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Phonological awareness in Arabic: the role of phonological distance, phonological-unit size, and SES

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Abstract

The study tested phonological awareness in a cross-sectional sample of 200 Arabic-speaking 2nd, 4th, 6th, 8th, and 10th graders from low and mid-high Socio-Economic Status (SES). Participants were native speakers of a local dialect of Palestinian Arabic spoken in the north of Israel. Twelve phonological awareness tasks were administered: six of them included stimuli that have an identical form in Standard Arabic and in the spoken dialect (hereafter, SpA words; e.g., */saʒad/* 'knelt') and six used StA words with a unique form different from the one used in the dialect (hereafter, StA words; e.g., */ʔaχað/* 'took'). Three tasks (blending, segmentation, deletion) were developed for each set of words to test syllable awareness and three additional ones to test phoneme awareness. Repeated measure ANOVAs showed a cross-sectional growth in syllable and phoneme awareness across grades, as well as significant differences between children from low versus mid-high SES. The results also showed a consistent effect of phonological distance on phonological awareness across all tasks and in both groups with awareness of SpA words higher than StA words. At the same time, the impact of phonological distance was more prominent in children from low SES as against mid-high SES, in phoneme awareness as against syllable awareness, and in segmentation and deletion tasks as against blending tasks. The results underscore the roles of item-based properties of phonological distance and phonological-unit size, as well as the role of participant-based characteristics of SES in phonological awareness in Arabic diglossia.

Keywords Arabic · Dialect · Diglossia · Phonological distance · SES · Spoken Arabic · Standard Arabic · Syllable awareness · Phonological awareness

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Introduction

Many factors impact children's acquisition of literacy. These include cognitive-linguistic, instructional, and environmental factors (Binks-Cantrell, Washburn, Joshi, & Hougan, 2012; Castles, Rastle, & Nation, 2018; McCardle, Scarborough, & Catts, 2001). Among the cognitive-linguistic factors, phonological awareness is the strongest predictor of reading in an alphabetic orthography (see Ziegler & Goswami, 2005, for a review), and its contribution to reading development cuts across languages that vary in typology and in orthographic depth (e.g., Caravolas, Lervag, Defior, Malkova, & Hulmes, 2013; Kirby, Desrochers, Roth, & Lai, 2008; Landerl et al., 2019; Saiegh-Haddad & Geva, 2008; Ziegler et al., 2010).

Phonological awareness refers to one's consciousness of and access to the sound structure of oral language (Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997; Wagner & Torgesen, 1987) and poor phonological awareness delays children's acquisition of the alphabetic principle and of the letter–sound correspondence rules (Stanovich, 1986). Conversely, children with strong phonological awareness skills are more likely to make better progress in learning to read (Liberman, Shankweiler, & Liberman, 1989; Torgesen et al., 1997; Wagner & Torgesen, 1987). ¶ Phonological awareness develops in stages from larger to smaller units (e.g., Liberman, Shankweiler, Fischer, & Carter, 1974; Ziegler & Goswami, 2005) and it may be tested by targeting phonological units that vary in size, such as syllables, sub-syllabic units (body, rime, onset, coda) and phonemes. Phonemic awareness, the ability to manipulate phonemes, the smallest semantically contrastive units of sound, is critical because it paves the way for the acquisition of alphabetic coding, or the use of grapheme-phoneme correspondence rules in the decoding of words (Liberman, Shankweiler, & Liberman, 1989; Stanovich & Siegel, 1994). Besides the effect of phonological unit-size, phonological awareness, and phonemic awareness in particular, is influenced by cognitive and linguistic factors, such as memory and linguistic context, respectively (McBride-Chang, 1995; Saiegh-Haddad, 2005; Russak & Saiegh-Haddad, 2011), and by task complexity (Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988). Phonological awareness is also affected by experience and familiarity with specific phonological structures (Caravolas & Landerl, 2010; Russak & Saiegh-Haddad, 2011), and as a result by the quality with which these phonological structures are represented in long-term memory (Elbro, 1996, 1998; Goswami, 2000; Katz, 1986). For example, Swan and Goswami (1997a, b) showed that when phonological representational quality was taken into account, some of the phonological awareness deficits observed in dyslexic children disappeared. These studies and others (e.g., Elbro, 1996, 1998) underscore the need to distinguish between at least two dimensions in the conceptualization of the phonological awareness construct. The first is phonological representation—the accuracy and the segmental organization of the phonological representation in memory—which may be language-specific and affected by structural linguistic factors such as phonological complexity, and by environmental experiential factors such as age-of-acquisition and familiarity. The second is meta-phonological awareness, which may be more

universal in nature, and probably subject to intrinsic child-related factors, such as aptitude, memory span and chronological age/grade level (De Houwer, 2017; Gibson, Summers, Pena, Dedore, Gillam, & Bohman, 2015; Melby-Lervåg, Lyster, & Hulme, 2012; Saiegh-Haddad, 2019).

An important factor that strongly impacts the establishment and the development of phonological representations, as well as awareness of these phonological representations, is linguistic distance between the child's spoken lect (dialect/language variety) and the language of literacy. Linguistic distance characterizes literacy development in Standard-with-Dialects contexts (Hudson, 2002), like the African American context in the US, and in Diglossic contexts (Ferguson, 1959), like the context of Arabic in all Arabic-speaking regions. In both contexts, children learn to read first in a language variety that is linguistically distant from the dialect they use for everyday speech. The nature of language and literacy development in such contexts has attracted some research attention (e.g., Abu-Rabia, 2000; Boudelaa & Marslen-Wilson, 2013; Bühler, von Oertzen, McBride, Stoll, & Maurer, 2018; Charity, Scarborough, & Griffin, 2004; Grohmann & Kambanaros, 2016; Khamis-Dakwar & Makhoul, 2014; Makhoul, Copti-Mshael, & Khamis Dakwar, 2015; Nevat, Khateb, & Prior, 2014; Perea, Abu Mallouh, & Carreiras, 2014; Treiman, Goswami, Tincoff, & Leevers, 1997). Yet, very few studies directly tested the impact of the linguistic distance between the spoken dialect and the standard language on basic reading skills development (however, see Bühler, Waßmann, Buser, Zumberi, & Maurer, 2017; Jalil & Liow, 2008; Khamis-Dakwar & Froud, 2012; Khamis- Dakwar, Froud, & Gordon, 2012), and even fewer tested these effects in the development of phonological awareness. An exception is a study by Sligh and Conners (2003) which examined onset- and coda-phoneme awareness in school children speaking Standard American English versus African American Vernacular English. Speakers of the African American dialect, in whose spoken dialect word codas tend to be reduced or phonetically simplified, systematically performed less well on coda deletions than their peers who spoke Standard American English. In contrast, both groups performed comparably on onsets. This finding suggested that the difficulty observed in the speakers of the African American dialect was attributed to their lesser experience with complex codas and, probably as a result, poorer linguistic representations for these phonological structures. While this research provides important insights into the role of linguistic distance in phonological awareness in dialect speakers, it remains to be tested whether the impact of distance surfaces in similar ways in other dialectal contexts, such as diglossic contexts, whether it changes over time as a function of growth in language and literacy skills, whether its impact is different for tasks that test phonological awareness of phonological units that vary in size (syllables versus phonemes), and for children who vary in SES. These questions constitute the focus of the current study and they are tested in the context of Arabic diglossia.

Impact of phonological distance on phonological awareness in Arabic diglossia

Diglossia represents the separate adaptation of related speech communities to their different sociocultural environments (Maamouri, 1998, p. 32). Ferguson (1959), in introducing the first coherent theory of diglossia, refers to four typical contexts,

one of them is Arabic. He describes the diglossic context as one in which in addition to the primary dialects of the language, "there is a very divergent, highly codified… superposed variety…. which is learned largely by formal education and is used for most written and formal spoken purposes but is not used by any section of the community for ordinary conversation" (p. 336). In Arabic, the standard written form is referred to today as *(Modern) Standard Arabic* (hereafter, StA) اللّغة الفُصحى (الفَصيحة)/ اللّغة المعياريّة. The (most) eloquent language/ The standard language', a modern descendent of *Classical Arabic* and *Literary Arabic*, and the spoken form is referred to as *Spoken or Colloquial Arabic* (hereafter, SpA) العَامية/المَحكيّة اللغة, which is an abstract term encompassing all spoken Arabic dialects. Thus, speakers reared in Arabic diglossia acquire and use two forms of the language, a spoken and a standard form, and language proficiency in Arabic entails proficiency in using both SpA and StA.

A conspicuous linguistic manifestation of diglossia in Arabic is a phonological distance between StA and SpA (Saiegh-Haddad, 2017; Saiegh-Haddad & Henkin-Roitfarb, 2014). Ferguson (1959) notes, in a structural linguistic account of the phonologies of the standard (which he refers to as High) and the spoken (Low) varieties the following: "It may seem difficult to offer any generalization on the relationships between the phonology of H and L in diglossia in view of the diversity of data. High and Low phonologies may be quite close, as in Greek; *moderately different, as in Arabic* or Haitian Creole; or strikingly divergent, as in Swiss German" (p. 335; emphasis added). Although Ferguson may be right in his depiction of the phonological distance in Arabic diglossia as being moderate, when compared with other contexts, like the Swiss-German context, his linguistic depiction must be treated with caution when the psycholinguistic consequences of linguistic differences are considered. This is especially so given evidence that: (a) approximately 40% of the words in the spoken lexicons of 5-year-old speakers of Palestinian Arabic in Israel consist of cognate words, which are shared words that have different surface phonological forms in SpA and StA (Saiegh-Haddad & Spolsky, 2014); and (b) a phonological distance in just a single consonantal phoneme between the SpA and the StA forms of cognates results in a significant drop in phonological representations among young elementary school children (Saiegh-Haddad & Haj, 2018). In the same vein, Maamouri (1998) argues "We still look forward to an early child psychology study of the problems caused by diglossia in school or pre-school. Only such a study can fully confirm any claims that fall outside of the accepted definitional norms of linguistics" (p. 35). We believe that our study is one step in this direction.

Phonological distance between SpA and StA might take different forms in different vernaculars and in different Arabic-speaking regions. Nonetheless, no spoken vernacular shares the exact set of linguistic units (words, syllables, phonemes, etc.) and structure with Standard Arabic (e.g., Bateson, 2003; Henkin, 2010; Versteegh, 2001; Watson, 2002). For instance, with respect to phonemes, StA comprises 28 consonantal phonemes and six vowel phonemes, and all words in Standard Arabic must begin with a CV, a single consonant followed by a vowel. In contrast, SpA vernaculars usually comprise a smaller set of consonants and a larger set of vowels, and they allow complex onsets. To illustrate, interdental consonants are not within the phonemic inventory of many urban dialects of Palestinian Arabic spoken in the

north of Israel. As a result, shared cognate words have a different phonological form in SpA, with StA interdental phonemes substituted for by SpA phonemes (e.g., StA /θaʕlab/; SpA /taʕlab/ "fox").

The impact of the phonological distance between SpA and StA on phonological awareness in native Arabic speaking children has recently been tested by systematically comparing awareness of linguistic units (phonemes, syllables, words) that keep an identical form in the spoken dialect and in Standard Arabic (hereafter, SpA units) with 'diglossic units/variables', namely those that are different in the two varieties and have a unique form in StA (hereafter, StA units). Using this design, Saiegh-Haddad (2003), for example, investigated phonemic awareness and found that kindergarten and first grade children had consistently lower scores when asked to isolate StA phonemes as against SpA phonemes. Moreover, phonemes embedded within StA syllables were harder to isolate than those embedded within SpA syllables. In the same way, Saiegh-Haddad (2004) compared phonemic isolation from StA words as against SpA words and pseudo words and found that StA phonemes embedded within StA words were the most difficult for kindergarten children to isolate, and they were more difficult than those embedded within pseudo words. This effect, referred to as the 'Linguistic Affiliation Constraint' (Saiegh-Haddad, 2007) or more recently a 'diglossia-effect' (Saiegh-Haddad, 2018), was found to persist across the early elementary grades and to show cross-dialectal external validity (Saiegh-Haddad, 2007). This effect was also found to surface equally strongly in phonological recognition as well as production tasks (Saiegh-Haddad et al., 2011), and to extend its effect to word reading in typically developing and in reading disabled children (Saiegh-Haddad, 2020; Saiegh-Haddad & Schiff, 2016; Schiff & Saiegh-Haddad, 2017, 2018).

The difficulty that children were observed to have in becoming aware of StA linguistic units appears to lie in difficulty establishing and accessing high-quality phonological representations for these units (Saiegh-Haddad, 2018, 2019, 2020; Saiegh-Haddad & Ghawi-Dakwar, 2017; Taha, 2016), that is, the quality of the representation of the word in memory. A recent study (Saiegh-Haddad & Haj, 2018) investigated the impact of phonological distance between SpA and StA on phonological representations for StA words by comparing identical, cognate and unique StA words in kindergarten, first grade, second grade and sixth grade children. Using a computerized pronunciation accuracy judgement task, the study demonstrated that identical words were the most accurately represented, followed by cognate and then by unique StA words. Moreover, the results showed a cross-sectional growth in phonological representations over the elementary school grades. This growth in phonological representations appears to be attributed to greater exposure to StA through schooling and literacy, and it is expected to be associated with a similar growth in phonological awareness. This latter prediction will be tested in the current study.

Phonological awareness develops in stages from large syllabic units to smaller phonemes (Liberman, et al., 1974). At the same time, cross-linguistic differences in syllabic structure impact phonological awareness development in different languages. For instance, Duncan, Colé, Seymour, and Magnan (2006) show striking differences in syllable awareness between French and English children, in favor of the French, on syllable segmentation tasks. This is argued to reflect differences in

oral language experience and in the clarity of French syllable boundaries. Similarly, cross-linguistic differences in the intra-syllabic structure has an impact on children's phonemic awareness skills (e.g., Caravolas & Bruck, 1993; Caravolas & Landerl, 2010; Durgunoglu & Öney, 1999). For instance, Caravolas and Landerl (2010) show that differential experience with consonant clusters explain differences in phonemic awareness between Czeck and German speakers of phonemes embedded within clustered onsets and codas.

Two features of Arabic make the study of the development of syllable versus phoneme awareness, as well as the possibly differential role of phonological distance on the development of the two levels of awareness, particularly informative. The first is the multi-syllabic nature of the Arabic word, including in the lexicon of young children. Saiegh-Haddad & Spolsky (2014) analyzed a corpus of words collected from 5-year-old speakers of Palestinian Arabic and showed that only 16.5% of the words produced by the children were monosyllabic; 61.1% of the words were bi-syllabic, 21.3% were tri-syllabic and 1% were quadri-syllabic. Notwithstanding phonological length, Arabic words are phonologically simple consisting of CV and CVC syllables. This is because the language does not allow consonants to appear in a cluster within words. For instance, the Arabic word */mustaʃfa:/* 'hospital' which features a word-internal consonantal sequence */st/* and */ʃf/* is syllabified as */mus-taʃ-fa:/* yielding simple syllables. This long, yet simple phonological structure of the Arabic word might lead to increased facility with syllables. Another factor that might contribute to facility with syllable awareness, especially among literate speakers, is the *abjad* (Daniels, 1992) writing system of Arabic, which maps the multisyllabic structure of the word using single letters or letter-plus-diacritic CV blocks in unvoweled and voweled Arabic, respectively. Yet, greater facility with syllables might be at the expense of decreasing levels of phoneme awareness, especially awareness of vowel phonemes, and especially among literate speakers. This is because the short vowels of Arabic are completely missing from the orthographic word in unvoweled Arabic, and are represented as superscripted diacritics rather than fully-fledged letters in voweled Arabic (Saiegh-Haddad & Henkin-Roitfarb, 2014).

While the multisyllabic structure of the Arabic word might have a positive effect on syllable awareness, its effect on phonological processing in working memory might be negative. Multi-syllabic words are difficult to maintain in limited-capacity verbal working memory (Acheson & MacDonald, 2009; Melby-Lervåg et al., 2012) and this is expected to make these words more difficult to operate on, especially when they are phonologically novel, i.e., encode phonological units not within SpA. In support of this hypothesis, Saiegh-Haddad & Ghawi-Dakwar (2017) used nonword repetition to measure phonological memory among kindergarten and first grade Arabic speaking children and showed that phonological memory was negatively impacted by phonological distance. This leads to the prediction that syllable awareness, a task found to be early mastered in other languages, such as English (Liberman, Shankweiler, Fischer, & Carter, 1974), might turn out to be relatively difficult for Arabic dialect speakers when encoding unique StA phonological units because of an effect of phonological distance on phonological processing in working memory (Melby-Lervåg et al., 2012). In fact, Makhoul (2016) found that a syllable detection measure of phonological awareness was more difficult than both a

phoneme detection and a phoneme isolation measure among second graders. This finding does not align with the prediction that the phonological structure of Arabic (multisyllabic and simple) and its orthographic architecture (CV-based *abjad*) should facilitate awareness of syllables. Neither does it align with established evidence supporting a developmental pattern of awareness from large phonological units to small units (e.g., Ziegler & Goswami, 2005). Because items in this study were not matched on (or alternatively systematically manipulated for) word length or phonological distance, the effects of these factors remain largely undetectable.

The impact of phonological distance on phonological awareness in Arabic is expected to be particularly strong in children coming from low SES. Two factors lead to this prediction. First, in general, children from low SES show lower metalinguistic skills than their peers from high SES (Schiff & Lotem, 2011). Second, Arabic speaking children from low SES in Israel are often reared in low-literacy homes and are, thus, less exposed to informal literacy in Standard Arabic (Aram et al., 2013; Korat, Aram, Hassunha Arafat, Hag-Yehiya Iraki, & Saiegh-Haddad, 2014). This latter factor might contribute to less familiarity with the phonological structure of StA and this, in turn, should undermine their ability to construct and access accurate phonological representations for StA linguistic units. The convergence of generally poor metalinguistic skills together with impoverished exposure to StA is expected to impact phonological awareness in general, and phonological awareness for StA words in particular, among children from low SES.

Phonological skills in children from low SES

It has been largely established that the language abilities of preschool children are related to their SES (Foorman et al., 2006; D'Angiulli, Siegel, & Herzman, 2004). From infancy, children from low SES are exposed to more directive than elaborative language; They are less likely to be involved as conversational partners in familial gatherings, and participate less than their high SES counterparts in shared book-reading and collaborative writing with their parents (Aram & Biron, 2004). All these practices are crucial to their developing literacy skills (Aram, Korat, & Levin, 2006; Duke, 2000). Consequently, children from less economically established settings and with less educated parents enter school with a disadvantage (Neuman & Celano, 2001).

The language and literacy disadvantage of children from low SES is expressed in high rates of failure from the very early grades (Battin-Pearson et al., 2000), poorer vocabulary (Au, 1998), and lower reading accuracy, reading comprehension, spelling and writing abilities (Chevrot, Nardy, & Barbu, 2011; Douglas, 2000). One hypothesis for the observed discrepancies in reading between children from low versus high SES relates to variations in children's level of phonological awareness (Aram, 2005; Aram & Levin, 2001; Korat & Levin, 2001). Recent work suggests that phonological skills mediate socioeconomic status effects in predicting reading outcomes (Zhang et al., 2013). In a study of the role of SES in predicting emergent literacy skills in Arabic-speaking kindergarteners in Israel, the child family's SES was found to have a direct effect on his/her phonological awareness in kindergarten

and on word reading in the first grade (Hassunah-Arafat, Aram, Korat & Saiegh-Haddad, 2017). It is yet to be determined whether phonological distance is related to the observed differences in phonological awareness in this group as against children from high SES. This is another question that the current study aims to address.

Method

Participants

The study tested a total of 200 Arabic native speaking children (N = 100 females) from Nazareth, an Arab town in the north of Israel. All children lived in Nazareth and were native speakers of the Nazarene dialect. Children came from two SES family backgrounds: mid-high and low as determined by official records of the Ministry of Education (N = 100 in each group). Since 1999, all official (government funded) elementary and junior-high schools in Israel are rated by the Ministry of Education on a socio-economic educational-demographic 10-point scale based on an average ranking of the families in their respective catchment areas. This scale addresses 16 variables, including family economic status (income, employment, housing, etc.), parental education, and number of children. Four schools were sampled: two mid-high SES and two low SES, and children were randomly recruited from five grades in the four schools sampled (N = 20 per grade per school): 2nd (mean age M = 7:08 years, SD = 3.1 months), 4th (mean age = 9:07, SD = 3.61), 6th (mean age = 11:06, SD = 3.26), 8th (mean age = 13:06, SD = 3.78), and 10th (mean age = 15:05, SD = 2.82). Each participant's parent signed a written consent form in compliance with Ministry of Education Chief Scientist and Bar-Ilan University Ethics Review Board guidelines explaining their rights as research participants. Consent forms were sent home with all children by the classroom teacher. Participants whose parent(s) returned a signed consent form participated in the study. Recruitment stopped when we had received 20 consent forms per grade per school. Child assent was obtained orally prior to the start of data collection. Bilingual children, as well as children with documented or apparent sensory, language, educational, psychological or neurological difficulties were excluded.

Materials

Twelve phonological awareness tasks, three testing syllable awareness and three testing phonemic awareness, were developed in two parallel language variety sets: SpA and StA (see "Appendix"). There were three syllable awareness tasks: syllable blending, syllable segmentation, and syllable deletion (initial, final, medial), and three phoneme awareness tasks: phoneme blending, phoneme segmentation, phoneme deletion (initial, final, medial). Two versions within each task were constructed: one using shared SpA words and another using unique StA words. The SpA tasks employed shared words that have an identical phonological form in StA and in SpA and, hence, do not encode any StA phonemes (e.g., *saʒad/* 'knelt'). The StA phonological awareness tasks used

words that have a unique phonological form in StA and encode one StA phoneme each (e.g., /ʔaχaðə/ 'took'). Words across all twelve tasks were matched word for word on phonemic length (3–12 phonemes), syllabic structure (2–5 syllables), morphological structure (1–3 morphemes), and orthographic length (3–9 letters). Words were derived from school textbooks. "Appendix" lists all testing items by task and category. Each task consisted of 15 items that progressed in difficulty from shorter to longer words, and from a simple syllabic structure to a more difficult structure consisting of a consonantal sequence in the middle of the word (e.g., items 4, 5, 8, 9) and double consonants, or geminates (e.g., items 12, 13, 14). In order to yield long words, inflected structures were also used (e.g., items 14, 15) and matched across tasks as shown in "Appendix".

Procedure

Testing was administered in individual sessions in a quiet room at the schools from which the students were recruited. Phonological awareness tasks in SpA and StA were administered in two separate sessions and order of administration was counterbalanced. Order of administration of tasks within each language variety session followed the following order: syllable awareness (blending, then segmentation, then deletion) to be followed by phoneme awareness (blending, then segmentation, then deletion). Children were asked to segment a word into phonological units by pronouncing each phonological unit separately. Children were asked to blend phonological units into words by saying the word that resulted from the blending of all units. Children were asked to delete a phonological unit by saying the part of the word that was left after deleting the target unit.

The same task was administered to all children across all grades. Testing was discontinued after three consecutive errors. Children received one score for succeeding to blend, segment or delete a syllable or a phoneme and a zero score if they failed the item or did not reach it. Errors in segmentation included deleting or adding phonological units to the target word or segmenting wrong units, such as syllables instead of phonemes; errors in blending included blending phonological units into nonwords or wrong targets; errors in deletion included producing a unit larger or smaller than the outcome of the target deletion. Phonological confusions and mispronunciation of phonological units also yielded a zero score. No partial scores were assigned. Alpha Cronbach reliability for tasks across grades ranged between $\alpha = 0.78$ and $\alpha = 0.91$. The only task with a questionable Cronbach alpha of α 0.65 was the syllable blending task. See "Appendix" for exact Alpha Cronbach values per task.

Results

Due to the relatively small sample size in each grade and SES group ($N = 20$), prior to examining the research questions of the study, we conducted Shapiro-Wilk tests for each study group in order to find out whether the dependent variables were normally distributed. The results indicated that the dependent variables in each study group were not normally distributed ($p < 0.05$). Furthermore, in order to examine

Table 1 Pearson correlation coefficient between SpA and StA phonological awareness tasks ($df = 198$)

SpA tasks	StA tasks					
	Syllable blending	Syllable segmentation	Syllable deletion	Phonemic blending	Phonemic segmentation	Phonemic deletion
Syllable blending	0.67***	0.18*	0.24***	0.21**	0.26***	0.25***
Syllable segmentation	0.14*	0.80***	0.81***	0.75***	0.79***	0.77***
Syllable deletion	0.12	0.71***	0.81***	0.70***	0.79***	0.80***
Phonemic blending	0.14	0.79***	0.82***	0.76***	0.81***	0.79***
Phonemic segmentation	0.14	0.78***	0.84***	0.75***	0.83***	0.81***
Phonemic deletion	0.13	0.77***	0.83***	0.74***	0.82***	0.80***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

the homoscedasticity of the variances, we conducted Levene's tests on the dependent variables. The results indicated that the null hypothesis of equal variances was rejected for some of the dependent variables. Therefore, we conducted both non-parametric and parametric analyses. Since the findings of the non-parametric and parametric tests were identical, only the results of the parametric analyses are reported.

Due to multiple comparisons and simultaneous statistical testing between five grades and two SES groups, in examining the source of significant interactions, we considered α values below 0.005 as significant. This conservative α value was determined by using the Bonferroni correction. α values between 0.05 and 0.005 were considered as only marginally significant. It is noteworthy that, except for the syllable blending task, the only task with a questionable reliability, all phonological awareness tasks in StA correlated significantly with all tasks in SpA. This is evidence for the convergent validity of the SpA and StA syllable and phoneme awareness tasks used in the study. These inter-correlations are presented in Table 1.

Syllable awareness tasks

To examine performance on the syllable blending, segmentation and deletion tasks, three separate 5 × 2 × 2 repeated measures analyses of variance (ANOVA) were conducted, with grade (second, fourth, sixth, eighth and tenth) and SES (low, mid-high) as between-subject variables, and language variety (SpA, StA) as a within-subject variable.

Syllable blending A main effect of language variety was found, $F(1, 190) = 5.21$, $p = 0.024$, $\eta_p^2 = 0.03$, indicating better performance on the SpA than on the StA task. The main effect of grade was also found to be significant, $F(4, 190) = 4.25$, $p = 0.003$, $\eta_p^2 = 0.08$. Scheffe Post-Hoc analysis indicated that syllable blending among the youngest second graders was significantly lower than that among the oldest tenth graders ($p = 0.018$). The main effect of SES on syllable blending was not significant, $F(1, 190) = 1.94$, $p = 0.166$, $\eta_p^2 = 0.01$.

The two way interactions of language variety by grade, $F(4, 190) = 0.49$, $p = 0.744$, $\eta_p^2 = 0.01$, language variety by SES, $F(1, 190) = 0.95$, $p = 0.332$, $\eta_p^2 = 0.01$, and grade by SES, $F(4, 190) = 0.26$, $p = 0.904$, $\eta_p^2 = 0.01$, were not significant. Moreover, the three-way interaction of language variety by grade by SES was not significant, $F(4, 190) = 1.23$, $p = 0.298$, $\eta_p^2 = 0.02$. (See Table 2).

Syllable segmentation A main effect of language variety was found, $F(1, 190) = 27.94$, $p < 0.001$, $\eta_p^2 = 0.13$, indicating better performance on the SpA than on the StA task. The main effect of grade was also found to be significant, $F(4, 190) = 15.30$, $p < 0.001$, $\eta_p^2 = 0.24$. Scheffe Post-Hoc analysis indicated that syllable segmentation among the second graders was significantly lower than that of the other four older grade-level groups ($p < 0.001$). Furthermore, the main effect of SES was significant, $F(1, 190) = 23.82$, $p < 0.001$, $\eta_p^2 = 0.11$, indicating higher performance among children from mid-high versus low SES.

The two way interaction of language variety by SES, $F(1, 190) = 3.90$, $p = 0.050$, $\eta_p^2 = 0.02$ was significant. However, the two way interactions of

Table 2 Percent correct scores (and SD) of performance on the SpA and StA syllable blending tasks by grade and SES

Tests	*Grades*	*Low SES*				*High SES*			
		SpA		*StA*		*SpA*		*StA*	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Blending	Second	80.17	17.56	76.83	21.62	82.33	14.28	78.63	19.57
	Fourth	81.67	23.68	82.00	21.20	86.50	11.77	77.83	24.22
	Sixth	80.17	22.20	79.60	20.34	88.33	13.12	82.86	17.64
	Eighth	86.00	19.45	85.67	22.71	92.50	7.77	91.23	19.55
	Tenth	92.67	10.12	89.67	12.88	91.83	7.17	93.79	7.70

language variety by grade, $F(4, 190) = 2.09$, $p = 0.084$, $\eta_p^2 = 0.04$, and grade by SES, $F(4, 190) = 2.34$, $p = 0.06$, $\eta_p^2 = 0.05$, were not significant. Finally, the three-way interaction of language variety by grade by SES was significant, $F(4, 190) = 3.24$, $p = 0.013$, $\eta_p^2 = 0.06$.

Paired samples *t* test examining the simple effect by comparing performance on the SpA and StA tasks in each grade and SES group separately revealed that while higher performance was found on the SpA compared to the StA syllable segmentation tasks in the low SES group among the second and fourth grades ($p < 0.001$), no significant differences were found between the SpA and StA syllable segmentation tasks in any grade in the high SES group (*p* values between .157 and .846). See Fig. 1.

Syllable deletion A main effect of language variety was found, $F(1, 190) = 63.14$, $p < 0.001$, $\eta_p^2 = 0.25$, indicating better performance on the SpA than on the StA tasks. The main effect of grade was also found to be significant, $F(4, 190) = 5.76$, $p < 0.001$, $\eta_p^2 = 0.11$. Scheffe Post-Hoc analysis indicated that syllable deletion among the second graders was significantly lower than that among the eighth ($p < 0.01$) and tenth ($p < 0.001$) graders. Furthermore, a main effect of SES was found, $F(1, 190) = 41.71$, $p < 0.001$, $\eta_p^2 = 0.18$, indicating higher performance among children from mid-high versus low SES.

The two way interactions of language variety by grade, $F(4, 190) = 8.13$, $p < 0.001$, $\eta_p^2 = 0.15$ and language variety by SES, $F(1, 190) = 10.16$, $p = 0.002$, $\eta_p^2 = 0.05$, were significant. In contrast, the two way interaction of grade by SES, $F(4, 190) = 1.74$, $p = 0.142$, $\eta_p^2 = 0.03$, was not significant. Finally, the three-way interaction of language variety by grade by SES was significant, $F(4, 190) = 2.51$, $p = 0.043$, $\eta_p^2 = 0.05$.

Paired samples *t* test examining simple effects by comparing performance on the SpA and the StA tasks separately in each grade and SES group revealed that while higher scores were observed on the SpA compared to the StA syllable deletion tasks among the low SES group, in the second ($p < 0.001$), fourth ($p < 0.001$) and sixth grades ($p = 0.004$), this same effect was significant only in second grade ($p < 0.001$) in the mid-high SES (see Fig. 2).

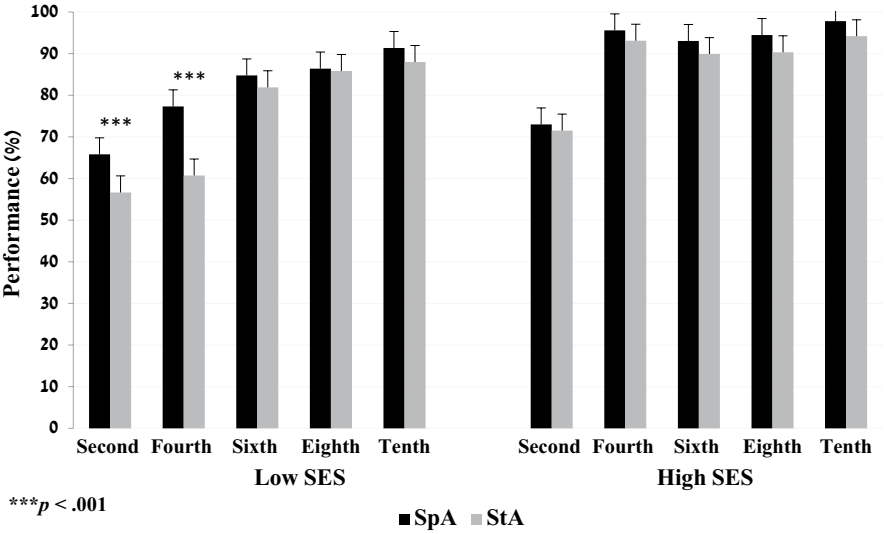

Fig. 1 Means (and SE) of the performances on the syllable segmentation test by language variety, grade and SES

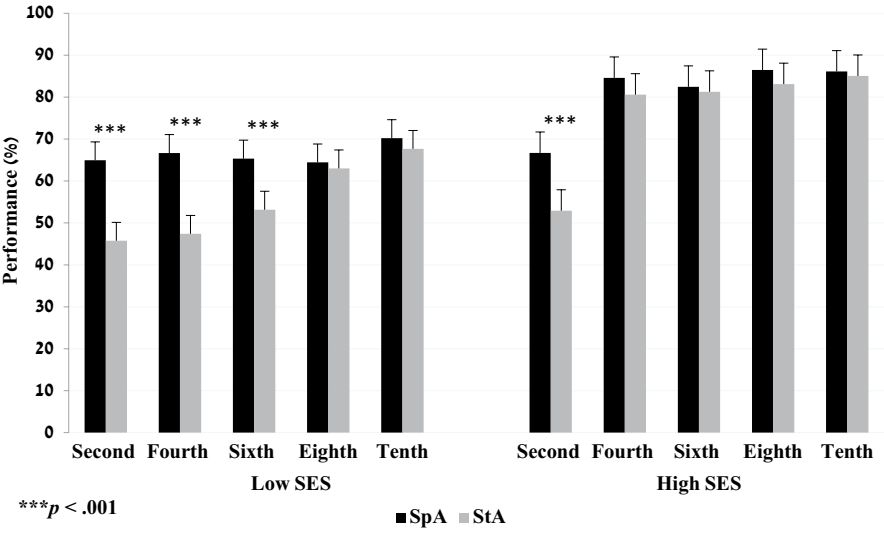

Fig. 2 Means (and SE) of the performances on the syllable deletion test by language variety, grade and SES

Phoneme awareness tasks

To examine performance on the phoneme blending, segmentation and deletion tasks, three separate 5×2×2 repeated measures analyses of variance (ANOVA) were conducted, with grade (second, fourth, sixth, eighth and tenth) and SES (low, mid-high) as the between-subject variables, and language variety (SpA, StA) as the within-subject variable.

Phoneme blending A main effect of language variety was found, $F(1,190)=74.23$, $p<0.001$, $\eta_p^2=0.28$, indicating higher scores on the SpA than on the StA task. The main effect of grade was also found to be significant, $F(4, 190)=13.25$, $p<0.001$, $\eta_p^2=0.22$. Scheffe Post-Hoc analysis indicated that phonemic blending in the second grade was significantly lower than that in the fourth grade ($p=0.030$) and the performance of the fourth grade was significantly lower that of the tenth grade ($p=0.024$). Furthermore, a main effect for SES was found, $F(1, 190)=24.75$, $p<0.001$, $\eta_p^2=0.11$, indicating higher performance among children from mid-high versus low SES.

The two way interactions of language variety by grade, $F(4, 190)=4.96$, $p=0.001$, $\eta_p^2=0.10$, language variety by SES, $F(1, 190)=8.65$, $p=0.004$, $\eta_p^2=0.04$, and grade by SES, $F(4, 190)=2.67$, $p=0.033$, $\eta_p^2=0.05$, were significant. Finally, the three-way interaction of language variety by grade by SES was significant, $F(4, 190)=3.94$, $p=0.004$, $\eta_p^2=0.08$.

Paired samples *t* tests examining simple effects by comparing performance on the SpA and StA tasks in each grade and SES group separately revealed that, while in the low SES group higher scores were observed on the SpA compared to the StA in the second, fourth and sixth grades ($p<0.001$), these effects were only observed in the second ($p<0.001$) and fourth ($p=0.001$) grades in the mid-high SES group (see Fig. 3).

Phoneme segmentation A main effect of language variety was found, $F(1, 190)=100.91$, $p<0.001$, $\eta_p^2=0.35$, indicating better performance on the SpA than on the StA task. The main effect of grade was also found to be significant, $F(4, 190)=11.11$, $p<0.001$, $\eta_p^2=0.19$. Scheffe Post-Hoc analysis indicated that performance on the phonemic blending task of the second graders was significantly lower than the performance of the other four older grades ($p=0.023$) and that performance of the fourth graders was significantly lower than that of the tenth graders ($p=0.048$). Furthermore, a main effect for SES was found, $F(1, 190)=29.84$, $p<0.001$, $\eta_p^2=0.14$, indicating higher performance among children from mid-high versus low SES.

The two way interactions of language variety by grade, $F(4, 190)=4.91$, $p=0.001$, $\eta_p^2=0.09$ and language variety by SES, $F(1, 190)=26.52$, $p<0.001$, $\eta_p^2=0.12$, were significant. In contrast, the two way interaction of grade by SES, $F(4, 190)=2.09$, $p=0.083$, $\eta_p^2=0.04$, was not significant. Finally, the three-way interaction of language variety by grade by SES was significant, $F(4, 190)=3.73$, $p=0.006$, $\eta_p^2=0.07$.

Paired samples *t* tests examining simple effect by comparing performance on the SpA and StA tasks in each grade and SES group separately revealed that, while in the low SES group higher scores were observed on the SpA compared

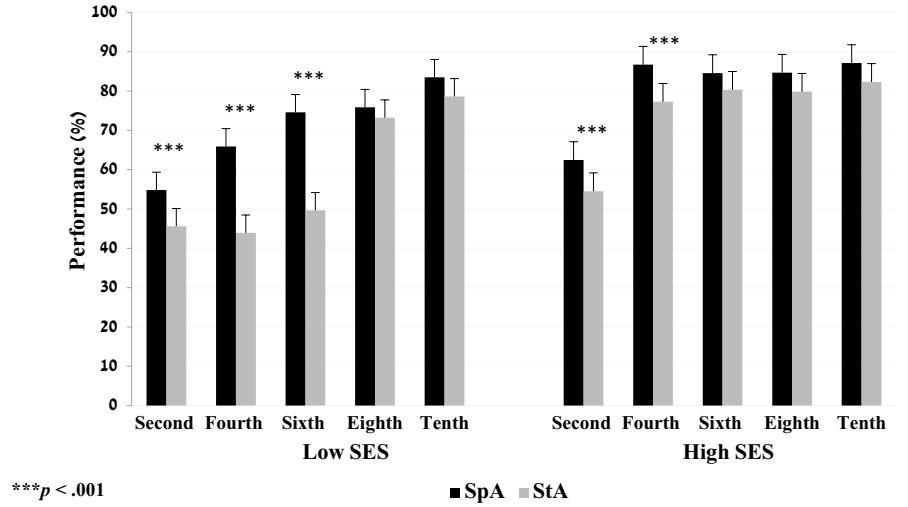

Fig. 3 Means (and SE) of the performances on the phonemic blending test by language variety, grade and SES

to the StA in the second, fourth, sixth and eighth grades ($p < 0.001$), these effects were only observed in the second ($p < 0.001$) and the fourth ($p < 0.001$) grades in the mid-high SES group (see Fig. 4).

Phoneme deletion A main effect of language variety was found, $F(1, 190) = 149.22$, $p < 0.001$, $\eta_p^2 = 0.44$, indicating higher performance on the SpA

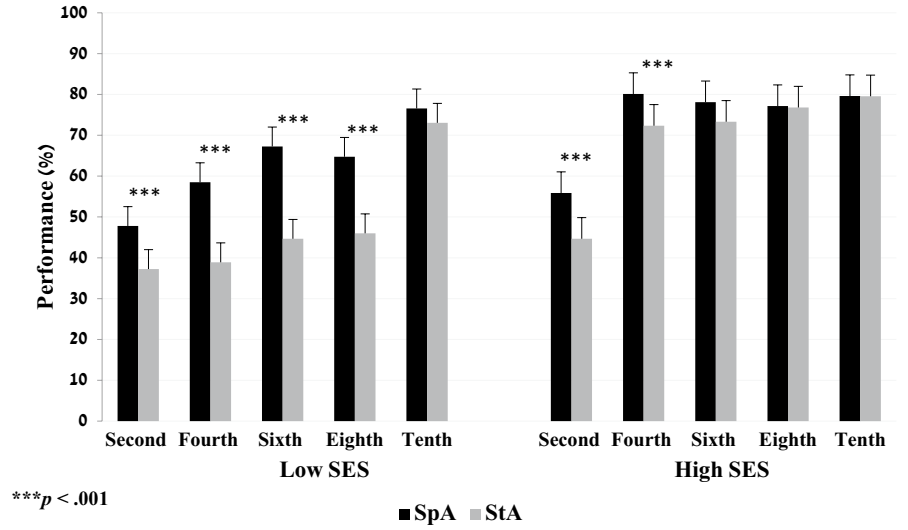

Fig. 4 Means (and SE) of the performances on the phonemic segmentation test by language variety, grade and SES

than on the StA task. The main effect of grade was also found to be significant, $F(4, 190) = 9.29$, $p < 0.001$, $\eta_p^2 = 0.16$. Scheffe Post-Hoc analysis indicated that phoneme deletion among the second graders was significantly lower than that observed in the other four older grades ($p = 0.025$ to $p = 0.000$). Furthermore, a main effect of SES was found, $F(1, 190) = 37.83$, $p < 0.001$, $\eta_p^2 = 0.17$, indicating higher performance among children from mid-high versus low SES.

The two way interaction of language variety by SES, $F(1, 190) = 36.86$, $p < 0.001$, $\eta_p^2 = 0.16$, was significant. In contrast, the two way interactions of language variety by grade, $F(4, 190) = 1.78$, $p = 0.134$, $\eta_p^2 = 0.04$ and grade by SES, $F(4, 190) = 1.45$, $p = 0.218$, $\eta_p^2 = 0.03$, were not significant. Finally, the three-way interaction of language variety by grade by SES was significant, $F(4, 190) = 2.99$, $p = 0.020$, $\eta_p^2 = 0.06$.

Paired samples t tests examining simple effect by comparing performance on the SpA and StA tasks in each grade and SES group separately revealed that, while in the low SES group higher scores were observed on the SpA compared to the StA in all five grades ($p < 0.001$), these effects were only observed in children from mid-high SES in the second ($p < 0.001$) and fourth grade ($p < 0.001$). Scores were only marginally higher for SpA in the 6th grade ($p = 0.041$), (see Fig. 5).

Discussion

Phonological distance between SpA and StA is a prominent feature of Arabic diglossia. The current study tested the role of phonological distance in syllable and phoneme awareness among 2nd, 4th, 6th, 8th and 10th school graders from low versus mid-high SES. The results showed a consistent effect of phonological

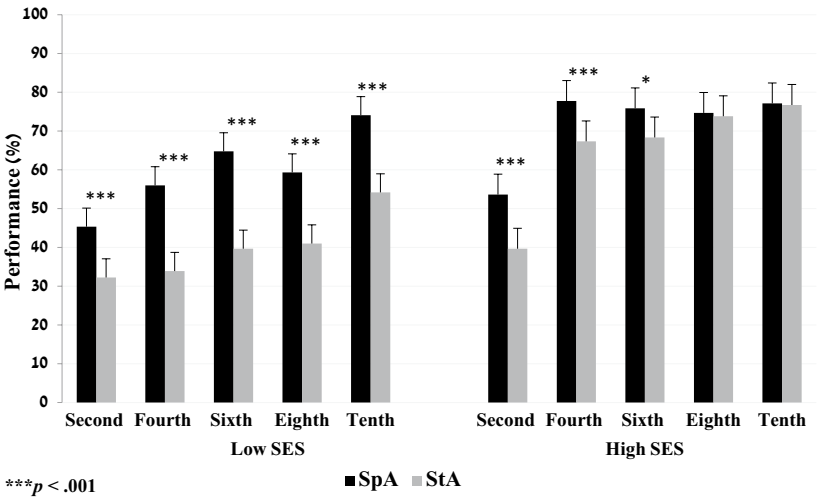

Fig. 5 Means (and SE) of the performances on the phonemic deletion test by language variety, grade and SES

distance on phonological awareness across all grades and in both SES groups with phonological awareness for shared SpA words significantly higher than that for unique StA words. These results extend earlier findings from young children (Saiegh-Haddad, 2003, 2007; Saiegh-Haddad et al., 2011) in three important ways: (a) in showing that phonological distance impacts syllable awareness, not only phoneme awareness; (b) in showing that the impact of phonological distance is long-lasting and is also observed in young elementary and in older junior-high students; and (c) in showing that phonological distance impacts phonological awareness in children from low as well as mid-high SES.

The observed impact of phonological distance on phonological awareness has important theoretical implications. It underscores the need to distinguish between at least two dimensions in the conceptualization of the phonological awareness construct (Melby-Lervåg et al., 2012). *The first dimension* is the quality of the underlying phonological representations in memory to which metalinguistic operations are applied (e.g., Elbro, 1998; Goswami, 2000). This dimension is lect-specific and is affected by language-specific factors, such as age-of-acquisition and exposure/familiarity with the phonological system of the specific language under question. Earlier research has shown that phonological distance between SpA and StA does not support the establishment of high-quality phonological representations of StA words in long-term memory (Saiegh-Haddad, et al., 2011; Saiegh-Haddad & Haj, 2018). Phonological distance was also shown to interfere with the processing of phonological information in working memory (Saiegh-Haddad & Ghawi-Dakwar, 2017). These representation-based effects might explain some of the difficulties we observed in phonological awareness for StA words. *The second dimension* is the ability to access and operate on underlying phonological representations. This is a metalinguistic meta-phonological ability which may be domain-general and more cognitive and universal in nature (De Houwer, 2017; Saiegh-Haddad, 2019). Some of the difficulties that the students in our study showed in becoming aware of phonological forms might have resulted from genuine difficulties in becoming aware of phonological structure, rather than difficulty in the quality of the underlying phonological representations of words. While genuine metalinguistic awareness difficulties might explain the difficulties in analyzing SpA words, their effect on phonological awareness for StA words cannot be dissociated from the effect of phonological representational quality unless a careful analysis of errors is conducted (Russak & Saiegh-Haddad, 2017). This analysis is for future research to pursue. Our findings from the current study align with the predictions of the MAWRID Model (Saiegh-Haddad, 2018), according to which linguistic distance between SpA and StA results in a 'diglossia-effect' which is "a processing advantage for SpA over StA linguistic structures, and observed on phonological processing for linguistic units that are not within the dialect of speakers" (pp. 554–455).

Even though phonological distance exerted a significant effect across tasks, grades and SES groups, the results revealed interesting differences in its effect on performance on the different phonological awareness tasks used. For instance, the syllable segmentation and syllable deletion tasks revealed differences in the prominence of the effect of phonological distance on younger versus older

students, and on students from low as against mid-high SES. In syllable segmentation, the effect of phonological distance was observed only in the low SES group and only in the 2nd and 4th grades. In contrast, in syllable deletion, the effect was observed also in the mid-high SES, yet it was extended over a longer developmental period in the low SES group (2nd through 6th grade) as against the mid-high SES (2nd grade only). In the same way, the phoneme blending task showed greater facility with SpA over StA words in both SES groups, but this effect was developmentally more persistent in the low SES group (2nd through 6th grade) than in the mid-high SES (2nd through 4th grades); In phoneme segmentation and deletion tasks the effect of phonological distance was developmentally even more persistent, especially in the low SES, extending to the 8th grade and the 10th grade, respectively. Altogether, these results show that phonological distance is an additional phonological complexity factor impacting phonological awareness in dialect speakers, and that its impact is more prominent in younger children and in children from low SES. The results also suggest that phonological distance and SES are separable risk factors impacting phonological awareness in dialect speakers, yet their negative impact on performance is exacerbated when they co-occur within the same child.

Why is it that children from low SES are more sensitive to the effect of phonological distance? Previous research has shown low phonological awareness levels in children from low SES (McDowell, Lonigan, & Goldstein, 2007; Schiff & Lotem, 2011; Zhang et al., 2013). This highlights the role of socioeconomic status, along with other educational and cultural resources, in the acquisition of metalinguistic skills (Buckingham, Beaman, & Wheldall, 2014). The literature also shows that children coming from low SES families may be linguistically impoverished (Hoff, 2013) and that their emergent literacy skills may also be poor (Kieffer 2010; Lubienski & Crane 2010). Early linguistic and emergent literacy skills are key to language and literacy development in diglossic Arabic because there is a remarkable linguistic distance, including in the phonological domain, between the spoken and the standard language. In a study of the role of SES in predicting emergent literacy and early reading skills in Arabic speaking kindergarteners in Israel, the SES of the child's family was found to predict phonological awareness in kindergarten and word reading in the first grade (Aram et al., 2013; Hassunah-Arafat, Aram, Korat, & Saiegh-Haddad, 2017). A study of Arabic speaking children from low SES homes in Israel showed that home literacy predicted 20% of the variance in their emergent literacy skills beyond SES (Korat et al., 2014). A child's exposure to the standard language is closely dependent in the Arabic diglossic context on parental education and parental involvement with literacy activities.

Besides a general role of linguistic distance in phonological awareness, the results of the study also highlight differences between phonological awareness tasks in their sensitivity to linguistic distance in the two SES groups. For example, while the syllable segmentation and syllable deletion tasks revealed differences between awareness of SpA versus StA words in the low SES group, only the syllable deletion task showed this effect in children from mid-high SES. Moreover, unlike syllable blending and syllable segmentation, the syllable deletion task revealed a difference in performance between the two SES groups, evident even in the highest 8th and 10th

grades, and even when SpA words were used. These results imply that the impact of phonological distance is not uniform across tasks. They also highlight the specific demands of the deletion task as a factor in explaining the observed differences between SES groups. Phonological deletion tasks may be linked with orthographic processing, especially when the word is orthographically transparent (Castles, Holmes, Neath, & Kinoshita, 2003). While speculative, it is possible that these skills may be less well developed in children from the low SES group due to less reading and spelling experience. Perhaps differences between low versus mid-high SES children in orthographic processing skills contributed to differences in syllable deletion between the two SES groups even in phonological awareness where SpA words were targeted.

To sum up, two set of factors impact phonological awareness in Arabic: The first set is linguistic-sociolinguistic whereas the second is social-environmental. The linguistic-sociolinguistic factors comprise phonological distance and phonological-unit size; the social-environmental factors encompass SES and related informal language and literacy exposure. The results show that all children find it more difficult to analyze unique StA than shared SpA words. These results reflect the impact of diglossia on phonological representations and awareness in Arabic speaking children. The results also show that awareness of the syllabic structure of the word is easier than awareness of the phonemic structure in both language varieties. This supports the salience of syllables as against phonemes in phonological representation and analysis. At the same time, the results show that children from low SES fare significantly more poorly on all tasks and in both language varieties (except for the syllable blending task), and the role of phonological distance is developmentally more persistent in this group of children, especially on linguistically and cognitively demanding tasks.

Conclusion and limitations

The study demonstrates that phonological awareness is not an all-or-none phenomenon, neither is it a purely metalinguistic cognitive construct. Rather, it is impacted by phonological distance and is hence affected by whether it is tested using shared words that keep an identical form in the spoken dialect of children and in the standard language versus words that have a unique standard Arabic phonological form (Saiegh-Haddad, 2018, 2019, 2020). If phonological awareness develops earlier and more efficiently when word stimuli have an identical form in the spoken dialect and in Standard Arabic, as our results show, it follows that initial training in phonological awareness should start with those shared words. It also follows that phonological awareness for unique Standard Arabic words which have different phonological forms in SpA and StA should be given special attention in training (Saiegh-Haddad & Everatt, 2017). This recommendation is reinforced by earlier evidence showing a similar effect of phonological distance on reading (Saiegh-Haddad & Schiff, 2016; Schiff & Saiegh-Haddad, 2017). This conclusion aligns with the principles of the *Exposure through Reading Program* (ERP) (Saiegh-Haddad & Spolsky, 2014). The tenets of the ERP

program of literacy instruction in Arabic are simple and they mimic the principles that underlie the *Reading Method* (West, 1953). One tenet of this program is that it is possible to promote literacy by controlled and structured exposure to the language encoded in print. Another tenet is that developing literacy in a language that is not spoken by children requires explicit, structured and controlled language exposure. The results of the current study suggest that the phonological distance between SpA and StA should be a central parameter in such a structured literacy training program. Relatedly, the results suggest that those assessing and diagnosing reading difficulties in Arabic should become cognizant of the fact that phonological distance adds a layer of difficulty that might impact phonological awareness. There is now some initial evidence suggesting that children with reading and language disability may be even more strongly affected by phonological distance (Saiegh-Haddad, 2020; Schiff & Saiegh-Haddad, 2017). Yet, much more research is needed to confirm this hypothesis.

It is noteworthy that the SpA words we used in this study were shared identical words; namely also used in Standard Arabic and have an identical form in the two varieties. The study did not target unique Spoken Arabic words which are only used in Spoken Arabic. Given that this study is based on a larger project testing relationships between various metalinguistic tasks and reading, and given that unique Spoken Arabic words do not have a conventional written form, these words were not included.

The current study is a cross-sectional developmental study of phonological awareness in Arabic. The cross-sectional developmental design is a limitation on the developmental arguments made in this manuscript. Moreover, sample-size is a limitation on the power of the statistical tests used. Note though that the size effects, while small, do support the main conclusions made in this study. To obtain more reliable estimates of grade differences future research would need to test larger samples within each grade. Finally, the evidence we report in this paper is based on a sample of speakers of a local dialect of Palestinian Arabic used in northern Israel. Data should be sought from speakers of other dialects in other Arabic-speaking regions.

Appendix

Test items by task and category

Total N items per task= 15	Syllable Awareness Tasks						Phoneme Awareness Tasks					
	Blending		Segmentation		Deletion		Blending		Segmentation		Deletion	
Structure	SpA	StA	SpA	StA	SpA	StA	SpA	StA	SpA	StA	SpA	StA
2 syllables CV/CVC=3 items	أَكَلَ	بَدَلْ	سَجَد	ظَلَمْ	ضَرَبْ	وَثَبْ	حَسَبْ	أَخَذْ	غَسَلْ	نَظَرْ	هَرَبْ	نَذَرْ
	حافِلْ	ظالِمْ	طابِعْ	ثائِرْ	عازِفْ	ثابِتْ	ضابِطْ	نافِذْ	صاحِبْ	جائِعْ	صابِرْ	ظاهِرْ
	عَفَوْ	عَدَوْ	صَبَوْ	كَذَوْ	كَسَوْ	خَوْ	زَسَوْ	كَذَوْ	خَجِوْ	عَدَوْ	عَجِوْ	ظَفَوْ
CVC/CVC= 1 item	مَعْروضْ	مَنْظور	مَهْجورْ	مَحْفوظْ	مَحْروسْ	مَنْثورْ	مَحْدوعْ	مَحْظورْ	مَفْروعْ	مَظْلومْ	مَحْفورْ	مَحْذولْ
CVC/CV=1 item	زَمْلي	ثَوْبي	ذَرْسي	عَظْمي	حَجْمي	نَذْري	زَمْري	جَذْري	كَرْمي	ظَهْري	أَكْلي	ذَلْجي
3 syllables CV/CV/CVC=2 items	حاصَرَتْ	واظَبْتْ	عارَضَتْ	جاذَبَتْ	كافَحَتْ	خاذَلَتْ	لاعَبَتْ	ناظَرْتْ	سافَرَتْ	ثابَرَتْ	جامَلَتْ	باحَثَتْ
	مَصانِعْ	مَذاهِبْ	مَطاعِمْ	مَظاهِرْ	مَصارِفْ	مَظاهِرْ	مَشاهِدْ	مَنافِذْ	مَتاجِرْ	مَذابِحْ	مَنازِلْ	مَناظِرْ
	مَشْروبي	مَنْدوري	مَحْبوبي	مَنْظوري	مَأْكولي	مَنْثوري	مَعْبودي	مَظْلومي	مَصْروفي	مَنْبوذي	مَكْتوبي	مَنْظوري
CVC/CV/CV=1 item CVC/CVC/CV=1 item	أَنْكَرْنا	أَظْهَرْنا	أَسْرَعْنا	أَنْذَرْنا	أَتْعَبْنا	أَعْذَرْنا	أَبْحَرْنا	أَحْدَثْنا	أَرْشَدْنا	أَثْبَتْنا	أَحْضَرْنا	أَوْرَثْنا
4 syllables	خاطَبْناها	ماثَلْناها	ساعَدْناها	ناظَرْناها	عارَضْناها	عاظَمْناها	غادَرْناها	حاذَلْناها	عاتَبْناها	حاذَقْناها	جامَلْناها	ظالَمْناها

CV/CVC/CV/CV=1 item CVC/CV/CV/CV=1 tem	لَمْلَموها	أَعْذَروها	هَنْدَسوها	تَلْمَذوها	دَحْرَجوها	لَعْلَموها	زَخْرَفوها	أَنْذَروها	غَرْبَلوها	بَعْثَروها	بَرْهَنوها	أَظْهَروها
Geminates 2 syllables: CV**C**/**C**VC=2 items 4 syllables= CV**C**/**C**V/CV=1 item	سَخَّنْ	كَتَّفْ	عَلَّمْ	عَذَّبْ	عَرَّفْ	نَطَّفْ	جَرَّبْ	عَظَّمْ	جَمَّعْ	قَطَّعْ	سَلَّمْ	هَذَّبْ
	نَجّارْ	حَرّاثْ	فَلّاحْ	كَذّابْ	حَطّابْ	حَذّاءْ	حَدّادْ	مَقّالْ	عَطّارْ	شَحّاذْ	نَجّارْ	كَذّاب
	كَلَّموني	هَذَّبوني	سَلَّموني	حَدَّثوني	فَرَّحوني	مَثَّلوني	كَرَّموني	عَظَّموني	صَرَّروني	وَظَّفوني	عَرَّفوني	عَذَّبوني
5 syllables CVC/CVC/CV/CV/CV=1 item	اِسْتَعْبَدوني	اِسْتَمْطَروني	اِسْتَكْبَروني	اِسْتَعْذَروني	اِسْتَحْمَلوني	اِسْتَعْذَبوني	اِسْتَخْدَموني	اِسْتَنْظَروني	اِسْتَهْدَفوني	اِسْتَظْرَفوني	اِسْتَعْمَلوني	اِسْتَكْبَروني
Cronbach Alpha	**0.65**	**0.78**	**0.80**	**0.85**	**0.81**	**0.82**	**0.90**	**0.89**	**0.90**	**0.90**	**0.88**	**0.91**

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