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הצעת מחקר לתואר השני הנושא:

הייצוגים הפונולוגיים בערבית דיגלוסית והקשר שלהם עם מודעות פונולוגית בגן

Phonological representations in Arabic Diglossia and their relationship with phonological awareness in kindergarten

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Table of Contents

Introduction

The current study has two main aims. First, to investigate phonological representations of words among kindergarten children in Arabic Diglossia, in which words have two phonological representations: a spoken one acquired first and used in everyday speech and a standard mainly written representation acquired later and used only in formal settings. The second is to test the impact of the phonological representations of words on the children's ability to develop phonological awareness. These questions are tested among Arabic speaking kindergarteners with a particular focus on the role of the linguistic distance between Spoken Arabic (SpA) and Standard Arabic (StA) on children's phonological representations and awareness, by studying typically developing children (hereafter TD) and comparing their performance to children with difficulty in kindergarten to develop basic literacy skills (children at risk for Reading Disability, hereafter RD).

Literature review

Phonological skills in reading development

Several researchers noted the relationship between reading development and a set of abilities such as the phonological awareness, letter knowledge, print concepts knowledge, expressive vocabulary, sentence repetition/imitation, and storytelling/recall. These skills are acquired prior to the formal instruction of reading and continue to develop with learning to read (Elbro, 1996; McCardle, Scarbough, & Catts, 2001), and are considered significant predictors of later literacy skills. Yet, among these skills, only phonological awareness (PA) was found to have a causal relationship with reading ability (Ehri & Wilce, 1980; Perfetti, Beck, & Hughes, 1987; Wagner, et al., 1997). At the same time, some other researchers argued that reading difficulties may not be related to children's difficulty in applying phonological operations only. Rather, they might be related to the difficulty in establishing and accessing accurate phonological representations (PR) of the words in the mental lexicons and that such poor PR may explain some of the PA problems these children might have (Elbro, Borstrom, & Petersen, 1998; Swan & Goswami, 1997; Fowler, 1991; Foy & Mann, 2001; Wesseling & Reitsma, 2001). Therefore, this study investigates PR among TD preschool children and the relationship between PR and PA in a diglossic context where children often acquire two phonological forms for each word: a spoken form and a standard form that is used for reading/ writing.

Phonological awareness

Phonological awareness (PA) refers to the individual's conscious awareness and sensitivity to phonological structure of spoken words, and it is operationalized as the ability to reflect on,

detect and manipulate the sound of the words at three levels of phonological structure: syllables, onset-rime (or body-coda) and phonemes. PA is often measured by various tasks such as isolating, segmenting, or blending of sounds. Many studies support the presence of a keen association between reading ability and PA skills (Ehri & Wilce, 1980; Perfetti, Beck, & Hughes, 1987; Wagner, et al., 1997).

Since reading acquisition depends initially on the ability to access the phonemes of spoken words and to link graphemes with phonemes using Grapheme-Phoneme correspondence rules (GPC rules), children's ability to analyse spoken words into phonemes and the ability to analyse and manipulate these phonemes, is a primary skill predicting reading ability. Therefore, PA has been directly linked to acquisition of word decoding in an alphabetic orthography (Adams, 1990; Goswami & Bryant, 1990; Kuo & Anderson, 2008), Accordingly, difficulty in applying phonological operations (such as isolating, deleting, or segmenting phonemes) on spoken words is a primary predictor of word recognition problems (NRP, 2000; Snow, Burns, & Griffin, 1998; Ziegler & Goswami, 2005). These phonological operations are used as a method of distinguishing TD children from children who are at risk for having RD. However, they might not distinguish between children's inability to perform PA tasks because of genuine reading disability, and TD children who face difficulty to perform PA tasks only because they have not constructed accurate PR for these words (Saiegh-Haddad forthcoming).

Phonological representations

Phonological representation (PR) refers to the abstract knowledge about the phonological properties of words stored in the mental lexicon, (Elbro & Jensen, 2005). According to the Lexical Restructuring Model (Metsala & Walley, 1998), phonological representations are dynamic and undergo an ongoing change in organizational accuracy and stability as vocabulary grows, the representations change from being holistic to more analytic representations encoding smaller units, such as syllables, onset-rime, and eventually phonemes. A range of tasks are used to assess the quality of the PR, such as picture naming, nonword repetition, and auditory lexical decisions. The Phonological Distinctness Hypothesis (Elbro, 1996), argues that differences in the distinctness of the PR of the lexical items is the primary source of the differences in phonological processing associated with reading development. Phonological distinctness refers in this hypothesis to (1) the accuracy of the underlying phonological representations of the words, and (2) the segmental organization of these representations (Swan & Goswami, 1997).

So far it has been agreed upon that the lack of specificity in the PR of words in the mental lexicon leads to poor performance in everyday speaking and listening tasks, and more specifically in

tasks that require reflection on these phonological representations and in the ability to acquire grapheme-phoneme correspondence (Thomson & Goswami, 2010). Evidence also indicates that the degree of accuracy or the level of specificity of the PR of words is a very important factor in PA and in turn in learning to read and write. For instance, Swan and Goswami (1997) examined whether the accuracy of the phonological representations of words in the mental lexicon of dyslexic children could account for the deficit in segmental awareness tasks at three linguistic levels (syllable, onset-rime, and phoneme awareness). They found that when the PR was accurate dyslexic children performed at equivalent levels to the control groups in the experiment when the task required stimuli to be segmented into the larger sub-lexical units (syllable, onset and rime), but the deficit remained at the phoneme level. This implied that children's ability to analyse sub-lexical units is affected by the accuracy and retrieval of the PR and by the linguistic level tapped by the PA task. However, no study to date has examined the effect of PR on the performance in PA in a diglossic context where there is phonological distance between the spoken language and the standard language that children learn to read and write. Arabic is a typical case of diglossia that offers a natural setting for testing this question, because, in addition to the syllable-length condition, it allows us to compare different types of words that vary in the distance existing between their phonological form in the spoken and the written language, and in turn, to test the relationship between PR and PA in these different types of words.

Arabic Diglossia

The linguistic context of Arabic as first described by Ferguson (1959) is a diglossia, in which within the same speech community there are two linguistic systems that vary in prestige and used for two different social functions; spoken Arabic (SpA) is used for everyday speech and Standard Arabic (StA) is used for formal speech and writing. These two systems show differences in linguistic structure at all linguistic domains; phonology, morphology syntax and lexicon (Saiegh-Haddad, 2003; 2008; Saiegh-Haddad & Geva, 2010; Saiegh-Haddad & Joshi, 2014; Saiegh-Haddad & Spolsky, 2014). Given the linguistic distance between SpA and StA, all linguistic units in Arabic may belong to one of the three linguistic affiliations; only SpA, only StA, or SpA-and-StA. This division can be applied to all linguistic domains in the language (Saiegh-Haddad, Levin, Hende, & Ziv, 2011).

Saiegh-Haddad & Spolsky, (2014) analysed a corpus of 17,499-word tokens and 4,408-word types collected from five-year-old Palestinian Arabic speakers in Central Israel and showed that the three affiliations mentioned apply to the lexical domain. The study revealed that Arabic-speaking children store in their mental lexicon three types of words; (1) identical words, which

SpA words that are lexically and phonologically identical with their form in StA (e.g. /*žamal*/ 'a camel', or /*daftar*/ 'notebook'), (2) Cognate words, SpA words that share only some phonological properties with their form in StA, within this category there are different levels of phonological distance; the distance can be as small as one vocalic alternation (e.g. /*ʃams*/ versus /*ʃamis*/ 'sun'), or as big as an alternation of both the phonemic and syllabic structure (/*qalb*/ versus /*ʔaleb*/ 'a heart'), or an alternations that affects many phonemes within the word (/*ʔimraʔa*/ versus /*mara*/ 'a woman'), (3) Unique MSA words, SpA words that have a phonological-lexical form that is completely different from its form in StA (e.g. /*juzda:n*/ in SpA versus /*ħaqi:ba*/ in StA 'bag'), in addition, category (2) and (3) might include words with unique phonemes, phonemes that do not exist in some vernaculars of SpA (e.g. /**ɵ**alj/ vs. /talij/ 'snow', or /**ɵ**uʕba:n/ vs. /ħayyi/ 'snake'). This mismatch between the phonological properties of words in StA and in SpA is expected to result in different levels of PR, especially as the two forms vary in Age of Acquisition (AoA), exposure and frequency of use. The focus of this study is on the effect of phonological distance between the SpA and the StA on PR among pre-schoolers, and then the relationship between PR and children's performance in PA.

Phonological distance and literacy skills

Research on reading development and reading disabilities has been predominantly based on research in the English language (Miles, 2000), but children with reading disability might not demonstrate phonological reading difficulties in the same way in the different languages. Even though the Arabic language is a consistent orthography with predictable letter-sound correspondences, the mismatch between the SpA and StA varieties can be an obstacle that beginning readers face in developing all the phonological skills including PR and PA, and TD children might be misdiagnosed as having reading disability if this issue is not taken into account (Daniels & Share, 2017; Saiegh-Haddad, 2018; forthcoming).

It is important to note that the research has tested the impact of the phonological distance between SpA and StA on the acquisition of literacy skills (Saiegh-Haddad, 2003; Saiegh-Haddad, 2007; Saiegh-Haddad, Levin, Hende, & Ziv, 2008; Saiegh-Haddad & Schiff, 2016; Saiegh-Haddad & Ghawi-Dakwar, 2017; Schiff & Saiegh-Haddad, 2018). This research has shown that the acquisition of reading and related phonological processing skills such as PA and phonological working memory, are affected by the phonological distance between spoken and standard Arabic, both in impaired and in TD children (For instance, Saiegh-Haddad & Schiff (2016) for reading among TD children, and Schiff & Saiegh-Haddad (2018) for reading among RD children). Saiegh-Haddad (2003, 2004, 2007) tested the impact of phonological distance on PA

and found again that phonological distance impacted PA in children in kindergarten through the second grade. Saiegh-Haddad & Haj (2018) tested the impact of phonological distance between SpA and StA on the PR among kindergarteners and first- second- and sixth-grade children. They used a pronunciation accuracy judgment task on StA words. Manipulating the degree of phonological distance, they found that the phonological distance between SpA and StA had an impact on the children's phonological accuracy judgments with unique words as the most difficult followed by cognates and the identical words. This implied that implied that phonological distance impact children's ability to encode an accurate PR of words among kindergarteners and first- second- and sixth-grade children, even when the words are within the receptive vocabulary of the children. Yet no study tested the relationship between PR and PA within each of the three conditions: a well-specified representation (e.g. Identical words), a degraded representation (e.g. Cognate words), and novel phonological representation condition (e.g. Unique words). This will be attempted by the current study.

Goals

This study has a twofold objective. First, to study the phonological representations of words among TD kindergarten children, considering the phonological distance between the SpA and StA. Second, to test the impact of PR quality on children's ability to perform PA tasks. Here, unlike earlier research on Arabic PA, which focused on phoneme-level awareness, we aim to target three different levels of PA: awareness of syllables, awareness of rhyme and awareness of phonemes, among senior kindergarteners (five years-old children). In addition, this study compares PR and PA and the relationship between the two in TD children and in kindergarteners who are at risk for RD, based on several literacy skills including letter knowledge, lexical retrieval, rapid naming and verbal memory.

Hypotheses

1. The phonological distance hypothesis: we hypothesize that the distance between SpA and StA will have an impact on the children's performance in the PR and PA tasks, this will be reflected as lower scores on PR and PA for unique words than for cognates and identical words.
2. The PR-PA hypothesis: we hypothesize that PR will be correlated with PA among kindergarten children across the board and regardless of the phonological distance.
3. The literacy group hypothesis: we hypothesize that low and high literacy groups will be different in their performance on both PA and PR tasks with the high literacy group outperforming the low literacy group.

Methods

Participants

The sample of the study will consist of 50 Arabic speaking 5-year old children (preschoolers). All the participants will enroll in kindergarten centers for typically developing children, Data collection will take place during the autumn-winter of 2018 in a quiet room at the kindergarten center. All tasks will be administered individually. Parental written consent well be obtained for all children participating in this study. Ministry of Education authorization for data collection will be obtained for data collection within the school system.

Materials

The item words for the PR and the PA tasks will be based on picturable objects (nouns), that are familiar to the target age participants (4-6 years old). The lexical and phonological differences between the specific vernacular spoken by the children and the standard Arabic will be considered. The words will be divided into 4 categories; Identical words, Cognates with one-phoneme distance, Cognates with two-phoneme distance (including novel phoneme/ consonant and a vowel each), and Unique words. Words will be evenly divided into monosyllabic, disyllabic, and multisyllabic words, (Total N= 48, 16 words per syllabic length category and 12 words per lexical family category). The 48 words will be employed in three experimental tasks that are designed to measure PA at three levels: the phoneme (using Initial and Final phoneme deletion tasks), the syllable (using Initial and Final syllable deletion tasks), and the rime (using a Rime judgment task).

Tasks

PR tasks

Picture naming. 48 pictures will be used for the picture naming task. Participants will be asked to name the objects in the pictures. It examines the PR of the different word categories.

Word repetition. The same 48 pictures of the picture naming tasks will be used in a word repetition task only if children failed to voluntarily name the object in the picture, and only after the experimenter has provided the picture name.

PA tasks

Rhyme awareness. This task will consist of 30 picturable words evenly divided between 15 pairs of disyllabic and multisyllabic words. only 16 words out of 30 will be included in the statistics, and the other 14 words are used as fillers. After, children name each item; or alternatively after the experimenter name the pictures and ask the participant to repeat the word for the object in

the picture, the participant will be asked to decide whether the pair of words in the pictures rhyme or not.

Syllable deletion. This task included 16 picturable words, made up of disyllabic and multisyllabic structures, with an equal number of each word-category. After, children name each item; or alternatively after the experimenter name the pictures and ask the participant to repeat the word, the participant will be asked to say the word without the target syllable. Half of the words are used for initial syllable deletion and half for final syllable deletion.

Phoneme deletion. This task included 16 picturable words. There are 4 words in each word-category includes monosyllabic words. After, children name each item; or alternatively after the experimenter name the pictures and ask the participant to repeat the word, the participant will be asked to say the word without the target phoneme. Half of the words are used for the initial phoneme deletion and half for the final phoneme deletion.

Literacy tasks

Letter-name knowledge. children will be presented with cards displaying 25 Arabic letters and will be asked to say out loud the name of each letter. The letters will be presented in their basic non-ligatured form to avoid orthographic difficulties. The number of correctly named letters will comprise the score on this task.

Letter-sound knowledge. children will be presented with cards displaying the same 25 Arabic letters of the previous task but organized differently. The number of correctly named letter-sound correspondences will comprise the score on this task.

Word decoding. Children will be asked to read aloud a list of 6 simple CVC monosyllabic words that are identical in SpA and StA and are high in frequency and familiar to all children.

Invented Spelling. Children will be asked to write 6 simple CVC monosyllabic words, that are identical in SpA and StA and are high in frequency and familiar to all children.

Cognitive Control measures

Rapid serial naming **RAN** (objects and shape). This task was adapted from (Denckla & Rudel, 1974). The serial naming of shapes contained five shapes ("مربع"‘square’, "دائرة"‘circle’, "مثلث" ‘triangle’, "مســتطيل"‘rectangle’, "نجمة"‘star”). And the serial naming of objects contained five pictures ("جرس"‘bell’, "شـمعة" ‘candle’, "أَرنت"‘rabbit’, "كرسـي"‘chair’, "مفتاح"‘key’), the words are identical in both SpA and StA and are all equal in length (disyllabic words). In both subtest there is a total of 50 items arranged in ten rows of five. Children will be asked to name the items as quickly as possible. The score on this task is the total number of correctly named pictures per minute.

Lexical retrieval fluency. This task is divided into two subtests; the *semantic fluency* task includes 3 semantic categories (animals, food, and clothing), and the *phonemic fluency* task includes 4 letters; 3 letters map phonemes that are identical in both StA and SpA (/m/[مْ], /b/[بْ] and /sh/[شْ]), and one letter maps onto a StA phoneme (/q/[قْ]). Participants will be given 1 min to produce as many words as possible within a semantic category or starting with the target given letter sound. The score of each subtest is the number of correct words in the first 15 seconds, the last 45 seconds, and per minute.

Non-verbal IQ test. The Raven's Progressive Matrices (RPM) will be used to measure non-verbal IQ (Raven, 1936). The task consists of 60 multiple choice questions, listed in order of difficulty. In each test item, the participant will be asked to identify the missing element that completes a pattern.

Verbal memory

The digit span task (DS). The WISC subtest Digit Span will be used to measure verbal memory. The forward-digit-span is used to test short-term memory. The backward-digit-span is used to measure working memory. Memory is measured by the number of correctly reproduced series of digits.

Non-word repetition. The nonword repetition task was adapted from Saiegh-Haddad & Ghawi-Dakwar (2017). Children will be asked to repeat 24 pseudo words adhering to StA phonology, varying in length and syllabic structure. This task includes a score for the novel words, a score for the non-novel words, and a score for the total number of words.

Procedure

Participants will be tested on different sets of tasks in three separate sessions. In the first session the verbal memory tasks (the digit-span and nonword repetition task), and the cognitive control measures (the RAN, lexical retrieval fluency and non-verbal IQ) will be administered. Children with IQ below the average will be excluded. The PR tasks and PA tasks will be administered on the second session. During the third session, the four literacy skills tasks will be administered.

Data analysis

Summary statistics will be used to compute means and standard deviations on the different tasks. Correlational analysis will be used to study the association between PR and PA. Repeated measure Analysis of Variance will be used to probe differences in PR and PA between the different categories of words (identical, cognate, unique).

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