awareness analysis	33.2	34.37	30.1	31.1	70.07	63.67	67.07	54.07	74.23	74.73	67.47	66.33	11.30**
Phonemic synthesis	6.81	7.15	6.8	6.4	9.83	11.7	8.78	13.34	8.89	5.6	8.23	5.31	
	32.73	32.47	29.07	29.53	67.43	61.97 <sup>1,2</sup>	66.47	54.53	72.6	73.67	65.87	65.7	11.50**
	6.48	5.21	6.24	5.2	8.94	11.01	8.74	12.41	8.51	5.86	6.94	5.91	
Phonemic omission	33.73	32.6	29.97	29.67	68.2	63.60 <sup>1,2</sup>	67.37	55.87	72.67	73.03	66.03	65.7	12.79**
	6.77	5.35	5.91	5.59	9.1	10.8	10.64	11.36	7.86	6.48	4.98		
Orthography	38.43	37.3	35.57	34.07	75	72.7	72.07	64.33	80.93	75.2	72.90 <sup>2,3</sup>	70.3	29.23**
	10.61	10.71	10.45	9.26	6.03	5.22	6.23	6.36	2.48	5.98	4.25	4.94	
Morphology 1	30.6	30.2	28.7	26.17	74.43	69.23	73	59.8	80.57	74.8	66.13	66.83	31.66**
	7.4	8.48	7.55	7.89	7.51	8.85	7.51	8.8	6.01	7.5	4.04	8.43	
Morphology 1	30.63	29.9	29.33	26.37	74.37	66.47 <sup>1,2</sup>	73.4	59.37	80.5	73.67	65.77	67.27	27.88**
	7.4	8.6	8.13	7.74	7.18	14.74	8.23	10.17	6.3	8.41	4.61	7.97	
Syntactic judgement	39.4	39.57	36.13	34.23	71.93	70.13	73.07	63.93	76.4	74.27	68.13	65.7	30.53**
	6.84	7.34	7.07	7.93	4.29	6.6	5.86	7.18	4.12	5.13	5.32	5.31	
Working memory	35.73	36.47	33.57	32.6	58.97	57.6	59.2	52.27	66.47	64.87 <sup>1,2</sup>	61.03	66	5.09**
	6.11	7.75	5.87	7.68	6.23	6	6.09	5.38	5.6	6.04	6.62	5.64	
Spelling	29.87	25.93 <sup>2,3</sup>	27.03	23.13	65.07	60.07	64.43	54.73	73.97	69.60 <sup>1,2</sup>	66.77	64.63	11.17**
	5.14	4.81	4.46	4.97	6.89	5.56	6.7	5.72	4.44	8.24	4.97	7.91	
spelling templates	32.43	29.93 <sup>1,2</sup>	28.40 <sup>1,2</sup>	26.23	73.23	70	72	63.33	79.43	76.87	69.8	70	33.85**
	7.28	7.04	5.63	6.39	6.77	6.93	6.01	7.66	3.15	4.67	5.04	5.21	
Reading comprehension	42.7	42.87	39.13	38.43	78.03	76.33	78.4	64.37	85.6	81.93	74.37	75.83	30.34**
	8.26	10.15	8.31	9.2	5.18	5.84	4.64	5.83	4.92	4.38	6.41	4.98	

Notes: Levene's test significance; <sup>1,2,3</sup> differently numbered averages significantly differ in post hoc analysis ( $p < 0.05$ ) \*\* $p < 0.01$ , \* $p < 0.05$ .

### **Analysis of Skills in Hebrew for 5<sup>th</sup> grade students**

The analysis of skills in Hebrew in relation to 5<sup>th</sup> grade students indicates that in general, there are no differences in the level of skills of students from different schools, apart for two skills: word recognition without punctuation and pseudowords. In word recognition without punctuation ( $F(2, 87) = 6.12, p < 0.01$ ) it was found that skills of Jewish students of monolingual schools ( $M = 61.57$ ) were distinctly lower than the level of skills of Jewish students in bilingual school ( $M = 65.67$ ) and from the level of skills of Arab students in the bilingual school ( $M = 66.30$ ). No distinct differences were found between Arab students and Jewish students in the bilingual school.

Differences between the groups were also found in the pseudowords task ( $F(2, 87) = 6.34, p < 0.01$ ). It was found that the level of Jewish students in the bilingual school ( $M = 55.70$ ) was distinctly higher than that of Jewish students in the monolingual school ( $M = 50.80$ ) and also higher than the level of skills of Arab students in the bilingual school ( $M = 50.80$ ). No differences were found between Arab students in the bilingual school and Jewish students in the monolingual school.

### **Analysis of Skills in Hebrew for 6<sup>th</sup>-grade students**

The analysis of skills in Hebrew in relation to 6<sup>th</sup>-grade students showed distinct differences between the experimental groups in relation to all the skills tested. In general, the analysis indicates no significant differences in the Hebrew skills of Jewish and Arabic students from the bilingual school, whereas the skills of the Jewish students in the monolingual school are inferior to those of Arab and Jewish students in the bilingual school. These distinct differences were demonstrated in relation to all the skills tested—except for word recognition without punctuation and working memory. The level of these skills was distinctly higher for Jewish students in the bilingual school, compared to Jewish students in monolingual school. However, no differences were found between the skills of these two groups of Jewish students and the skills of Arab students in the bilingual school.

### **The analysis of students' skills in Hebrew suggests a number of conclusions:**

In general, there are no significant differences in the skills of the 3<sup>rd</sup> and 5<sup>th</sup> graders in Hebrew. In 3<sup>rd</sup> grade students, no distinct differences were found in the level of Hebrew skills between Jewish students in the bilingual school and Jewish students in the monolingual school. Moreover, with the exception of a higher level of spelling skills of Jewish students, there were no differences in Hebrew skills of Jewish and Arab students in the bilingual school.

In addition, the results show that the level of phonologic awareness, analysis, synthesis and omission were higher amongst Arab students in the bilingual school than amongst Jewish students in the monolingual school.

As a rule, the findings regarding 5<sup>th</sup>-grade students show no difference in the level of Hebrew skills between Jewish students studying in the bilingual school

and Jewish students in the monolingual school. Likewise, these findings show no differences in Hebrew skills of Arabs from the bilingual school and none of the Jewish students groups.

On the other hand, it was found that the level of skills of Jewish students in the monolingual school is lower than that of Jewish and Arabic students in the bilingual school. Moreover, it was found that pseudowords skills of Jewish students from the bilingual school is higher than that of the Arab students in this school, and from the level of skills of the Jewish students in the monolingual school.

Notwithstanding, many differences in the level of skills in Hebrew of 6<sup>th</sup>-grade students were found: the level of skills in Hebrew of students of the monolingual school was distinctly lower than that of Jewish students in the bilingual school. Furthermore, the Hebrew skills of 6<sup>th</sup>-grade students of monolingual school were found to be distinctly lower than that of Arab students in the bilingual school in all skills tested, apart from word recognition without punctuation and working memory. No differences in the level of Hebrew skills were found between 6<sup>th</sup>-grade students, Arabs and Jews, in the bilingual school.

## 7. Discussion

According to the hypothesis, Arab students studying in the bilingual school, will acquire better second language skills (Hebrew), compared to Arab students studying Hebrew in the monolingual school. The Hebrew level of Jewish students in the bilingual school would be similar to the level of Arab students studying in the bilingual school, and would be better than the level of Arab students studying in the monolingual school.

In general, no significant differences in the lingual skills of 3<sup>rd</sup>-grade students and 5<sup>th</sup>-grade students were found. Amongst 3<sup>rd</sup> grade students, no differences at all were found in the level of skills in Hebrew between Jewish students from the bilingual school and Jewish students from the monolingual school.

Similarly, almost no differences were found in Hebrew linguistic skills between Jewish students and Arab students from the bilingual school. Moreover, phonologic awareness in Hebrew by Arab students in the bilingual school was better than that of Jewish students in the monolingual school.

Findings related to 5<sup>th</sup>-grade students, as a rule, showed no differences in the level of Hebrew skills between Jews studying in the bilingual school and Jews studying in the monolingual school. Similarly, these findings showed no differences in Hebrew skills between Arabs from the bilingual school and any of the other groups of Jewish students.

As for 6<sup>th</sup>-grade students, again, Jewish students from the bilingual school were better in Hebrew than Jewish students in the monolingual schools.

Likewise, the Hebrew of Arab students in the bilingual school was better than the Hebrew of Jewish students in the monolingual school, except for word recognition and working memory, and, most important—both groups of the bilin-

gual school achieved similar scores in Hebrew.

What stands out from the results is that Hebrew as a second language, does not come at the expense of mother tongue skills, amongst Arab students, neither does the mother tongue of Jewish students in the bilingual school is damaged. Thus, the students “earned” an additional language.

The results of this research call for a discussion in the term meta-linguistic awareness. An interlingual transfer of skills had occurred, a transfer that is the result of an increase in the level of the meta-linguistic awareness. Such a transfer occurs swiftly and easily if the orthographies of the two languages are similar (Script-dependent Hypothesis), as in the case of Hebrew and Arabic—two Semitic languages which definitely share many similarities. Such a transfer of skills is not likely to occur if the orthographies are substantially different (Pasquarella, Chen, Lam, Luo, & Ramirez, 2011; Bialystok, Majumder, & Martin, 2003).

Conversely, according to the inter-dependence hypothesis, the transfer of interlingual skills occurs regardless of the orthography (Abu-Rabia & Siegel, 2002; Geva & Siegel, 2000). According to this theory, the transfer of writing skills from one language to the other strengthens the connection between languages as a result of the high level of meta-linguistic awareness amongst bilingual individuals (Geva & Ryan, 1993; Manis, Lindsey, & Bailey, 2004).

Bilingualism has a proven positive effect on the cognitive abilities of both young (Bialystok, 2001) and old (Bialystok, Craik, & Ryan, 2006; Bialystok & Martin, 2004) learners. Learning two languages reinforces specific skills in the learning process and the controlling the attention ability in task performance. Researchers explain the effect of learning/utilization of two languages on the control and focus of attention of learners and speakers of two languages, in the fact that the transfer from one language to the other requires deep attention and control over the attention amongst bilingual individuals in the speaking process, compared to monolinguals coping with only one language.

The process a bilingual individual undergoes is very demanding in terms of attention resources, and this tussle facilitates the high cognitive abilities of bilingual learners (Bialystok, Craik, Green, & Gollan, 2009).

The results of the current research reinforces similar results shown by Abu-Rabia & Siegel (2002) who tested the development of lingual skills amongst bilingual Canadian students of Arabic origin, compared to local monolingual students. Both groups showed similar abilities in English, with no evidence of any damage to the lingual skills of bilingual students in Arabic. In addition, a comparison between dyslectic bilingual students and dyslectic monolingual students showed better abilities of bilingual dyslectic students in several meta-linguistics tasks: spelling, syllable pronunciation, working memory and phonologic awareness. This finding indicates the significant contribution of bilingual education on linguistic abilities of populations in need of special attention.

Other studies conducted worldwide have reached similar conclusion concerning bilingual education as reinforcing the lingual abilities in both languages

(Abu-Rabia & Sanitsky, 2010; Abu-Rabia & Siegel, 2002, 2003; Deacon et al., 2009; Kahn-Horwitz et al., 2005; Nassaji & Geva, 1999; Akamatsu, 2003).

In general, the results of the current research are strongly positive in favor of bilingual students studying in bilingual school, compared to students studying in monolingual schools.

Bilingual students preserved and developed their Arab mother tongue equally or better compared to their peers studying in a monolingual school and Jewish students developed their Hebrew mother tongue equally or better compared to their peers studying in the monolingual school.

Also, the development of the second language is equal or better for both Arabs and Jewish students studying in the bilingual school, compared to their peers studying in the monolingual school.

These results call for a discussion in the term meta-linguistic awareness: children studying two languages simultaneously, like in a bilingual school, develop meta-linguistic abilities that grant them an advantage in linguistic flexibility compared to their monolingual peers. Many researchers agree that bilingual individuals acquire meta-linguistic abilities that grant them an advantage in linguistic flexibility, compared to monolingual co-equals, and that this meta-linguistic ability allows better control and development of linguistic skills amongst bilinguals compared to monolinguals (Bialystok, 2001; Ellis, 2002).

Meta-linguistic awareness is defined as a learner's ability to reach language abstraction. It is the ability to contemplate and control the linguistic structure and the processing of common structures in a given linguistic process: reading and speaking. It is measured through the accessibility of the learner and his control over manipulative actions in the structure and the processing of a language (Gombert, 2003).

This meta-linguistic awareness was well displayed with the abilities of Hebrew bilingual students. The meta-linguistic abilities of phonology, morphology, and in the word level, were evident in a high level of skills acquired by students in the bilingual school, compared to their monolingual peers in all age groups. The results of this research in the phonological aspect coincide with similar results of studies by other researchers in this field (Gottardo et al., 2001; Verhoeven, 2007).

In the aspect of orthographic awareness and its transfer from the first language to the second language, the results are also supported by many studies worldwide (Da Fontoura & Siegel, 1995; Wang et al., 2006).

Deacon et al. (2009) presented results showing the transfer of orthographic skills from the mother tongue to the second language. These results were obtained in languages with two similar orthographies—English and French. Schiff & Calif (2007), tested 4<sup>th</sup>-grade students studying English as a second language in phonologic, orthographic, morphologic, and word reading tasks in Hebrew and English. The results showed high positive correlations in all skills tested in Hebrew and English. In addition, regression analysis shows that phonologic, morphologic and orthographic skills in both Hebrew and English predicted bet-

ter ability of word deciphering in English as a foreign language (Schiff & Calif, 2007).

The above applies to the transfer of morphological skills (reviewed by Schiff & Calif, 2007): many researchers worldwide displayed results that support the transfer of morphologic skills from one language to the other (Geva & Siegel, 2000). It is important to point out that Ben-Zeev's (1977) theory discussed the advantages of bilingualism already in the seventies. According to his theory, the Theory of Bilingual Facilitation (TBF), cognitive flexibility develops differently and better amongst bilingual individuals compared to monolingual individuals (Hakuta & Diaz, 1985).

The empirical findings of many studies support TBF (Bruck et al., 1997; Bialystok et al., 2003, 2005). These findings confirmed better meta-cognitive abilities of bilinguals compared to monolinguals. Kuo & Anderson (2010) suggested the Structural Sensitivity Hypothesis, arguing that bilinguals develop abstract lingual representations to the common and distinct features of the languages they acquire. This hypothesis differs of what Bialystok et al. (2003, 2005) suggested, who state that bilinguals develop meta-linguistic abilities regardless of specific features of a language, orthography, phonology, morphology and syntax. Evidently, the results of the current research support the theory of Bialystok et al. (2003, 2005) claiming that learning two languages improves meta-linguistic abilities, as shown in the comparison of the results of bilingual student to monolingual students.

In summary, in the results of the current research, the success of the bilingual students who started their education with learning two languages, Hebrew and Arabic, stands out compared to their monolingual peers. The superiority of bilingual students was evident in almost all skills, both in the first and in the second language amongst Jews and Arabs.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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