

# Consonant Profile of Arabic-Speaking School-Age Children in Jordan

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## Key Words

Consonant profile · Arabic phonology · Language acquisition · Diglossia · Literacy · Articulation · Jordan

## Abstract

The paper provides a detailed consonant profile of 100 Jordanian children at the onset of formal schooling. The data were elicited through a modified version of Amayreh's (1994) articulation test. The findings showed that all consonants of Jordanian Spoken Arabic were acquired. The six consonants that were not acquired in Standard Arabic have dialectal forms. The accuracy rates of these consonants were discussed in the light of frequency of occurrence of consonants and diglossia. The study recommended an earlier targeting of consonants that have dialectal variants. It also suggested that knowledge of the diglossic nature of Arabic is important for literacy development as well as for diagnosis and treatment of articulation problems. Copyright © 2007 S. Karger AG, Basel

## Introduction

This paper reports on the findings of a large-scale study that aims at determining the consonant profile of Arabic-speaking first graders in Jordan. It also addresses the po-

tential role of variables such as frequency of occurrence of consonants and diglossia in the shaping of this profile.

Current research revealed that children's phonological problems may have a great impact on their progress in many areas [1]. For instance, Lewis and Freebairn [2] found that the performance of a group of adults who had a history of phonological problems was worse than the performance of normal controls on reading and spelling tasks. Moreover, the study of phonological development in children in diglossic situations, as is the case in Arabic, may shed light on the impact of diglossia on literacy and language achievement in formal schooling. Alrabaa [3, p. 76] reported that Arabic-speaking secondary school students (aged 17–18 years) '... were not anywhere near full proficiency in the literate language ...'<sup>1</sup> In this context, it is believed that determining the consonant profile of normally developing children at the onset of formal schooling is especially important for educators in their attempts to alleviate the potential negative impact of diglossia on the development of reading and writing skills in further school years.

The diglossic nature of Arabic has received considerable attention in the literature [4–8]. Ferguson [4] suggested that Arabic has two main varieties: High, which is

<sup>1</sup> An anonymous reviewer suggested that low literacy in a diglossic context might be ascribed to insufficient literacy lessons.

very prestigious, particularly among many educated speakers, and Low, which has no official status, and that the two forms are in complementary distribution with each other in terms of situational usage.<sup>2</sup>

The High variety is primarily used in official contexts and literary discourse, whereas the Low variety is the medium of informal and everyday conversations. The High variety is often used to refer to Classical Arabic, which was first systematically codified in the 8th century. The current version of Classical Arabic is known as Modern Standard Arabic (MSA). However, within MSA a spoken subvariety known as Educated Spoken Arabic (ESA) has emerged among educated communities. Both MSA and ESA are often pronounced with regional or local accents. But unlike MSA, ESA is mainly characterized by the frequent deletion of case markers [9] in addition to the occasional unmonitored use of some dialectal phonological variants. Preschool children may encounter MSA and ESA while watching some TV programs or when interacting with their kindergarten teachers in some religious and Arabic language activities. They may also be exposed to these varieties when in the vicinity of adults, mainly educated parents and their friends and colleagues, using either variety in a situation that motivates them to do so. The extent to which a preschool child will benefit from such sporadic exposure to these language varieties remains to be explored. Because MSA and ESA have the same consonant inventory, the term Standard Arabic (SA) will be used when reference is made to either version unless the context requires specification.

The Low variety is associated with the dialects spoken in the various Arab countries. The variety of interest in the present study is Jordanian Spoken Arabic (JSA), particularly dialects spoken in Amman, the capital of Jordan. It is the variety that Jordanian children acquire before schooling and that Jordanians normally use for everyday oral communication. From a demographic perspective, JSA embraces three main dialects, urban, rural, and Bedouin, which are mutually intelligible. Variation within each main dialect is also present. These dialects, particularly the first two, continue to present themselves to varying degrees in Amman. However, it is worth noting that women in Amman tend to show much more preference than men for the urban dialect [10, p. 324].

SA includes 28 consonants: 8 stops, 13 fricatives, 1 affricate, 2 nasals, 1 lateral, 1 trill, and 2 glides. Five conso-

nants, namely, /d/, /t/, /s/, /ð/ and /q/ are emphatic, accompanied by a secondary articulation in which the root of the tongue is pulled towards the pharynx [11]. Except for /q/, the emphatic consonants have nonemphatic cognates. An underline was used with the IPA symbols to indicate emphasis.

The number of consonants in JSA varies slightly from one dialect to another. For instance, there are 24 in the urban (madani) dialect and 26 in the rural (fallahi). Both SA and JSA have 22 consonants in common. The remaining 6 consonants in SA, namely /d̥/, /q/, /θ/, /ð/, /ð̥/ /d̥ʒ/ have dialectal variants in JSA (table 3). Moreover, the researchers wish to observe that an increasing number of female speakers of certain dialects, social class aside, tend to de-emphasize completely or partially 3 emphatic consonants, viz. /t/, /s/, and /d/.

Research on the acquisition of the phonology of Arabic is still in its infancy [12–18]. Amayreh and Dyson [14] conducted a study on Jordanian children aged 2;0–6;4 from Amman and near Amman to find the age at which each of the consonants of Arabic is acquired. The data were given by nine different age groups, each comprising 20 children. The following 12 consonants were reported not to be acquired by the oldest age group (6;0–6;4): /ʔ/, /ð/, /θ/, /z/, /ʕ/, /d̥ʒ/, /j/, /t/, /d̥/, /s/, /ð̥/, and /q/. With the exception of /t/, /s/, /z/, /j/ and /ʕ/, all of these late consonants have dialectal forms that are commonly used in JSA. Amayreh and Dyson [14] did not consider the potential role of frequency of occurrence of consonants and diglossia in the acquisition process. In fact the first study on the frequency of consonants in ESA [9] appeared in 1999, one year after the publication of Amayreh and Dyson's [14] study. In a recent study on the acquisition of 'late consonants' by Jordanian children aged 6;6–8;4, Amayreh [17] concluded that SA consonants would be eventually acquired by approximately 8;6–9;0 years.

During the first year in school the Jordanian child is required to learn the SA phoneme sounds and the written symbols (i.e. letters) associated with them. Thus, an early identification of consonants, whether in SA or JSA, that are not usually acquired by school age may motivate educators and teachers to devise plans to speed up the acquisition of these consonants through conscious and explicit teaching. This may also provide speech-language pathologists with relevant information for diagnosis and intervention decisions.

The purpose of the study reported here is to determine the Arabic consonant profile of children in Amman as they enter formal schooling. Specifically, the study seeks answers to the following questions:

<sup>2</sup> The use of the labels 'High' and 'Low' initiated by Ferguson [4] does not necessarily reflect the authors' appreciation of these terms. However, reexamining them goes beyond the scope of this paper.

(1) Which consonants are produced correctly by Jordanian children at the onset of formal schooling? The answer to this question will be used to verify the findings of Amayreh and Dyson [14], which were based on data collected from a similar but smaller group, i.e. 20 children aged 6;0–6;4.

(2) What are the potential variables that determine the production accuracy rate of a certain consonant? In particular, the following variables will be investigated: frequency of occurrence of consonants and diglossia.

## Methods

### *Subjects*

One hundred normally developing first-grade children (50 boys and 50 girls) from middle-class families, with a mean age of 6;4, were randomly selected from two schools in Amman. All the children were informally screened for their language ability and orofacial mechanism. They also passed a 25-dB pure-tone hearing screening test conducted by one of the authors who is a speech-language pathologist, using a portable audiometer. Any child who did not pass the pure-tone hearing screening test or showed an obvious speech or language problem during the test was excluded from the study. Prior to data collection, the dominant dialect for each subject was identified on the basis of a short conversation with one of the researchers. About 60% of the subjects showed a preference for the urban dialect and 40% for the rural. In terms of gender, 80% of the female subjects had a dominant urban dialect and 20% a rural one. Within the male subjects, the percentages for the urban and rural dialects were 40 and 60%, respectively.

### *Data Collection*

The data were elicited 1 month after the subjects' enrollment in school using a modified version of Amayreh's [13] articulation test. The modified test consisted of 65 picture words that allow for the production of SA consonants or their dialectal forms in initial, medial and final positions, with the exception of /ð/, which was represented initially and medially only. Colored pictures and toy objects were used to elicit the data from each subject (see 'Appendix'). Each consonant was tested at least once in each possible word position.

Each child was tested and audiotaped individually in his or her school. The child was shown the pictures or the objects and asked to name them. Children were not cued to produce the target words using any particular form of Arabic. In fact, children at this age are not fully aware of what the terms standard and spoken mean. If the child was unable to name a picture spontaneously, he/she was given cues to help identify it. If the child did not produce the standard form spontaneously (if the SA form were different from the spoken one, e.g., [naḏḏa:ra] for /naḏḏa:ra/ 'glasses'), delayed imitation was applied to get it. This was adopted to exclude the possibility that the produced form was a misarticulation rather than a dialectal preference. The total number of correct production of these consonants was counted twice, with and without delayed imitation.

The audiotaped material was narrowly transcribed independently on a prepared form by 2 experienced listeners, viz., the au-

thors, using the consensus procedure outlined by Shriberg et al. [18]. The 2 transcribers were native speakers of JSA; they were also proficient in MSA. After transcription of each target word, the two versions were compared. Transcriptions on which there was agreement were entered into the Logical International Phonetic Programs (LIPP) developed by Oller and Delgado [19], and adapted for Arabic by Amayreh and Dyson [14]. In case of disagreement, the word was replayed up to 3 times. Most disagreements were resolved the first or second time the word was replayed. To examine transcription reliability, 20% of the samples (10 males and 10 females) were selected from the independently transcribed versions, before applying the consensus procedure, and entered into the LIPP. Transcription agreement between the 2 transcribers was 0.968. The percentage of correct productions of a consonant (by all subjects) was calculated by dividing the total number of correct productions in all positions tested by the number of tokens in the test. For example, the total number of correct productions of the /f/ sound was 1,188 out of 1,200. Therefore, the accuracy percentage of this sound was 99%. Before concluding this section, it is worth noting that the produced sound was considered correct if it matched the adult form as pronounced in SA or in JSA.

## Results and Discussion

Before proceeding with the analysis, it is useful to provide a brief definition of the terms that will be used in the course of data presentation and discussion. The count of SA spontaneous productions was maintained when the subjects responded naturally to the stimulus prompts using the targeted SA form. Delayed imitation was applied only when the subjects used a dialectal variant of an SA form. When delayed imitation failed, i.e. when the child insisted on producing a dialectal variant, the dialectal form was recorded and counted separately. For instance, when the subjects were cued to produce the SA /d/ spontaneously, 49% of their attempts were accurate; 32% were dialectal variants. When delayed imitation was applied, the production of dialectal forms was reduced by 9%; the remaining 23% continued to reflect a dialectal preference (table 1). Acceptable productions were counted twice, once to consider the percentage of correctly produced SA forms and once to consider the percentage of correctly produced dialectal variants. Dialectal forms include both established and emerging forms. The former refer to those forms recognized by the JSA-speaking community as a whole whereas the latter refer to those transitional segments used by a sizable number of JSA speakers, particularly women. Table 1 provides a complete profile of the percentages of consonant productions by all subjects.

A look at the spontaneous productions of SA consonants shows that 22 consonants were produced correctly at least 90% of the times they were attempted. The per-

**Table 1.** Profile of the percentages of consonant production in SA and JSA by all subjects

Consonant	Standard forms			Acceptable production dialectal forms		Standard and established JSA	Error
	spontaneous production	delayed imitation	total	established	emerging <sup>2</sup>		
/b/	100	NA	100	SAS	–	100	–
/d/	99	NA	99	SAS	–	99	–
/t/	100	NA	100	SAS	–	100	–
/d̥/ <sup>1</sup>	49	9	58	23	15	81	4
/t̥/	95	NA	95	SAS	5	95	–
/k/	100	NA	100	SAS	–	100	–
/q/ <sup>1</sup>	58	25	83	16	–	99	1
/ʔ/	100	NA	100	SAS	–	100	–
/f/	99	NA	99	SAS	–	99	1
/ð/ <sup>1</sup>	60	19	79	18	–	97	3
/θ/ <sup>1</sup>	55	21	76	23	–	99	1
/ð̥/ <sup>1</sup>	43	29	72	27	–	99	1
/s/	93	NA	93	SAS	6	93	1
/z/	98	NA	98	SAS	–	98	2
/s̥/	99	NA	99	SAS	–	99	1
/ʃ/	98	NA	98	SAS	–	98	2
/ʁ/	90	NA	90	10	–	100	–
/χ/	100	NA	100	SAS	–	100	–
/ʀ/	100	NA	100	SAS	–	100	–
/h/	100	NA	100	SAS	–	100	–
/h̥/	100	NA	100	SAS	–	100	–
/d̥ʒ/ <sup>1</sup>	45	25	70	25	–	95	5
/m/	100	NA	100	SAS	–	100	–
/n/	100	NA	100	SAS	–	100	–
/l/	100	NA	100	SAS	–	100	–
/r/	99	NA	99	SAS	–	99	1
/j/	100	NA	100	SAS	–	100	–
/w/	100	NA	100	SAS	–	100	–

NA = Not applicable; SAS = same as the standard form.

<sup>1</sup> This consonant has one or more dialectal variants in JSA.

<sup>2</sup> The following emerging forms are attested in the data: /d̥/ → [d]; /t̥/ → [t]; /ð̥/ → [d]; /s̥/ → [s].

**Table 2.** Spontaneous production of SA consonants (%) that have not met the acquisition criterion

Target consonant	Phonetic environment			Average
	I	M	F	
/d̥/	44	56	48	49
/q/	70	56	48	58
/ð̥/	70	50	–*	60
/θ̥/	50	66	50	55
/ð̥̥/	46	46	38	43
/d̥ʒ/	40	40	54	45

I = Initial; M = medial; F = final.

\* This consonant was not targeted in this position.

centage of accuracy of the remaining 6 consonants, viz. /d̥/, /q/, /ð̥/, /θ̥/, /ð̥̥/ and /d̥ʒ/, ranged from 43 to 60%. When delayed imitation was applied to elicit these consonants that have dialectal variants, the percentage of accuracy increased, ranging between 58% for /d̥/ and 83% for /q/. This increase in accuracy rate may suggest that the child's use of a dialectal variant in spontaneous production was a matter of preference rather than production difficulty. However, some children who did not benefit from delayed imitation and insisted on producing the dialectal variant might have had articulation problems. For instance, a child who speaks a rural dialect that has /θ̥/ as in /θ̥alla:dʒa/ 'refrigerator' and cannot produce it correctly may insist on substituting [t], the

urban variant, for /θ/ to hide as a result of his/her articulation problem.

Following Amayreh and Dyson [14], the average percentage of correct productions was used to determine the age of acquisition of consonants. According to their formula, the age of acquisition of a consonant is set within an age group if at least 75% of their total productions of this consonant are correct in each of the positions tested. On applying this formula to the spontaneous production of SA consonants, we found that the following 22 consonants were acquired: /b/, /d/, /t/, /t̪/, /k/, /ʔ/, /f/, /s/, /z/, /s/, /ʃ/, /χ/, /ʁ/, /ʕ/, /ħ/, /h/, /m/, /n/, /l/, /r/, /j/, /w/. The acquisition criterion for the remaining 6 consonants was not met in at least one of the targeted positions. Table 2 provides a list of the correct percentages of these 6 consonants in each position tested.

A comparison of the findings of this study and those of Amayreh and Dyson [14] shows some similarities and some differences. In particular, the two studies did not list /d̪/, /q/, /θ/, /ð/, /ð̪/ and /d̪z/ among the acquired consonants. This seems natural as these consonants have dialectal variants coupled with the fact that the subjects who belonged to different dialects gave the data mainly through spontaneous responses to stimulus pictures. Although Amayreh and Dyson [14, p. 647] posited that these consonants would be acquired after age 6;4, we are inclined to claim that the accuracy rates of the standard forms of these consonants are not sufficient per se to determine their age of acquisition. In reality, the rates in this case do not reflect production problems inasmuch as they mirror a diglossic acquisition context in which many preschool children who are asked to name the stimulus pictures tend to naturally favor dialects spoken in the family.

A glance at the percentages of acceptable productions in table 1 shows that JSA consonants did not pose difficulty for the subjects. This seems to be in harmony with the general acquisition scene in other languages. For instance, the consonants in Cantonese and German are reported to be acquired by the age of 5 [20, 21].

Because the subjects did not encounter any serious difficulty in producing acceptable forms, one may wish to focus on the subjects' low performance on the 6 SA consonants that have dialectal variants. What is interesting to observe at this stage is that production difficulty in SA is not associated with a particular place or manner of articulation. Because Jordanian preschool children have sporadic exposure to SA, one may argue that the low accuracy rates for these consonants can be attributed to their low frequency of occurrence in this variety. This may imply that accuracy rate correlates with frequency of

occurrence. However, close examination of the data in table 1 reveals that such a proposal falls short of fully explaining why the subjects found these consonants more difficult than others.

In the study by Amayreh et al. [9] on the frequency of occurrence of consonants in ESA, one finds that, within the 28 Arabic consonants, the rank order of the 6 consonants under investigation was as follows: /q/ (16), /d̪z/ (19), /ð/ (23), /θ/ (24), /d̪/ (25) and /ð̪/ (27). On the face of it, this seems to support the claim that there is a correlation between frequency of occurrence and accuracy rate. However, counterevidence can be provided. For instance, /t̪/, /s/, /χ/, /z/ and /ʁ/ are among the least frequent consonants; they ranked 20, 21, 22, 26, and 28, respectively, but their accuracy rates ranged between 90 and 100%. Obviously, a complete match between frequency of occurrence of ESA consonants and accuracy rate cannot be established. Moreover, it may turn out that the frequency of consonants in adult speech and child-directed speech are quite different. For instance, Amayreh and Dyson [14] attributed the high accuracy rate of /χ/, which has a low frequency rate in adult ESA, to its frequent use in words said to young children. To validate this, further research is needed.

While Amayreh and Dyson [14] suggested that 12 consonants were not acquired by school age, the study reported here indicated that the number was 6. In particular, /t̪/, /ʔ/, /j/, /z/, /s/, and /ʕ/, which were not acquired by age 6;4 in Amayreh and Dyson [14], appeared in the set of acquired consonants in the study reported here. The absence of /ʔ/ and /j/ from the set of Amayreh and Dyson [14] might have been due to their use of some picture words that do not naturally motivate the use of the standard forms. For instance, they targeted /ʔ/ medially using the picture word /ruʔu:s/ 'heads', which '... was typically replaced by the acceptable variant [ru:s], especially by older children who named the picture spontaneously' (p. 646). The /ʔ/ does not constitute a problem in initial position as it has one form in the standard variety and the dialects. In the present study, /ʔ/ was targeted medially and finally in /qirɑ:ʔa/ 'reading' and /laʔ/ 'no', respectively, which would normally motivate the use of the standard forms.

The fact that /t̪/, /z/, /s/ and /ʕ/ did not appear in Amayreh and Dyson's [14] list of acquired consonants by older children (6;0–6;4) does not seem to lend itself to a straightforward interpretation. The only explanation they offered was their assumption that the acquisition of the emphatics and some of the infrequently used standard consonants would be possible after age 6;4 [14,

**Table 3.** A profile of 6 SA consonants and their most frequent dialectal forms in Amman

SA consonant	Dialectal forms		Remarks based on the authors' observations and intuitions as native speakers of JSA
/d/ as in <i>daraba</i> 'hit'	[ð] ðarab [d] darab	R U	there is an emerging tendency among some young and middle-aged female speakers who use the urban dialect to de-emphasize /d/
/ð/ as in <i>ðanab</i> 'tail'	[ð] ðanab [d] danab	R U	speakers of urban JSA may produce /ð/ as [z] in certain phonetic environments, e.g. [zanb] 'sin'
/ð/ as in <i>naððā:ra</i> 'glasses'	[ð] naððā:ra [d] naddā:ra	R U	speakers of urban JSA may produce /ð/ as [z] in certain phonetic environments, e.g. [zulum] 'oppression.'
/q/ as in <i>qalam</i> 'pen'	[g] galam [k] kalam [ʔ] ʔalam	R R U	speakers of all dialects tend to produce /q/ correctly in certain religious or educated words, e.g. [qurʔā:n] 'Holy Quran' and [qā:hira] 'Cairo'
/θ/ as in <i>θaflab</i> 'fox'	[θ] θaflab [t] taflab	R U	speakers of urban JSA may produce /θ/ as [s] in certain phonetic environments, e.g. [sawra] 'revolution'
/ḍʒ/ as in <i>dʒamal</i>	[ḍʒ] dʒamal [ʒ] ʒamal	R U	there is a growing tendency among young and middle-aged female speakers, regardless of dialect, to replace /ḍʒ/ by [ʒ]

R = Rural; U = urban.

p. 649]. In the absence of explicit explanation by Amayreh and Dyson [14] for the exclusion of these consonants from the list of acquired ones, the best we can offer is to appeal to differences in sample size [i.e. 100 in this study and 20 in ref. 14]. In this regard, we wish to claim that our sample may be more representative of the acquisition status of this age group. Native speaker versus nonnative speaker perception of consonants is another potential variable that may account for the difference in connection with the 3 unique Arabic consonants /t/, /s/ and /ʔ/. In Amayreh and Dyson [14], a native speaker of JSA, who is also proficient in SA, and a native speaker of English, who does not speak Arabic, transcribed and analyzed the data. In the study reported here, the researchers who transcribed and analyzed the data were native speakers of JSA, who were also proficient in SA.

Now we look into the potential relationship between diglossia and level of accuracy. Recall that the urban dialect was used by 60% of the subjects, the majority of whom were females (see 'Methods' section). Table 3 provides a profile of the least accurately produced SA consonants and their dialectal variants in Amman.

It shows that some of the SA consonants exist in one dialect but not in the other. For instance, although /ð/, /ð̣/, /θ/ and /ḍʒ/ are shared by both SA and rural JSA, only /d/ shows up in the urban dialect. However, both /ð̣/ and /d/ are distributed differently in the dialects. Both /ð̣/ and

/d/ in SA merge into [ð] in the rural dialect, but they merge into [d] in the urban one. The only SA consonant that is not shared by either dialect is /q/. Moreover, 2 consonants in the dialects, namely /ʒ/ and /g/, do not exist in SA.

In light of the foregoing, one might suggest that accuracy rates for these 6 consonants may be influenced by their presence or absence in the dialect spoken by each group of children. For instance, children who speak the rural dialect are more likely to encounter difficulty in producing /q/ and /d/ only. In contrast, children who use the urban dialect are more likely to encounter difficulty in producing /q/, /ð/, /ð̣/, /θ/ and /ḍʒ/. Moreover, the subjects' performance may be influenced by the variable distribution of some consonants in both SA and the dialects. In particular, children who use one sound in their dialect to represent two sounds in SA have to learn the contexts in which they have to keep this sound and the contexts in which they have to shift to the SA form. For instance, at the onset of schooling, a child who uses the rural dialect has to learn when to keep /ð̣/ as in /naððā:ra/ 'glasses', but to replace it with /d/ as in /bajda/ 'egg'. In contrast, a child who uses the urban dialect has to learn when to keep /ʔ/, /d/, /d/ and /t/ and when to replace them with /q/, /ð/, /ð̣/ and /θ/, respectively. In addition, children who tend to use /t/, /d/ and /s/ for /t/, /d/ and /s/ have to learn when to abandon de-emphasis.

An examination of the data presented in table 1 shows that the lowest accuracy rates were for SA consonants that have established or emerging dialectal forms. However, if the profile of these consonants is taken into consideration (table 3), one observes that these accuracy rates do not reflect reality. They simply echoed the performance of the subjects as if they had a homogeneous dialectal background. In reality, the subjects belonged to two main JSA dialects, viz., rural and urban, which do not have identical phonetic inventories. For instance, the spontaneous production accuracy rate for /d/ was 49%. Apparently, this rather low percentage may lead to a misleading conclusion (i.e. this consonant is acquired late). A similar low score on /d/ and the other 5 consonants motivated Amayreh and Dyson [14] to conclude that they were not acquired by age 6;4. However, the diglossic profile shows that /d/ is shared by both SA and urban JSA. This suggests that this sound is not difficult to produce for children who belong to the urban dialect. In light of this, the seemingly 'low' percentage for the whole group of subjects in this regard is mainly attributed to the inclusion of the performance of children who speak the rural dialect. When a tentative recount of correct production was made on the basis of data elicited from the children who were thought to have urban dialect (n = 60), the accuracy rate was 78%. Of course, this should not imply that the accurate production of this consonant was solely made by the urban JSA-speaking children. A small percentage of correct production was made by the rural JSA-speaking children who benefited from sporadic exposure to SA.

Along the same lines, it may be argued that the low rates of accuracy for /ð/, /ð/, /θ/ and /d̤/ (43, 60, 55, 45%, respectively) were mainly ascribed to the inclusion of the performance of the urban JSA-speaking children in the count (table 3). Presumably, the percentage of accuracy would have been higher if the performance of those children had been excluded. Once again, the correct production of these consonants was mainly made by rural JSA-speaking children, who naturally have these sounds in their dialect. However, in order to establish correlation between the use of a particular dialect, e.g. rural, and correct production of SA consonants shared by that dialect, further research is needed.

The low accuracy percentage of spontaneous production for /q/ (58%) merits a special treatment as it poses equal difficulty for all subjects. In fact, this sound does not exist either in the urban or in the rural dialects spoken in Amman. Consequently, one would expect a much lower spontaneous production accuracy rate. One plausible explanation to this unexpected percentage resides in

the nature of the stimulus pictures used to elicit this sound. In effect, three out of six of the stimulus pictures that targeted /q/ naturally motivated the production of the SA form; these words were /qurʔa:n/ 'Holy Quran', /qira:ʔa/ 'reading' and /qita:r/ 'train'. Moreover, the use of these words before the other three in the test might have motivated some subjects to generalize the use of /q/ to the other words.

So far, the data were not examined in terms of gender. Two decades ago, Abd-el-Jawad [10, p. 324] reported that women in Jordan '... produce the urban linguistic variants much more often than men ...'. The data of the study reported here provided evidence that Abd-el-Jawad's [10] remark is still a fact of life in Amman. Not only do women now show a massive preference for urban JSA, but they also instill this 'prestige', sometimes consciously, in the younger female generation. Table 4 shows gender distribution of replacements of consonants that have dialectal or emerging variants. A glance at the table shows that the majority of the urban replacements were made by female children. For instance, on the basis of spontaneous production of SA, /q/ was replaced by [ʔ] 130 of the times, 69% of which were made by girls. The same tendency was evident in the replacements of /θ/, /ð/, /ð/ and /d̤/.

Abd-el-Jawad [10, pp. 357–358] maintained that a complete change towards the standard forms in Amman could not be predicted as women, half the speech community, were not moving in the direction of the standard variety as much as men. Another manifestation of Ammani women's moving away from standardization compared with men, we claim, is evident in an emerging tendency, particularly among the young and middle-aged generations, to de-emphasize the emphatic consonants. Closer examination of the data presented in table 4 implies that this tendency is transferred to the female children, who are unlikely to abandon it as they grow into young and adult women. For instance, /d/ was replaced by [d] 75 times, 61% of which were made by girls. Further, /t/ was replaced by [t] 30 times. In view of the foregoing, it may be suggested that child language, as early as school-age, could provide reasonable indicators of both established and emerging linguistic variations. To validate this, further research is needed.

### Implications and Recommendations

Before concluding this paper, the researchers wish to share with the specialist and interested reader the following implications and recommendations.

**Table 4.** Gender distribution of replacements of consonants with dialectal or emerging variants

Target consonant and replacement	Attempts and replacements, total n		Replacements in terms of gender			
	attempts	replacements	M		F	
			n	%	n	%
/q/ → [ʔ]	600	130	40	31	90	69
/θ/ → [t]	300	132	42	32	90	68
/ð/ → [d]	200	73	25	34	48	66
/ð̤/ → [d̤]	400	161	40	25	121	75
/d̤ʒ/ → [ʒ]	600	300	100	33	200	67
/d̤/ → [d]	500	75	29	39	46	61
/t̤/ → [t]	600	30	7	23	23	77
/s/ → [s]	500	30	5	15	25	85

#### *Accuracy Rate, Elicitation Technique and Age of Acquisition*

In diglossic contexts, it is not always plausible to determine the age of acquisition of consonants on the basis of accuracy rates of spontaneous production of the standard forms elicited through picture or object-naming tests. We claim that the result will not be very much different even if data are collected from adults belonging to different dialects unless they are instructed or cued to use the fuṣḥa ‘standard’ forms. If this line of argumentation is correct, then a preschool child who spontaneously names a picture targeting a standard consonant that has a dialectal variant, and fails to produce it correctly, may not be reflecting his/her real acquisition competence of the standard form. The child’s use of a dialectal variant here may turn out to be a matter of preference rather than production difficulty. In this context, it may be argued that delayed imitation may prove to be a useful technique to elicit the standard forms of these consonants.

In early school years, speech clinicians interacting with Arabic-speaking children may wish to include oral reading samples (at least at word level in grade 1) in the process of evaluating and diagnosing children who have potential articulation problems. If the production of the dialectal variants persists in the reading of a certain child, the clinician may decide to evaluate him/her further to determine if articulation treatment is needed.

#### *Exposure to SA Forms*

The findings of this study indicated that some children benefited, though not greatly, from their sporadic exposure to SA forms prior to formal schooling. This was evident in the relatively high percentage of accuracy (58%) for the spontaneous production of /q/, which does not exist in any of the dialects spoken by the subjects. Further

supporting evidence came from some urban JSA-speaking children who produced /ð̤/, /ð̤/, /θ/ and /d̤ʒ/ correctly despite the fact that these sounds do not typically exist in their dialect. Similarly, some rural JSA-speaking children were able to produce /d̤/ correctly although it does not typically exist in their dialect. Therefore, one may suggest that maximizing kindergarten children’s exposure to SA forms might have a positive impact on the development of their literacy skills at school. This can be achieved through relevant activities such as songs, rhymes, Quranic verses and story-telling or through child-directed TV programs that use SA. This may also speed up their subsequent acquisition of literacy skills. Moreover, exposure to SA forms at school would be maximized by primary school teachers if they consciously used SA in class.

#### *Consonant Achievement and Textbook Material*

First graders in Jordan are introduced to SA mainly through a textbook titled *Our Arabic Language* [22]. The authors reported in the Teacher’s Book that they sequenced the treatment of sounds in the syllabus (and the letters representing them) according to their frequency, ease of articulation and functional need in reading lessons and exercises [23, pp. 19–20]. They added that these criteria were determined on the basis of the authors’ expertise and in response to feedback from supervisors and teachers of the first grade.

Careful examination of the various units of *Our Arabic Language* shows that the following 9 consonants were systematically introduced and drilled in the fourth quarter of the book: /t̤/, /q/, /k/, /ħ/, /h/, /ʁ/, /ð̤/, /θ/ and /d̤/. Put another way, first graders were scheduled to start learning about these consonants in the last 2 or 3 months of the school year [23, pp. 26–27]. Three points should be made here. First, 5 of these consonants, viz., /t̤/, /k/, /ħ/, /



/h/ and /ħ/, do not have dialectal variants. Second, though the authors of the book did not cite any research source as a base for the ordering of sounds, these 9 consonants were among the least frequent 14 in Amayreh et al. [9]. However, the findings of our study indicated that a complete match between frequency of occurrence and ease of articulation cannot be established. Third, it seems that the authors' decision to delay the systematic teaching of these sounds to the fourth quarter of the year is based on the false assumption that first graders in Jordan have a homogeneous phonetic inventory, and thus they will find these consonants equally difficult. In reality, first graders consist of subgroups, each speaking a different dialect. However, all the subjects have a core set of consonants that do not have variants. Such a set includes /t/, /k/, /h/, /h/ and /ħ/, among others, which explains why the subjects of the study found them easy to produce (table 1). Moreover, a subgroup of first graders who have /ð/ in their dialect (but not /d/) will find this consonant easier to produce compared with another subgroup who have /d/ in their dialect and thus tend to substitute it for the standard /ð/.

In view of the foregoing, textbook writers and teachers of first grade alike may wish to reconsider their decision or actual practice to delay the systematic presentation and drilling of standard consonants that have dialectal variants. Addressing the element of linguistic difference in first graders at an earlier stage, say during the first 2–3 months of the first year, may turn out to be useful for significant achievement in reading. Such a task should include, inter alia, careful preparation/selection and presentation of listening and prereading oral activities that subconsciously motivate children to perceive and produce correctly those standard forms that have dialectal variants. These activities may include poems, rhymes, songs, short stories and Quranic suras (chapters).

## Conclusion

The study reported here was meant to determine the consonant profile of school-age children in Amman, Jordan. The findings of the study showed that all consonants of JSA were acquired by the subjects. The 6 consonants that were not acquired in SA have one thing in common: they have dialectal forms. The low accuracy rates of these consonants were discussed in the light of two variables, viz., frequency of occurrence of consonants in ESA and diglossia. It was argued that a complete match between frequency of occurrence and accuracy rates cannot be established. The examination of the diglossic situation in Amman provided a more feasible interpretation. In fact, the subjects who belonged to two JSA dialects did not find these consonants equally difficult. For instance, the urban JSA-speaking children found the /ð/, /ð/, /θ/ and /d̤/ more difficult than the rural JSA-speaking group.

The findings of the study suggested that delayed imitation and oral reading could be used as useful techniques for eliciting standard forms in diglossic contexts. They also suggested that knowledge of the diglossic nature of Arabic is essential for speech-language pathologists to differentiate between misarticulations and dialectal variants. Maximizing exposure to SA forms during the preschool stage may play a positive role in unifying the consonant inventory of children at the onset of formal schooling. Finally, the study recommended that targeting consonants that have dialectal variants at an earlier stage may turn out to be useful in creating an SA base in first graders as well as in promoting their ability to acquire reading and writing skills.

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## Appendix

A modified version of Amayreh's [13] articulation test.

Cons	Target	Target	Target	Target	Target	
/b/	/bana:t/	girls	/ħabl/	rope	/dub/	bear
/t/	/talafo:n/	phone	/mifta:ħ/	key	***	
/t̤/	/ta:ʔira/	plane	/qit̤a:r/*	train	/mift̤/*	comb
/d/	***		/madrasa/	school	/walad/	boy
/d̤/	/d̤ifd̤af/	frog	/bajda/	egg	/ʔabjad/	white
/k/	/kursi/	chair	/samaka/	fish	/ʔubba:k/	window
/q/	/qurʔa:n/**	Quran	/baqara/	cow	/waraq/	paper
/ʔ/	/ʔasad/	lion	/qira:ʔa/*	reading	/laʔ/**	no
/m/	/mawz/	banana	***		/qalam/	pencil
/n/	/na:r/	fire	/ʔinab/	grapes	***	
/f/	/fi:l/	elephant	/safi:na/	ship	/ħaru:f/	lamb
/θ/	/θala:θ/*	three	/ʔiθna:n/*	two	***	
/ð/	/ðanab/	tail	/ʔuðun/*	ear	NT	
/ð̤/	/ð̤ahr/	back	/nað̤a:ra/	glasses	/ħa:fið̤/	(boy's name)
/s/	/sa:ʔa/	watch	***		/dʒaras/	bell
/s̤/	/s̤u:ra/	picture	/ħisa:n/	horse	/ba:s/	bus
/z/	/zara:fa/	giraffe	/ʔaza:l/	deer	/ʔa:z/	oven
/ʃ/	***		/fara:ʃa/	butterfly	/mifmif/*	apricot
/χ/	***		/ʔaχdar/	green	/batti:χ/	watermelon
/ʁ/	/ʔaza:l/	deer	/jaʁsil/	wash	/samʁ/	glue
/ħ/	***		/tuffa:ħa/	apple	***	
/ʕ/	***		***		/ʔiʕbaʃ/	finger
/h/	/hadijja/	gift	/zahra/	cauliflower	/wadʒh/	face
/d̤ʒ/	/d̤ʒamal/	camel	/findʒa:n/**	cup	/dadʒa:d̤ʒ/	hens
/l/	/lajmu:n/	lemon	/t̤a:wila/	table	***	
/r/	/ra:s/*	head	***		***	
/w/	***		/marwaha/	fan	/mi:w/**	mew
/j/	/jad/	hand	***		/ʃa:j/**	tea

NT = Sound not targeted in this position.

\* Replacements of items used in the original articulation test.

\*\* Words added to the original test.

\*\*\* Empty cells represent sounds that are targeted in other words in the test.