Bar Ilan University

Faculty of Humanities

Department of English

Dissertation Proposal for the Doctor of Philosophy

Dissertation Topic:

The connection systems between cognitive, linguistic, meta-linguistic, and emergent literacy skills among kindergarten children in diglossic Arabic: An intervention study

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מדעי הרוח

המחלקה לבלשנות וספרות אנגלית

הצעת מחקר לתואר שלישי

<u>הנושא</u>:

מערכות הקשרים בין היכולות הקוגניטיביות, השפתיות, המטא-לשוניות וניצני האוריינות בקרב ילדי גן דוברי ערבית בהקשר דיגלוסי: מחקר התערבות

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Aims and General Description:

Language, meta-linguistic, and literacy skills in kindergarten are important predictors of reading and spelling in later development. Since diglossia poses a challenge to the acquisition of Standard Arabic language and literacy skills (Saiegh-Haddad, 2018), it is important to study how children develop linguistic, meta-linguistic, and emergent literacy skills in a standard form that they are not familiar with? Also, whether it is possible to enhance kindergarten children's emergent literacy, especially among those coming from low SES, whose language and literacy skills are known to be generally compromised.

The first aim of the study is to investigate the contribution of a structured intervention program aimed at language, metalinguistic and cognitive skills to the development of children's skills in all three domains (linguistic, meta-linguistic, and emergent literacy skills), as well as to their word-reading reading and spelling, and listening comprehension of stories (hereby, story comprehension). The intervention program implemented in the current study has been constructed specifically for the Arabic language and it targets some of its major linguistic and orthographic features, including, among other things, morphological structure, phonological structure, and allography (letter shapes). Moreover, the intervention program targets the linguistic distance in diglossia and aims at: a) enabling children's linguistic and metalinguistic skills in Spoken Arabic and b) systematically mediating Standard Arabic structures leveraging, hence, Standard Arabic skills via Spoken Arabic. The second aim of the study is to investigate kindergarten linguistic, metalinguistic, and emergent literacy concurrent predictors of word reading, word spelling, and story comprehension, before and after the intervention. This latter aim will examine the connection systems between language, meta-linguistic, emergent literacy, and reading skills in kindergarten, before and after the intervention, while taking into account important cognitive factors such as memory and naming speed. The study is expected to have an important theoretical contribution to understanding literacy acquisition in general and in

Arabic in particular. Moreover, the results will have practical implications for assessment and instruction for young kindergarten children, and for speakers of Arabic in particular.

1. Theoretical background

1.1. Theories of reading

Reading acquisition is a subject of major interest, and several models were suggested to explain the complex process of reading acquisition. The Simple View of Reading (SVR) is one of the most influential models of reading comprehension (RC) (Gough & Tunmer, 1986; Gough, Hoover, & Peterson, 1996). According to this model, RC consists of two components; decoding and linguistic comprehension skills. Skilled decoding is the ability to use phonological recoding to recognize a printed word, which allows access to the representation in the mental lexicon and the retrieval of the semantic knowledge and linguistic comprehension is operationalized as the ability to understand oral language by answering listening comprehension questions (Hoover & Gough, 1990). The two components are separate yet they are both necessary for RC (Gough & Tunmer, 1986).

Several studies have tested the SVR model in various languages besides English, including Hebrew (Joshi, Ji, Breznitz, Amiel, & Yulia, 2015) and Arabic (Asadi, Khateb, & Shany, 2017). This research and others showed that while the SVR model is valid in predicting RC, the reading process is not as simple as it was originally presented by Gough & Tunmer in 1986. These studies highlight the role of the orthography (primarily orthographic depth), and the contribution of other components, besides decoding and language comprehension (Florit & Cain, 2011; Kim, 2017; Kirby & Savage, 2008; Nation, 2019; Ouellette & Beers, 2010). Moreover, a measure of speed was added into the equation (Aaron & Joshi, 1992). Another influential model is the Direct and Indirect Effects on Reading (DIER) model (Kim, 2017) which claims that word reading and listening comprehension make a direct contribution to reading comprehension, as does the SVR model, but other cognitive and language components have an indirect effect resulting in a hierarchical structure. The DIER model

argues that working memory, vocabulary, grammatical knowledge, inference, and Theory of Mind components are indirectly related to RC via word reading and listening comprehension.

The components of reading and their relationship with RD have been shown to vary with orthographic depth. The Orthographic Depth Hypothesis (Katz & Frost, 1992) emphasizes the role of the systematic relationship between the letters and sounds in the acquisition of decoding. As such, in shallow orthographies, there is a one-on-one relationship between the graphemes and the sounds they represent. In these contexts, decoding predicts RC more strongly in younger grades (Torppa , Georgiou, Lerkkanen, Niemi, Poikkeus, Nurmi, 2016). In contrast, in deep orthographies, the grapheme-phoneme correspondence rules are more complex and this makes the acquisition of decoding more challenging (Seymour, Aro, Erskine, & network, 2003). In these contexts, decoding continues to be a predictor of RC even in older children (Ellis, Natsume, Stavrpoulou, Hoxhallari, Van Daal, Polyzoe, Tsipa, Petalas, 2011).

Despite differences in orthographic depth, reading appears to depend on similar cognitive factors in all languages and orthographies. The Central Processing Hypothesis captures this idea. This hypothesis argues that similar underlying cognitive processes explain reading in different languages and regardless of orthographic depth (Geva & Siegel, 2000). These cognitive factors include; short-term memory, working memory, phonological awareness (PA), rapid naming, and other cognitive factors (Geva, Wade-Woolley, & Shany, 1993; Geva & Siegel, 2000; Siegel & Ryan, 1989). Importantly, the Central Processing Hypothesis does not conflict with the Orthographic Depth Hypothesis. Geva and Siegel (2000) addressed this question in reading development in English-Hebrew bilinguals in Canada and found that the two hypotheses were valid. In other words, even though reading in shallow orthography Hebrew was found to develop more easily than in deep orthography English, similar memory skills were found to predict reading in both orthographies.

Another important factor in reading acquisition that has received increasing attention in recent years is “dialect”, and this interest was focused on reading in sociolinguistic contexts in which the spoken language variety of the child doesn’t match the standard language in which he is supposed to

develop reading (Dexter, Johnson, Bowman, & Barnett, 2018; Terry, Connor, Petscher, & Conlin, 2011). This situation characterizes reading acquisition among African American children, for instance, who speak "African American (Vernacular) English" and are required to acquire reading in Mainstream American English. Another example of this context is Arabic diglossia in which Arabic speaking children use spoken Arabic (SpA) for everyday speech but are required to develop reading in Standard Arabic (StA) (Saiegh-Haddad, 2017; Saiegh-Haddad & Ghawi-Dakwar, 2017; Tibi & Kirby, 2019). The most important question that arises about reading in dialectal contexts pertains to the relative role of decoding and oral language skills (or listening comprehension) in predicting RC, as well as the impact of the linguistic distance between the spoken dialect and the standard language on the development of oral language comprehension and reading.

1.2. Oral language comprehension

Oral language comprehension has been largely operationalized in the literature as a text-level listening comprehension task. Listening comprehension is a complex skill that includes "parsing, bridging and discourse building" (Hoover & Gough, 1990, p. 128) and it draws on a multitude of language and cognitive skills such as working memory, inhibitory control, attentional control, vocabulary, grammatical knowledge, and inference making (Hoover & Gough, 1990). Gough and Tunmer (1986) state that linguistic comprehension is "the process by which, given lexical (i.e., word) information, sentences and discourses are interpreted" (Gough and Tunmer, 1986, p. 7).

How do listeners construct meaning from the text? According to the Construction-Integration model, this comprises two phases: construction and integration. The construction phase relies on establishing initial elementary propositions from the words and sentences in the text; the integration phase comprises as integration of propositions with the comprehender's prior knowledge (Wharton & Kintsch, 1991). It follows that there are three levels of mental representations: the surface code, the textbase, and the situation model (Wharton & Kintsch, 1991). Kim and Plicher (2016) suggest direct and indirect effects on listening comprehension of the following variables: a) foundational cognitive

skills, including working memory and attention which help maintain the linguistic information in memory and construct "surface code", b) foundational oral language skills, including vocabulary and grammatical knowledge, which together with the foundational cognitive skills construct the "text base code", and c) higher-order cognitive skills, including inference, "theory of mind" and comprehension monitoring to construct "situation model". Kim (2016) assessed listening comprehension among first-grade South Korean children and showed that listening comprehension was directly predicted by working memory, grammatical knowledge, inference, and Theory of Mind, while it was indirectly predicted by attention, vocabulary, and comprehension monitoring. In a more detailed analysis, it was shown that vocabulary and grammatical knowledge were directly related to listening comprehension as well as indirectly through higher-level skills, which were independently related to listening comprehension. These findings support the situation model.

1.2.1 Predictors of listening comprehension in kindergarten

Cain and Oakhill (2007) reviewed factors predicting listening comprehension among children in second grade and found that phonological skills, semantics, syntax, meta-linguistic skills, discourse-level skills (inference and integration, understanding story structure) were significant predictors.

The question that looms is whether these factors predict listening comprehension in kindergarten? The role of vocabulary and morphology in kindergarten listening comprehension was confirmed in other studies (Florit, Roch, & Levorato, 2013, 2014; Fong & Ho, 2017). For instance, Florit et al. (2014) found that both lower and higher-level semantic components uniquely predicted unique variance in listening comprehension. In the same way, Florit, et al. (2013) showed that listening comprehension was related to lexical/semantic, cognitive, and pragmatic abilities. A study of predictors of listening comprehension in Chinese kindergarten children showed that the linguistic skills predicted unique variance and morphological awareness (MA) was the strongest unique contributor explaining (Fong & Ho, 2017).

As for the role of cognitive factors in listening comprehension the results have been mixed. Some studies showed that, while memory didn't significantly contribute to listening text comprehension (Florit et al., 2014), others showed that memory did have an influence on listening comprehension indirectly through higher-order cognitive skills (Kim, 2016) and that both short term and working memory predicted unique and independent variance in listening comprehension after controlling for verbal abilities (Florit, Roch, Altoè, & Levorato, 2009). As for the effect of the higher cognitive skills, Kim and Phillips (2014) tested the role of inhibitory control, Theory of Mind, and comprehension monitoring among kindergarten children and found that each of the three components independently related to listening comprehension after accounting for one another as well as age and vocabulary (Kim & Phillips, 2014).

1.3. Code-oriented skills and executive functions

Code-oriented skills include knowledge of graphemes and grapheme-phoneme correspondence rules, decoding, and spelling (Storch & Whitehurst, 2002). The assessment of predictors of code-oriented skills includes the assessment of memory, auditory discrimination, PA, rapid naming, knowledge of concepts of print letter knowledge (shape, name, sound), and invented spelling.

According to the Developmental Model of Ehri (Ehri, 1993, 1994), reading proceeds in four developmental phases: the pre-alphabetic or the logographic stage, the partial or novice alphabetic stage, the full or mature alphabetic stage, and the consolidated alphabetic or orthographic stage. Similarly, Frith (1985) suggested that spelling and reading progress through three stages; Logographic, which includes reading the word as a whole and applying this strategy to spelling, Alphabetic, in which letter-sound correspondence knowledge is applied in reading, and in spelling the child learns that he can break the spoken word into phonemes that map onto letters. Orthographic, the child has a representation of the written word that is transferred to spelling (Frith, 1985).

1.3.1 Predictors of code-oriented skills in kindergarten

Scarborough (1998) argues that reading and spelling are predicted by the following factor: print knowledge, PA, rapid automatized naming, memory, vocabulary, grammatical skills, and MA.

Given the importance of orthographic depth in the acquisition of reading and spelling, Kim (2011), investigated predictors of word reading and spelling of phonological transparent and opaque words among Korean kindergarten children in the shallow Korean orthography. The predictor measures were PA tasks (syllable and phoneme level), expressive vocabulary, MA, code-related skills (letter name and sound knowledge, rapid naming), and orthographic choice (choosing the right written form out of two options). For word reading, the most dominant predictor was orthographic awareness, then syllable awareness, letter-name knowledge, and PA while phoneme deletion, vocabulary, morphological awareness were not. For word spelling, no single predictor was found, but it was shown that phoneme awareness was uniquely related to spelling.

1.4 Reading development in Arabic diglossia

Arabic speaking children are born into a linguistic context called diglossia (Ferguson, 1959). In this context, there are two varieties of the same language within the same community; Standard Arabic (StA) and Spoken Arabic (SpA). Children acquire the spoken dialect they hear in everyday interaction in the immediate environment. Once they enter formal school, they are systematically exposed to StA as the language they use for reading and writing, while in classrooms they hear mostly SpA (Amara, 1995a). There is a co-existence between the two varieties, while SpA is the primary spoken language, children are exposed to StA through book reading, TV programs, and prayers (Saiegh-Haddad & Henkin-Roitfarb, 2014).

1.4.1 The linguistic distance between spoken and standard Arabic

StA and SpA differ in all language domains: phonology, morphology, syntax, and lexical-semantics (Saiegh-Haddad & Henkin-Roitfarb, 2014). (1) Morphologically, the main difference is in

the inflectional categories, such as case and mood inflections which are not marked in any SpA dialect "waladun" (boy) in StA versus "walad" in SpA. (2) Syntactically, word order is different: VSO (verb subject-object) in StA (ʔakala al-waladu a-tuffa:ħa "the boy ate an apple") and SVO (subject-verb-object) in SpA (el-walald ʔakal tuffa:ħa "the boy ate an apple" (Maamouri, 1998). (3) Phonologically, StA is comprised of 28 consonantal phonemes and six vowel phonemes (three short vowels and three long vowels), but in some spoken vernaculars some phonemes are not used, such as /q, θ, ð, ðˤ/ in the urban northern dialect (4) Lexically, only a sub-class of words are shared and keep an identical form in StA and SpA (words that have the same phonological form in StA and SpA) like */batti:x/ 'watermelon'*;~20%), whereas the majority of words are either cognate (which are partially overlapping phonological forms in StA and SpA StA /*ðahab*/ versus SpA /*dahab* / 'gold'; StA /*sama:ʔ*/ versus SpA /*sama*/ 'sky'; ~38%) or unique words (which are words who have unique lexico-phonological forms in SpA that is totally different from the StA form (/*raʤul*/ in StA and /*zalame*/ in SpA 'man'; ~42%) (Saiegh-Haddad & Spolsky, 2014).

1.4.2 Reading development in Arabic

Arabic is a Semitic language that uses abjad orthography. It contains 28 letters of which two letters represent both consonants and long vowel each (Saiegh-Haddad & Henkin-Roitfarb, 2014). Saiegh-Haddad (2018) proposed a model for Arabic word reading in development (MAWRID) according to which three conspicuous factors shape the development of word reading in the Arabic language and orthography: vowelization, morphological structure, and diglossia. The consistent phonological structure of the vowelized word encourages the use of bottom-up grapheme-based (letter and diacritic) phonological recoding until the second grade after which the transparency and the abundance of morphology trigger the use morphological processing in reading. According to this model, the beginner reader needs to resolve an important challenge that is diglossia specifically the phonological distance between the form of the word in SpA and StA, which may affect reading fluency and accuracy since reading a word in StA may lead the reader to activate linguistic units that have not been acquired. Reading a SpA word would be more efficient because it has a proper linguistic representation (Saiegh-Haddad, 2017).

1.4.3 The role of diglossia in language and reading skills

In the past few years, there has been increasing interest in the role of diglossia in language and reading development in Arabic, including its role in phonological processing, reading, narrative production, and reading comprehension (e.g., Abu-Rabia, 2000; Asaad & Eviatar, 2013; Khamis-Dakwa, Froud, & Gordon, 2012; Leikin, Ibrahim, & Eghbaria, 2014; Saiegh-Haddad, 2003a; Saiegh-Haddad & Schiff, 2016; Schiff & Saiegh-Haddad, 2017). Saiegh-Haddad and colleagues tested the effect of the phonological distance in Arabic diglossia on phonological processing skills (phonological awareness, phonological representations, phonological memory, phonological learning) and word reading accuracy and fluency, and found that the phonological distance made it harder for children to acquire these skills (Saiegh-Haddad, 2003a, 2004, 2007, 2012; Saiegh-Haddad & Schiff, 2016; Schiff & Saiegh-Haddad, 2017, 2018; Saiegh-Haddad & Haj, 2018; Saiegh-Haddad, Shahbari-kassem, & Schiff, 2020). In the same way, as for morpho-syntactic skills, Khamis-Dakwar et al., (2012) tested the role of morpho-syntactic distance on the performance in grammaticality judgment task and found that when the structures were not matched (identical in SpA and StA), scores were lower. Finally, Abu-Rabia (2000) found that experimental exposure to standard Arabic in kindergarten was predictive of higher reading comprehension scores in the second grade. All this suggests that linguistic distance between SpA and StA does not support the acquisition of language and comprehension skills in StA.

As for the development of narratives in Arabic, Ravid, Naoum, Nasser (2014) compared story-retelling narratives among 97 children from seven age groups: pre-kindergarten, kinder-garden, first-graders, second-graders, fourth-graders, seventh-graders, and Adults. The story was told in Standard Arabic, and the narratives were analyzed based on the macro and microstructure level and found that with an increase in age, stories grow longer, the number of errors declines and older participants used more StA words in the retelling than younger ones. Leikin et al., 2014, examined the influence of diglossia on narratives among 30 kindergarten children and used two story retelling task using book stories presented in SpA and StA and the texts were matched in complexity, and found that the

production of retelling the Standard story was characterized with less fluency, shorter clauses, and more morpho-syntactic errors, and less retelling vocabulary rates for nouns and verbs. The researchers suggest that diglossia seems to impact the proficiency levels in the linguistic level and structural level in both spoken and Standard Arabic.

1.4.4 Predictors of decoding and spelling in Arabic

Predictors that were investigated in the literature to be related to the reading process are vocabulary, phonological awareness, phonological discrimination, naming speed (measured by RAN), verbal memory, orthographic processing, and morphological awareness. In the Arabic context, Saiegh-Haddad (2005) tested the role of verbal memory, rapid naming, phonological awareness, and speed of letter-sound conversion on pseudoword decoding speed at the end of the first grade. The study showed that verbal memory, rapid naming, and speed of letter-sound conversion made a direct contribution to pseudoword fluency, whereas phonological awareness and phonological discrimination skills had an indirect effect through their role in letter-sound conversion speed. Tibi and Kirby (2019) tested the contribution of vocabulary, PA, naming speed (NS), orthographic processing (OP), and MA on word reading accuracy and fluency, pseudoword reading accuracy, text reading fluency, and maze reading comprehension in Arabic speaking third graders. This study showed that PA had the strongest effect on word and pseudoword reading accuracy, whereas NS had a significant effect on reading fluency, and vocabulary and MA on the comprehension measures.

1.4.5 Predictors of emergent literacy in Arabic in kindergarten

In Arabic-speaking regions, reading instruction starts in the first grade, not in kindergarten (Saiegh-Haddad, & Everatt, 2017). In kindergarten, literacy instruction is haphazard and much reduced if at all existent. Afsah (2019) tested the relation between phonological processing skills and emergent literacy skills among Egyptian Arabic speaking children in kindergarten. The emergent literacy tests included text discrimination of letters and words from non-alphabetic strings, letter knowledge, partial

alphabetic reading (matching a written word to a picture), name writing, and concepts about print,while the phonological processing tests included phonological awareness (syllable and phoneme level), phonological memory using digit span and non-word repetition, and rapid naming. The results of this study show that isolating final phonemes and rapid naming were the best predictors of the emergent literacy total score. While for the specific measures, final phoneme isolation, and rapid naming best predicted partial alphabetic reading while other measures like blending syllable and phonemes, phonological memory showed no significant correlations with emergent literacy skills.

Arafat, Korat, Aram, and Saiegh-Haddad, (2017) investigated the effect of family socioeconomic status (SES), age on literacy skills such as letter and sound knowledge, phonological awareness, written words, word recognition, letter, and word writing. They found that age and family SES had a significant and direct effect on early literacy skills. Similar results were obtained in Aram, Korat, Saiegh-Haddad, Hassuna-Arafat, Khoury, Abu Elhija (2013) who investigated the effect of SES, home literacy environment (HLE), and maternal mediation level in a writing activity on early literacy skills among kindergarten children, and found that HLE predicted phonological awareness, alphabetic knowledge, and vocabulary with SES being controlled. While measures of early literacy expect for vocabulary were predicted by maternal mediation of writing after controlling for HLE and SES.

1.5 Literacy and executive function Intervention in kindergarten

Research on intervention programs among kindergarten children has been a subject of great interest (Connor et al., 2014; Johanson & Arthur, 2015; Kim, Lee, & Zuilkowski, 2019; Wheldall et al., 2016). Kim et al, 2019, and Lonigan & Shanahan, 2009 performed a meta-analysis for literacy intervention programs in kindergarten. A report of the national Early Literacy Panel (Lonigan & Shanahan, 2009) shows that code-oriented interventions that were reviewed had a positive and strong effect on phonological awareness, alphabetic knowledge. Oral language, reading, and spelling. The improvement in reading and spelling was largely mediated by the positive impact on phonological awareness and alphabetic knowledge. While Kim and colleagues (2019) showed that there was a

moderate effect size for the intervention programs, the meta-analysis showed support for a policy of systematic and direct reading instructions in kindergarten, as well as the importance of teacher's training.

Intervention programs were designed to improve various linguistic skills. Some studies addressed several domains all together and others addressed specific domains such as listening comprehension and code-oriented skills. As for listening comprehension of sentences and stories, Vasilyeva, Huttenlocher, & Waterfall (2006) tested the effect of an intervention program focused on understanding passive sentences on comprehension skills of passive sentences among a group of pre-kindergarten compared to a control group and found that children who heard stories in the passive voice scored better in the comprehension task and produced more passive voice sentences. Guajardo and Watson (2002) tested the effectiveness of highlighting the main storyline, feelings, and thoughts on improving the scores in a Theory of Mind task and found a positive effect compared to the control group. Similarly, Bianco et al. (2010) compared the improvement in listening comprehension between three groups assigned to three different intervention programs: phonological awareness, story reading, and multiple component skills including situation model and story structure. They found that the group which received the multiple component skills outperformed the other two groups on listening comprehension.

As for code-oriented skills, Vadasy and Sanders (2008) tested the effect of an intervention plan focused on code-oriented skills on literacy and language skills among kindergarten children. It was found that children who received intervention either individually or in small groups outperformed the control group in alphabetic knowledge, phonological awareness and reading accuracy and word reading efficiency, oral reading fluency, spelling, comprehension. Moreover, they found no difference between individual or group intervention. It was claimed that intervention programs that are focused only on phonological awareness are not sufficient and therefore there is a need to combine between improving phonological awareness and language skills. This claim was tested by Bowyer-Crane et al.

(2008) who performed a comparison between the gains of a phonological-reading group (P+R group) and an oral language group (OL group) among a group of pre-kindergarten children with a poor vocabulary and oral reasoning, it was found that children in the P+R group showed better results in the code-focused skills while the OL group showed a gain in vocabulary and grammar suggesting that an integrated approach combining both phonological and reading with oral language program may be valuable for children entering school

Literacy-linguistic intervention that combined executive functions showed effective effects. Duncan and colleagues (2018), examined the effectiveness of a combined kindergarten emergent literacy program with self-regulation intervention and found that children who participated in the combined program showed more gains in self-regulation relative to children who participated in the emergent literacy program alone. Van de Sande, Segers & Verhoeven (2018) showed similar findings, they examined the effects of literacy and language intervention programs with executive functions embedded in the activities compared to a control group who received teaching according to the curriculum as usual. They found that the experimental group outperformed the control group in letter knowledge, especially among children with higher levels of executive functions. Therefore is it important to combine literacy-language skills and executive function embedded in the activities.

1.5.2 Intervention research on Arabic speaking kindergarten children

Few studies conducted systematic intervention research on language and literacy skills in Arabic speaking kindergarten children. Levin, Saiegh-Haddad, Hende, and Ziv (2008) tested the effect of an intervention program that lasted for 7 months among low SES kindergarten children on the performance in early literacy skills which included: letter knowledge, alphabetic awareness, and PA compared to a control group. The intervention program included one weekly meeting delivered by the teacher and included PA activities, letter knowledge, and invented spelling. The teachers participated in a study group which included theoretical knowledge and received a printed guideline for the activities and individual guideline. Results showed that the experimental group outer performed the

control group in all the measures tested. The study showed that teacher's training which involves both learning theoretical frameworks and individual tutoring was effective in promoting children's literacy skills. Massarwe (2018) tested the effectiveness of three intervention programs of book reading on vocabulary, story comprehension, and recall among 4-5 year-old children. Stories were read with mediation in three different conditions; only in spoken, a combination of SpA and StA (mixed condition), and only in StA, while the control group included reading a book in StA without mediation. Results showed that the three intervention groups improved in vocabulary and learned new words compared to the control group. Also, the standard group progressed significantly in listening comprehension and story-retelling as the spoken group, while the standard group was better than the mixed and control group in comprehending the mental attribution of the story`s elements.

2. The Current Study

2.1 Research Questions:

1) Does an intervention program aimed at helping children develop their linguistic, metalinguistic, and emergent literacy skills produce gains in listening comprehension and code-related reading and spelling skills in StA among kindergarten children?
2) Does an intervention program aimed at helping children develop their linguistic, metalinguistic, and emergent literacy skills affect the predictor systems of listening comprehension and the code-related decoding and spelling skills in StA among kindergarten children?

   Specifically, we will ask the following questions:

   2a- What are the cognitive and linguistic skills that predict listening comprehension in StA among Arabic-speaking kindergarten children before and after the intervention?

   2b- What are the cognitive, linguistic, metalinguistic, and emergent-literacy skills that predict reading and spelling of words among Arabic-speaking kindergarten children before and after the intervention?

2c- Does diglossia or the linguistic distance between StA and the child's spoken dialect have the same impact on linguistic and metalinguistic processing skills in Standard Arabic before and after the intervention?

2.2 Research hypotheses:

1) The experimental group will outer perform the control group in decoding and spelling words and listening comprehension.

2) The intervention program will affect predictors systems of decoding, spelling word, and listening comprehension. We predict to see a stronger relationship between the dependent variables of reading, spelling, and listening comprehension and the independent linguistic metalinguistic and emergent literacy skills after the intervention than before the intervention.

2a) The foundational language skills and the foundational metalinguistic cognitive skills will predict listening comprehension.

2b) The linguistic, meta-linguistic, and emergent literacy skills tested in the study will predict word reading and spelling. More specifically, we predict that phonological awareness, letter knowledge will have a direct link to reading and invented spelling whereas vocabulary and morphological awareness will have an indirect link to word reading and invented spelling.

3c) The linguistic distance between StA and the spoken dialect of the child will affect vocabulary knowledge, morphological and phonological awareness producing higher scores when SpA versus StA structures are compared.

2.3 Participants: The sample of this study will consist of 1000 Kindergarten children (approximate age 5.5 years) from low-middle SES class who will be divided into two groups; an intervention group (800 children) and a control group (200 children). In choosing the sample we will have a representative

sample of the various dialects among the Arabic-speaking population in Israel: northern urban, rural, Druze, and Bedouin dialects, and the dialect in the triangle.

2.4 Materials: Most of the experimental tasks used in the study were developed for this study. In the majority of tasks, items systematically target and manipulate the linguistic distance between SpA and StA. Items were and extracted from a lexical database which was coded and analyzed for the sake of the current study. The lexical database was based on 70 story-books used with pre-kindergarten and kindergarten children as part of the Arabic project "Pajama Library" (Maktabat Al-Fanus) and included 19836 word tokens and 6526 word types.

2.4.1 Oral Language tasks: a) *Listening comprehension:* sentence level and text level comprehension; b) *Vocabulary: receptive and expressive*; c) *Syntactic knowledge:* sentence repetition; d) *Phonological representation:* Auditory discrimination and pseudoword repetition.

2.4.2 Metalinguistic tasks: a) *Morphological awareness:* root relatedness and morphological analogies: inflection and derivation; b) *Lexical awareness: SpA-StA cognate relatedness;* c) *Phonological awareness:* rhyme, syllable, CV, and phoneme awareness tasks (blending, segmentation, and deletion),

2.4.3 Emergent literacy and Code-oriented skills: a) *Letter sound knowledge;* b) *letter name knowledge;* c) *Word reading* of simple CV:C words; d) *Invented spelling* of simple CV:C words.

2.4.4 Cognitive control measures skills: Verbal memory (Digit Span), rapid naming (RAN), Non-verbal intelligence, to assess children's non-verbal ability we will use the Raven's Colored Progressive Matrices (Raven 1965), Semantic rapid naming, and phonemic rapid naming

2.4.5 Executive functions: Non-verbal inhibition test: two levels of a computerized test using the E-Prime software, Non-verbal working memory test: two levels of a computerized test using the E-Prime software, Non-verbal flexibility test: two levels of a computerized test using the E-Prime software.

See appendix A for more detailed information about the tasks.

2.5 Procedure: The children will be tested before and after the intervention program at the beginning and end of the year. The tests will be conducted by special education teachers or communication disorders' students, they will participate in training sessions delivered by the research team and will be escorted throughout the testing period. A randomized pretest-intervention-posttest design will be used to examine the impact of a six months intervention program. The children in the intervention group will be chosen and randomly assigned by the teacher and are supposed to be heterogeneous and stable for 20 weeks of intervention. They will receive a 30 minutes session, three times a week for 20 weeks in small groups of 5 children each. The intervention program will combine linguistic, literacy skills, and cognitive skills while the control group will follow the regular school curriculum.

2.5.1 Intervention program:

The intervention program will combine linguistic, literacy skills, and executive functions. Executive function supported activities will be embedded in each session through a combination of features as stop (notice), think (focus), formulating strategies, scaffolding, and monitoring presented in icons (See appendix C) (van de Sande et al., 2018). The topics of the intervention program will include PA (rhyme, syllable, body-coda, and phoneme level), letter knowledge (shape, sound, and name), MA (inflectional and derivational structure), vocabulary (semantic domains and networks), lexical awareness of cognate in SpA—StA, narrative skills (micro and macrostructure), reading and spelling simple words (see Appendix B). The program will take into consideration the linguistic distance between StA and SpA. For instance, in training children in phonological awareness, it will consider the phonological structures that are not within SpA and will give specific training in the representation of these phonemes and only then in awareness.

2.5.2 Teacher's training:

The intervention will be implemented by kindergarten teachers. Therefore, as part of the intervention program, teachers will receive a 30-hour training course that will provide the theoretical framework of

the intervention content and procedures. Teachers will also receive printed copies of the games and activities for each intervention meeting and explicit written guidelines on how to implement them. Teachers will also receive guidance via weekly visits by a literacy specialist who will help with hands-on practice in implementing the program and who will observe teachers in their work and will give feedback. The literacy experts are all mostly speech-language pathologists or special education instructors with 3-21 years of expertise in working with children and escorting educational staff. The literacy experts will participate in training sessions, receive written guidance, and be escorted by the research team along with the intervention program. Each literacy expert will accompany each teacher for one of the three meetings per week. The remaining two meetings will be conducted by the teacher only based on explicit written instructions. See appendix C for examples of the intervention session.

2.5.3 Intervention fidelity:

Intervention fidelity will be ensured by having both teachers and the accompanying literacy experts fill in weekly reports on the intervention implementation (Albritton, Patton Terry, & Truscott, 2018). see appendix D - "*Fidelity questioner filled by the teacher every week*"**.** Data will be collected about the age, education, and years of expertise of the teacher in the intervention and control group. Also, teachers in the intervention group and control group will fill a questioner about knowledge, believes, and self-perceptions on the intervention's topics.

2.6 Data analysis: In order to examine the contribution of linguistic skills, meta-linguistic skills, emergent literacy, and cognitive skills on the prediction of the dependent variables of reading and spelling words and listening comprehension, we will conduct four hierarchical regression analysis for each measure. In the first step, the demographic variables will be entered, in the second step, the rest of the independent variables will be entered in a step-wise manner. Based on the regression results we will consider creating a structural equation model (SEM). To examine there is a significant difference in the performance of reading and spelling words and listening comprehension by the study group and time, two-way mixed ANOVA will be conducted with the study group as a between-subject factor and

time as a within-subject factor. In order to investigate whether significant differences would be found in the contribution to the intervention program within the different kindergarten classes, we will use HLM (nested samples)

2.7 Pilot study: A pilot study was conducted based on the performance of 281 kindergarten children, 186 from the intervention group, and 95 from the control group. The two groups were matched on non-verbal intelligence. Pre and post-testing Tasks included language skills, meta-linguistic skills, cognitive skills, ad emergent literacy skills. We used Two-way mixed ANOVA, to compare the performance of the experiment and control group, pre and post-intervention. Results showed that the intervention group significantly outperformed the control group in listening comprehension, receptive and expressive vocabulary, and sentence repetition. Moreover, there were marked differences in performance on most of the phonological awareness tasks, morphological analogies, letter name and letter-sound knowledge, reading, and spelling. No differences were found, however, in the root-awareness task, rhyme awareness, lexical awareness, and sentence comprehension. These results attest to the effectiveness of the intervention program in inducing gains in many aspects of language, metalinguistic, emergent literacy, and reading, and spelling skills in the intervention group as compared with the control group.

3.1 Appendix A – Research Tasks

			Items	Comments
Oral language tests	Listening comprehension	Story comprehension	13	Translated to Arabic from Gagarina, Klop, Kunnari, Tantele, Välimaa,, U. & Walters, J. (2012)
		Sentence comprehension	21	Adapted partially from (Rakhlin, Aljughaiman, & Grigorenko, 2019)
	Vocabulary	Receptive vocabulary	30	Prepared for the research based on the "Fanous-Library" lexical database
		Expressive vocabulary	30	Prepared for the research based on the "Fanous-Library" lexical database
	Syntactic knowledge	Sentence repetition	15	Prepared for the research
	Phonological representation	Auditory discrimination	18	Adapted from (Saiegh-Haddad & Ghawi-Dakwar, 2017)
		pseudoword repetition	24	Adapted from (Saiegh-Haddad & Ghawi-Dakwar, 2017)
Meta-linguistic skills	Morphological awareness	Root relatedness test	21	Prepared for the research based on the "Fanous-Library" lexical database
		Morphological analogies	24	Prepared for the research ??
	Phonological awareness	Rhyme identification	15	Prepared for the research based on the "Fanous-Library" lexical database
		Syllable blending	16	Prepared for the research based on the "Fanous-Library" lexical database
		Syllable segmentation	16	Prepared for the research based on the "Fanous-Library" lexical database
		Syllable deletion	20	Prepared for the research based on the "Fanous-Library" lexical database
		Body-coda blending	5	Prepared for the research
		Body-coda segmentation	5	Prepared for the research
		Initial phoneme isolation	6	Prepared for the research
		Final phoneme isolation	6	Prepared for the research
		Phoneme blending	5	Prepared for the research
		Phoneme segmentation	5	Prepared for the research
		Phoneme deletion	16	Prepared for the research

	Lexical awareness	Lexical awareness to cognate words	20	Prepared for the research based on the "Fanous-Library" lexical database
Emergent literacy and Code-oriented skills	Letter knowledge	Letter name knowledge	29	Prepared for the research
		Letter sound knowledge	29	Prepared for the research
	Decoding	Decoding of CV:C words	6	Prepared for the research
	Invented spelling	Invented spelling of CV:C words	6	Prepared for the research
Cognitive measures skills		RAN objects		Created for this study, contained only identical words based on Denckla, 1973
		RAN shapes		Adapted from CELF-4
		Digit span (forward and backward)		Adapted from Wechsler Intelligence Scales for Children-Revised (WISC-R)
		Semantic rapid naming		Prepared for the research
		Phonemic rapid naming		Prepared for the research
Intelligence and learning skills		Non-verbal intelligence, to assess children's non-verbal		Raven's Colored Progressive Matrices (Raven 1965)
		Visual linguistic artificial grammar learning(AGL) task		Kahta & Schiff, 2016
Executive function		*Non-verbal inhibition test*		Adapted from Ohayon, 2018
		Non-verbal working memory test		Adapted from Ohayon, 2018
		Non-verbal flexibility test		Adapted from Ohayon, 2018

3.2 Appendix B: Meetings of the intervention program

Domain	Week	Content of the
Phonological Awareness	1	Syllable awareness; blending, segmentation, deletion
	2	Rhyme awareness
	3	Body-coda level: blending, segmentation, deletion.
Letter Knowledge	4	/r, z/- letter shape, sound, and name
	5	/s, ʃ/- letter shape, sound and name
	6	diglossic letters /f, θ/- letter shape, sound, and name
	7	vowels - letter shape, sound, and name
Phonological Awareness	8	Phonemic awareness: blending, segmentation, deletion.
Morphological awareness-inflections	9	Gender noun inflections
Morphological awareness-inflections	10	Number Noun inflections
Morphological awareness-inflections	11	Gender and number Verb inflections
Morphological awareness-derivational	12	Root Awareness
Morphological awareness-derivational	13	Pattern Awareness
Vocabulary and semantic fields	14	Semantic fields
Vocabulary and semantic fields	15	Cognate relatedness between StA and SpA
Listening comprehension and narrative production	16	Micro and macrostructure
Listening comprehension and narrative production	17	Micro and macrostructure
Word reading	18	Reading words in the structure of CV:C
Word reading	19	Reading words in the structure of CV:C
Invented spelling	20	Writing words in the structure of CV:C

Appendix C- Structure of the intervention session.

		Comments
Opening activity	5 min	Presenting the topic to the children using story/questions/game/movie/song/puppet show
Main activity	10 min	Main activity according to the topic using: cards/computer game/song/pictures/
• Seeking attention to the topic		Presenting the topic/phenomena to the children
• Planning		Using executive function tools presented in icons in order to give the answer. Attention ➔concentrate➔implanting (using a strategy for each topic) ➔ answer➔ elaboration
• Feedback		How the teacher should give proper feedback that empathizes the thinking process of the child to answer.
Summary	2 min	Summary of the meeting, using an interactive conversation with the children
Evaluation	3 min	Each child is asked a question about the topic to evaluate him.

An example of one of the intervention sessions about Phonological awareness: syllables (week 1)

		Comments
Opening activity	5 min	The teacher reads a story about a girl that likes to segment everything (an apple, banana, and even words), it's an interactive story that children are asked to segment words like the character in the story.
Main activity	10 min	Cards containing bi-syllabic and tri-syllabic words, icons, cubes. The words are organized according to levels based on the syllabic structure. Children are asked to pick a card and segment then blend it back.
• Seeking attention to the topic		Explaining that words can be segments into syllables, and syllables can be blended into words. Giving an example of segmenting a word and then blending it back.
• Planning		 Attention ✓ listen to the word

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>  </td><td>Concentrate
✓ on the syllables</td></tr>
<tr><td>  </td><td>Implement
✓ Segment (pronounce the word slowly and stop inside)
✓ Blend (say the first syllable and the second one and blend them into a word)</td></tr>
<tr><td>  </td><td>Answer
✓ Say the answer</td></tr>
<tr><td>  </td><td>Elaboration
✓ Explain the answer using the icons.</td></tr>
</table>
</td></tr>
<tr><td>• Feedback</td><td></td><td><u>Feedback for a correct answer:</u> good for you, you noticed that we can say the word slowly and stop in the right place… “raaaaa - ʕiiii”
<u>Feedback for a wrong answer</u>: The teacher asks to check his answer while pointed to the icons, concentrating that we should pronounce the word slowly and stop within it.</td></tr>
<tr><td>Summary</td><td>2 min</td><td>Summarize the session using directed questions:
- What did we do today?
- On what we have concentrated?
- What are syllables?
- How we segment words?</td></tr>
<tr><td>Evaluation</td><td>3 min</td><td>The teacher uses different cards, and ask a single question to each child, and then records in the sheet.</td></tr>
</table>

An example of one of the intervention sessions about Narratives (week 16+17)

<table>
<tr><td></td><td></td><td>Comments</td></tr>
<tr><td>Opening activity</td><td>5 min</td><td>The teacher narrates the story of “the boy and the cat”</td></tr>
<tr><td>Main activity</td><td rowspan="4">10 min</td><td>The teacher narrates the story and then ask comprehension questions about the “goal, attempt/action outcome” and mental state.</td></tr>
<tr><td>• Seeking attention to the topic</td><td>The teacher asked questions to draw attention to the story’s elements.</td></tr>
<tr><td>• Identifying the topic</td><td>The teacher will explain the story’s elements using the icons.</td></tr>
<tr><td>• Planning</td><td>
<table>
<tr><td>  </td><td>Attention
✓ listen to the story and look at the pictures</td></tr>
<tr><td>  </td><td>Concentrate
✓ on the story elements</td></tr>
<tr><td>  </td><td>Implement
✓ recognize the story elements:
o beginning (characters, time, place)
o episode (goal, attempt/action, outcome)</td></tr>
<tr><td>  </td><td>Answer
✓ Say the answer (narrate the story)</td></tr>
<tr><td>  </td><td>Elaboration
✓ Explain the answer using the icons.</td></tr>
</table>
</td></tr>
<tr><td>• Feedback</td><td></td><td><u>Feedback for a correct answer:</u> good for you, you noticed the goals of the cat and his actions and outcome of the action.
<u>Feedback for a wrong answer</u>: The teacher asks to check his answer while pointed to the icons, concentrating on the story elements.</td></tr>
<tr><td>Summary</td><td>2 min</td><td>Summarize the session using directed questions:
- What did we do today?
- On what we have concentrated?
- What are the elements of the story?
The teacher summarizes the meeting.</td></tr>
<tr><td>Evaluation</td><td>3 min</td><td>The teacher asks a single question to each child and then records in the sheet.</td></tr>
</table>

Appendix D: Fidelity questioner filled by the teacher every week:

A fidelity questioner filled by the teacher

Name: _____ name of the literacy specialist: _____ Date: _____

Town: _____ Subject of the intervention meetings:

1- Did you deliver all the intervention meetings in the current subject? Yes \ No

2- If you answered No, which parts you did not deliver? _____

3- Did you deliver a group meeting for all the kindergarten in the current subject? Yes\No and If Yes, then how many times? _____

4- Rate how well did you manage to deliver the meeting as required?

5	4	3	2	1
Very well	Well	Moderately	Little	Very little

** In the next questions, please rate your answers according to this scale:

5	4	3	2	1
Excellent	**Very good**	**good**	**Low**	**Very low**

Group 2					Group 1					
5	4	3	2	1	5	4	3	2	1	
										Name of the child
										To what extent I succeeded in helping the child to pay attention?
										To what extent I succeeded in helping the child to concentrate on the task?
										To what extent I succeeded in helping

										the child to understand the requirement?
										To what extent I succeeded in helping the child to plan the steps of answering the task?
										To what extent I succeeded in helping the child to assess his performance?
										To what extent I succeeded in helping the child to implement the task and acquire the skills
5		**4**		**3**		**2**		**1**		
										Did the child need additional intervention meetings? If yes state how much?

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