

WORKING PAPER

DEVELOPMENT OF A SPEECH PRODUCTION SCREENING TOOL IN TWO ARABIC DIALECTS FOR MULTILINGUAL CHILDREN IN THE NETHERLANDS

Mirjam Blumenthal, Barbara Giannuzzi, Liesbeth Holstvoogd,
Elianne de Ruiter, Petra Bos

Please do not cite or distribute without permission of the authors.

Abstract

Language and speech screening of multilingual children is a challenging task for speech language therapists (SLT) who do not speak the first language (L1) of these children, which is usually the case when it concerns minority children (McLeod & Verdon, 2014). Information about the child's development in the L1 is, however, crucial in these cases, and is usually gathered and interpreted together with an interpreter. Information about the typical language development in minority languages is sometimes hard to find, and so are reliable tests, which makes the screening even more challenging. This study is a description of part of a Dutch research project in which screening tools for phonological production in four minority languages and two Arabic dialects were developed for pre-school children in the Netherlands. The project involved Turkish, Polish, Rif Berber, Somali, and the Arabic dialects¹ Egyptian Arabic (EA) and Moroccan Arabic (MA). This article reports on the development of the tool in both Arabic dialects. The tool consists of 30-40 pictures that children have to name in their L1 and a scoring form that helps the SLT evaluate the phonological production of the child. All consonant phonemes of the two dialects are present in the words that belong to the pictures. The advice of native speakers of the different dialects (living in the Netherlands) and of expert linguists, was essential in this process.

¹ Sometimes these are called languages, or language varieties, sometimes dialects. There are no universally accepted criteria for distinguishing a language from a dialect. The difference is often a matter of degree rather than of kind. The dictionary of Linguistics defines dialect as a variety of a language used by people from a particular geographic area. (Source: https://www.nsf.gov/news/special_reports/linguistics/dialects.jsp).

1. Introduction

In the Netherlands young children with suspected delays in language development are referred to multidisciplinary diagnostic teams at an early age, preferably well before the age of four. In these teams, audiologists, psychologists, social workers, linguists and speech language therapists work together. The tasks of the team are to decide if an impairment is present, and if so, to establish the nature of the impairment and to give advice about the treatment and educational needs of the child. This multidisciplinary assessment consists of hearing tests, case history taking, a non-verbal psychological test, behaviour observation, and tests for language and speech development. Assessment of speech production is one of the tasks of the speech language therapist (SLT).

An increasing percentage of the children assessed by these multidisciplinary teams is multilingual. In some areas in the Netherlands (the large cities) this is between 50% and 80% of the caseload. Testing these children solely in their second language (L2; in this case Dutch) will not give the speech language therapist a reliable overview of the language and speech abilities of the child. Young children are often still dominant in the first language (L1), which makes it unreliable to test them in their L2. Especially if the child has a language impairment, he or she will not be very keen on performing language tasks, and certainly not in a language that is not his or her L1. For a fair assessment of the child's language and speech abilities, the speech therapist needs reliable data in both languages (International Expert Panel on Multilingual Children's Speech, 2012; Blumenthal et al., 2015).

Grosjean (1989:3) states that "the bilingual is not two monolinguals in one person" and therefore existing normed tools - based on the L2 of the child - cannot be used as a primary

source for diagnosis. The same applies to the child's performance in L1: the exposure to each of the languages of a bilingual child influences the rate of development, due to less exposure as compared to monolingual children. Being 'late' compared to monolingual children is thus not always equivalent to a serious developmental delay in bilingual children. Both languages need to be assessed (Salameh, Nettelbladt & Norlin, 2003). When it comes to assessing the first language, the task for the SLT is a very complex one (Williams & McLeod, 2012). The language development of these children is not comparable to the language development of their monolingual peers in the home country of their parents, so tests that are used by SLT's in those countries cannot be used either. As there are hardly any SLT's in the Netherlands who speak a minority language, the best practice at this moment is that SLT's work together with interpreters in assessing the language development in the minority language (Langdon & Cheng, 2002). Language sample analysis with an interpreter is difficult, expensive and time consuming, therefore the SLT's are in need of tools that are developed specifically for bilingual young children. Since there are many immigrant languages in the Netherlands, there is a need for these tools in a large number of minority languages.

Moroccan Arabic and Egyptian Arabic are two frequent home languages of the children who are assessed by multidisciplinary teams in the Netherlands, according to statistics of interpreter use in different languages (Blumenthal, 2012). There are no tools for the assessment of speech production development in Arabic dialects as a minority language, which makes it hard to assess the child's speech production skills in these languages. Early and adequate diagnosis of speech sound disorders (SSD) is essential to reach a good outcome in therapy.

The current study describes the objectives, method, obstacles and outcomes of the development of such a tool in Egyptian Arabic and Moroccan Arabic.

2. Aim

The aim of this study was to develop a screening tool for phonological development in two Arabic dialects, based on existing data from monolingual children, bilingual children, advice from expert linguists and native speakers of the two dialects who are living in the Netherlands.

3. Method

3.1 Starting point

In 1996 an SLT working at the Audiological Centre in The Hague, Ms. Segerien Donner, developed an informal bilingual screening tool for child speech in Turkish / Dutch. The tool could be played like a game and children responded well to it. The tool however, could not be disseminated as there was no manual and it consisted of copied pictures of booklets, for which no copyright was obtained. In 2013 a project was started to reconstruct the original screening tool in Turkish into a multilingual tool in altogether five languages and two Arabic dialects (see table 1 below) for the assessment of consonant production in young minority children from different backgrounds. The project team (psychologists, SLT's, and linguists) decided to focus on consonants because vowels are acquired early, and hardly ever cause developmental problems (Dodd, 1995 in Holm et al., 1999). In order to modify the original

tool into a multilingual screening tool, several adjustments had to be made. The project aimed at a number of improvements, as stated in table 1.

*Table 1:
Aims of the reconstruction of the original Turkish tool into a multilingual screening tool*

from	to
Paper version	Electronic application
'Illegal' pictures (no copyright)	Legally obtained pictures
Only Turkish	7 languages / dialects: Dutch, Turkish, Moroccan Arabic, Egyptian Arabic, Somali, Polish, Tarifit-Berber
No manual	Manual available
Hardly any literature used to select the words	Systematic selection of the words
No information about the phonological development of children in the language in question	Information about phonological development of the specific language is added (if available)
Dissemination not possible	Dissemination easy

The process of finding the right words and matching pictures, searching for evidence from literature, expert linguists' opinions and native speakers, will be described in the next section. A number of conditions had to be met. The amount of words that can be elicited in young children (2,5 – 4 years) is limited. Practitioners experience that the maximum amount of words that young children are willing to name (after many other tests) is between 30 and 40, sometimes less. To be effective, the list of words had to contain most (or preferably, all) consonants of the language, in different positions in a word, with different clusters, and the tool had to consist of both monosyllabic and multisyllabic words. The selected words had to be part of the early vocabulary of children. The tool had to start with at least a few words that are easy to pronounce, in order to make the child feel at ease. Only words that could be

elicited with a picture could be selected. The selected pictures had to be photographs, for young children these are easier to recognize than drawings (Simcock & DeLoache, 2006).

3.2 Item pool generation

The search for items in a new screening tool is usually preceded by a literature review of language development in that particular language. In the case of Arabic dialects, this is not an easy task. The linguistic situation in Arabic-speaking countries is complex. Diglossia is a well-known feature of the Arabic language: throughout the Arabic world, the standard language, also known as Modern Standard Arabic (MSA), is the language that is used for all formal communication, for written communication and it is also the language used in education and therefore the language that most linguistic research is based on. The language spoken at home, and therefore the mother tongue of young children, is the regional dialect. In each Arabic country a different colloquial variety of Arabic is spoken at home. Even within the dialects themselves there are differences regarding pronunciation and lexicon. As these dialects are seldom used for writing, and usually do not have an official written codification, systematic research on language development in the mother tongue of young Arabic speaking children is scarce, especially in a bilingual context. For young children screening tools in MSA are not suitable. Children only start to learn MSA at school, when they learn to read. Although the spoken dialects and the standard language are closely related to each other and have overlapping phonology and grammar, they are definitely not identical and therefore MSA should not be used to assess young children's speech production. In addition to that, tests in MSA are usually constructed for older children than our target group, as 2- or 3-year olds do not speak MSA yet.

Two sources were found in which descriptions of the acquisition of the lexicon in Moroccan bilingual children were presented. Schlichting (2006) developed a word list (called the Lexiconlist) for young bilingual children in the Netherlands in several languages, among which Moroccan Arabic. Boerma (2005) investigated the lexical development of 230 bilingual Moroccan children aged 18-44 months old. Both sources were used in the process of selecting the words to be used for the screening tool.

For Egyptian Arabic, several sources were used for the selection of the words. We used the Mansouri Arabic Articulation test (Abou-Elsaad, Baz & El-Banna, 2009) and a word list retrieved from Ammar & Morsi (2006), as well as parts of the Comprehensive Arabic Language Test (CALT), developed by Abo-Ras et al., (2009). All these tests were developed and normed in Egypt, so we gave special attention to choosing items that were suitable for bilingual children raised in the Netherlands.

3.3 Validity of the items

As a starting point, a total of about 40 words were selected for each specific language. First the words were chosen in such a way that it was highly probable that young children were familiar with them. Second, we made sure that as many consonants of the particular dialect as possible appeared syllable-initial and syllable-final. A tentative version of the pronunciation of the words was added to the trial version list, using the International Phonetic Alphabet (IPA). After that, two rounds of expert advice were organized. First, expert linguists in the Netherlands for each language were contacted. They were asked to comment on the list, and the list was adapted according to their advice. After that, native speakers of the dialects, living in the Netherlands, were consulted. In the end, photographs

matching the words were bought from Shutterstock. We made sure that the selected photographs were visually stimulating and culturally-appropriate (Stow & Pert, 1998).

Eleven EA native speakers and seven MA native speakers were consulted about the items in their respective dialects, in order to get a good idea of the usability of the screening tool.

The informants had to meet the following criteria:

- they learned to speak the language as a child, at home;
- they were at least 16 years old at the time of consultation;
- they used the native language (almost) daily since immigration, and they used it in different environments;
- they finished at least primary education;
- they had no known hearing, language or speech problem.

The native speakers' features were assessed on the basis of part A of a questionnaire². The native speakers were asked to name the chosen photographs in their mother tongue, and to decide whether the selected photographs were a good match with the words. If not, other photos were chosen. Furthermore, the pronunciation of the words by the native speakers was recorded, and compared to the IPA transliteration in the list. The native speakers were asked questions about dialectical variation in naming or pronunciation of each photo. Words that showed too much variation in naming or pronunciation were deleted. The native speakers were also asked if they thought that these words were part of the early productive

² Questionnaire can be obtained from the first author.

vocabulary of young bilingual children in the Netherlands. When necessary and if possible, words were replaced with the help of the native speakers.

4. Results

4.1 Background information

In paragraphs 4.2. and 4.3 first the outcomes of a literature search on the phonological systems of Moroccan Arabic and Egyptian Arabic will be presented. The reason for this search was twofold. First, we needed a reliable overview of all existing consonants in both languages and the word positions they can appear in (syllable initial and/or final). Second, the literature search was aimed at obtaining information about the order in which young children acquire the consonants in both languages. We needed this information for establishing the order of the items in the tool: starting with the easiest items and the most difficult ones in the end. In general, the search was complicated, and led to limited results. However, we were able to get access to a small number of publications on the phonological system of both dialects. The information in these sources sometimes led to contradictory findings and even more questions. Different sources seemed to use different IPA-symbols for seemingly the same sound, which led to doubts about the nature of the sounds described. The researchers double-checked these issues through personal communication with language experts and through the consultation of reliable websites for the pronunciation of the world's languages³.

³ <http://meertaligheids taalstoornissen.vu.wikipaces.com/MarokkaansArabisch>
<http://www.dummies.com/how-to/content/how-to-pronounce-arabic-sounds.html>
http://www.omniglot.com/writing/arabic_moroccan.htm

4.2 Moroccan Arabic

Phonological system of MA

The following overview (chart 1) was built on the basis of the earlier described search. The major sources that were used, were Benkirane (1998) and Ait Cherif et al. (2011).

*Chart 1:
Consonant system of Moroccan Arabic*

			Coronal			Dorsal			Glotta
	Bilabia 	Labio- dental	Alveolar	Post- alv eolar	Palata 	Velar	Uvular	Pharyngea 	
Plosive	p b		t d			k g	q		ʔ
emphatic			t ^s d ^s						
Nasal	m		n			ŋ			
Trill			r						
Fricative		f v	s z	ʃ ʒ		χ	ʁ	ħ ʕ	h
emphatic			s ^s z ^s						
Lateral fricative			l			ɬ			
Approximant	w				j				

Additional information about the chart: In case of two phonemes in one cell, the phoneme on the left is voiceless and the one on the right is voiced. The phonemes [p] and [v] only appear in loan words in Moroccan Arabic. The phoneme [q] has an allophone pronunciation [g]. The difference between the emphatic phonemes and their plosive and fricative counterparts consists of a velar construction (velarisation) added to the typical place of articulation of the phoneme (double articulation). Although distinctive in meaning, the difference is hard to perceive. However, slight vowel changes are audible in the context of emphatic sounds. Because the production of vowels is not included in the screening tool, we decided not to include the emphatic consonants. The pronunciation of the letter /l/ depends on the phonological context: it is a 'dark' velarized /l/ before back vowels and a 'clear' alveolar /l/ before front vowels.

As opposed to MSA, word-initial consonant clusters occur frequently in Moroccan Arabic (with a maximum of two phonemes). Therefore, clusters might be acquired at an early age.

Phonological development in MA speaking children

No publications were found on the order of acquisition of phonemes in young Moroccan Arabic speaking children. On the basis of the frequency of occurrence in the lexicon and on the basis of the complexity of the phonemes, the following hypotheses can be made: In contrast to many other languages the posterior consonants are highly frequent in Moroccan Arabic and therefore likely to be acquired in a relatively early stage: [q], [ħ], and [χ]. This is also due to the fact that a lot of words often used speaking to children include these phonemes, so they hear them frequently – as in /u χ t/ ‘sister’, /a χ / ‘brother’, /shu χ / ‘pee’.

Universally early acquired phonemes, such as [b], [m], [d], [n] and [t], will most probably be acquired at an even earlier stage though. On the basis of this information we formed a tentative overview of the order of acquisition of phonemes in Moroccan Arabic, see table 2.

*Table 2:
Overview of the most likely order of acquisition of phonemes in Moroccan Arabic*

age	phonemes
< 2;6	d, t, n, b, m
2;6 – 3;6	ʃ, f, k, l, s, w, z, h, g q, ħ, χ
3;6-4	j
> 4	r, g, ʕ, ʁ

On the basis of this information, a first draft of the word list was made. Dr. El Aissati, a phonologist and researcher in the field of MA and Berber languages, commented on the list (regarding correctness of the words and appropriateness for young children) and on the

basis of these comments a second draft was made. Matching photos were found, and bought from Shutterstock and a first version of the screening tool in Moroccan Arabic was ready. It consisted of the words presented in table 3.

Table 3:

Overview of initial 40 words in Moroccan Arabic (translation between brackets)

dubb (bear)	jɪdd (hand)	wədn (ear)	mus (knife)
bænæ:n (bananas)	zitu:n (olive)	ataj (tea)	təbsi:l (plate)
ni:f (nose)	druʒ (stairs)	mə ʃ ʃ (cat)	sak (bag)
fi:l (elephant)	χ æ:təm (ring)	ħut (fish)	fri:z (strawberries)
ħəlluf (pig)	sənduq (box)	timsaħ (crocodile)	ki:wi: (kiwi)
ʕin (eye)	sbəʕ (lion)	fɑ:r (mouse)	ʕəŋq (neck)
ʕnəb (grapes)	kəlb (dog)	fərx (bird)	xubz (bread)
ʕbi:b (doctor)	bəgra (cow)	fərmɑ:ʒ (cheese)	swihla (melon)
qnɪjja (rabbit)	nəffaxa (balloon)	dʒæ:ʒa (chicken)	təlfaza (television)
buli:si: (policeman)	ʕumubi:l (car)	ʃ ukula (chocolate)	bæbbəʕa (parrot)

Consultation of native speakers

Seven native speakers of Moroccan Arabic were interviewed. The interviews took about 45-60 minutes each. Six participants were female, one was male. Ideally, a word was named similarly by all speakers, the chosen photo was deemed adequate, and the speakers estimated that young children would know the word in question. For Moroccan Arabic, 25 words were categorized as acceptable by all informants (see table 4). The words ‘bear’, ‘crocodile’ and ‘parrot’ were deemed too difficult for 2- and 3-year olds, so these three words were removed from the list. In the case of the other 12 words the informants had some doubts. For the pictures for ‘ear’, ‘car’, ‘bird’, and ‘melon’ many possible synonyms were mentioned, and the informants didn’t like the word ‘pig’ as part of a screening tool, so

these five words were also removed from the list. There were doubts about the difficulty of some of the pictures ('doctor', 'rabbit', 'lion') and the informants further wondered if the picture for 'box' was suited for eliciting [sənduq] and whether children might describe the picture for 'tea' with the Moroccan Arabic equivalent of 'cup'. Also, the words for 'balloon' and 'television' might be named with their French equivalent. It was decided to keep these seven items in the instrument and to evaluate this decision after the pilot studies. An overview of the categorization by the native speakers is presented in table 4.

Table 4:
Classification of the words after consultation of native speakers

generally accepted words		doubtful but remains in the list	too difficult or too many alternatives or not culturally acceptable
bænæ:n (bananas)	ħut (fish)	ṭbi:b (doctor)	dubb (bear)
ni:f (nose)	fɑ:r (mouse)	qnIjja (rabbit)	ṭumubi:l (car)
fi:l (elephant)	fərmɑ:ʒ (cheese)	sənduq (box)	wədn (ear)
ʕin (eye)	dʒæ:ʒa (chicken)	sbəʕ (lion)	timsaħ (crocodile)
ʕnəb (grapes)	ʃ ukula (chocolate)	nəffaxa (balloon)	fərx (bird)
buli:si: (policeman)	mus (knife)	ataj (tea)	swihla (melon)
jI dd (hand)	təbsi:l (plate)	təlfaza (television)	bəbbəʕa (parrot)
zitu:n (olive)	sak (bag)		ħəlluf (pig)
druʒ (stairs)	fri:z (strawberries)		
χ æ:təm (ring)	ki:wi: (kiwi)		
kælb (dog)	ʕənq (neck)		
bəgra (cow)	xubz (bread)		
mə ʃ ʃ (cat)			

In total, a number of 32 words were selected for Moroccan Arabic. The distribution of phonemes in these remaining 32 words is presented in table 5.

Table 5:
Distribution of phonemes in the MA words of the instrument

frequency	1-2 occurrences	3-4 occurrences	5-6 occurrences
place			
syllable initial	w, d, r, ʃ, ʒ, j, q, ħ, ʕ, h, z, ʁ	s, b, m, n, l, k, ʁ	f, t
syllable final	m, f, t, d, s, z, ʃ, ʒ, j, k, q, ʕ	n, r, b, l	

4.3 Egyptian Arabic

For Egyptian Arabic (EA) the literature search led to some very resourceful studies about phonological development in EA (e.g. Ammar & Morsi, 2006 and Saleh, Shoeib, Hegazi & Ali, 2007). Conflicting information was found about age of acquisition, possibly caused by different criteria used to decide if a phoneme was acquired or not. Omar (2007) reports about the early communication and initial vocabulary of 37 children, of which ten under the age of four, in the village Sheikh Mubarak in Egypt, in 1968. These findings however, are too limited in number, and far away in time and place to be relevant for Egyptian children growing up today, in the Netherlands. Instead the words of the Mansoura Arabic Articulation test (Abou-Elsaad, Baz & El-Banna, 2009) were used as inspiration, but with caution, because the words in that test were chosen from the experiences of children that grow up in Egypt, and not in the Netherlands. The Mansoura Arabic Articulation test is also normed for older children, 42-70 months.

Phonological system of EA

The following chart represents an overview of all existing consonants of the phonological system of Egyptian Arabic. Several sources were consulted in order to check findings and to cross-check doubts about sounds and their corresponding IPA symbols. The major sources

that were used, were Abou-Elsaad & al. (2009), Ammar & Morsi (2006), Omar (2007), Saleh et al. (2007) and Watson (2002).

*Chart 2:
Consonant system of Egyptian Arabic*

			Coronal			Dorsal			Glotta l
	Bilabia l	Labio-de ntal	Alveolar	Post-alv eolar	Palatal	Velar	Uvular	Pharyneal	
Plosive	p b		t d			k g	q		ʔ
emphatic			t ^ʕ d ^ʕ						
Nasal	m		n						
Trill			r						
Fricative		f v	s z	ʃ		χ	ʁ	ħ ʕ	h
emphatic			s ^ʕ z ^ʕ						
Lateral fricative			l			ɬ			
Approximant	w				j				

Additional information about the chart: In case of two phonemes in one cell, the phoneme on the left is voiceless and the one on the right is voiced. The sounds [p], [v] and [ʒ] occur only in loan words in Egyptian Arabic. The [q] rarely appears in EA, unlike the case of MA. It is realized in the northern part of Egypt as a glottal stop ([ʔ]) and in the southern region as a [g]. In Egypt, it is pronounced as a [q] only in Modern Standard Arabic (MSA) and therefore only in formal language. The [g] is pronounced as a [dʒ] in the southern region of Egypt. The words and their pronunciations in our tool are based on the Cairene dialect of the north. Like in MA, the emphatic phonemes are not examined apart from their non-emphatic counterparts.

Phonological development in EA speaking children

The major sources that were used in order to obtain information about the phonological development in Egyptian Arabic were Ammar et al. (2006), a research on the speech development of Egyptian Arabic children between three and five years old, who spoke the Cairene dialect, Saleh

et al. (2007), a study on the analysis of spontaneous speech of Egyptian children of 12-30 months old and Omar (2007), a study dated 1973 on the speech-language development of children between 6 months and 15 years old living in middle Egypt. Sometimes our sources did not give us unequivocal and complete information about the order in which phonemes are acquired by young children. We compared data and found discrepancies between what Omar (2007) and Saleh et al. (2007) call high-frequent phonemes in child's speech (and therefore acquired at a young age) and what Ammar et al. (2006) call acquired phonemes (90% correct pronunciation at a certain age). The following inventory for Egyptian Arabic was drafted (table 6).

*Table 6:
First inventory of the order of acquisition of phonemes in Egyptian Arabic*

age	high-frequent	acquired (> 90% correct)
2;0 - 2;6	ʔ b t d h s m n w j l	
2;6 - 2;11		
3;0 - 3,11		t k ʔ f ʃ χ ħ h m n w j l
4;0 - 4,11		ʕ
> 5;0		b d d ^ʕ t ^ʕ g s s ^ʕ z z ^ʕ ʁ r

The largest discrepancy between the researches of Saleh et al. (2007) and Ammar et al. (2006) concerned the acquisition of [b] and [d]. It is highly unlikely that these sounds, which are quite universal and not as articulatory challenging as, for instance, pharyngeal phonemes, are acquired as late as Ammar et al. (2006) state (> 4 years). For the construction of our score form we used the information in table 7 as rough guidelines.

*Table 7:
Overview of the most likely order of acquisition of phonemes in Egyptian Arabic*

age	phonemes
< 2;6	b, t, d, m, n, ʔ
2;6 - 3;6	k, f, ʃ, h, s, l, w, z, g
2;6-4	ħ, χ, j
>4	r, g, ʁ, ʕ

As opposed to MA, word-initial consonant clusters do not occur frequently in Egyptian Arabic. Words in EA preferably start with one consonant and not with a vowel. Even if a vowel is perceived as the first phoneme of a word (by non-native speakers of EA), the vowel is most likely preceded by a [ʔ] or a [ʕ]. Final clusters of two consonants (not more!) are highly frequent and acquired at an early age (Ammar et al, 2006).

After the literature search, a first draft of the word list of 48 words was composed. This list is presented in table 8. In the case of Egyptian Arabic, no external linguist expert was consulted because of available expertise within the project group.

Table 8:

Overview of initial 48 words in Egyptian Arabic (translation between brackets)

ʔi:d (hand)	sitt (woman)	boʔ (mouth)	mo:za (banana)
ʔæsæd (lion)	ʔæ:læm (pen)	wæləd (boy)	læbæn (milk)
duʃ (shower)	fi:l (elephant)	ʃæ:j (tea)	di:k (rooster)
nunu (baby)	ti:n (fig)	sæʕa (clock)	ħusa:n (horse)
ʕe:ʃ (bread)	ge:b (bag)	fɑ:r (mouse)	ʕe:n (eye)
læmu:na (lemon)	hedəja (gift)	ʃɑgɑrɑ (tree)	χ i:jɑrɑ (cucumber)
χ o:χ a (peach)	χ aru:f (sheep)	ko:ra (ball)	ʕinæb (grapes)
sillim (stairs)	ʃebbæk (window)	kubbæ:ja (drinking glass)	ʔæssæ:la (washing achine)
muftæ:ħ (key)	nigma (star)	murge:ħa (swing)	kursi (chair)
tɪlɪfɪzjo:n (television)	ʔutubi:s (bus)	mænæ χ i:r (nose)	bæɾbæɾæn (parrot)
kælb (dog)	widn (ear)	ʃæms (sun)	ʃɑʕr (hair)
tɪlɪfo:n (telephone)	ʕarabijja (car)	nimr (tiger)	ʕægæla (bicycle)

Consultation of native speakers

11 native speakers of EA were interviewed. The interviews took about 45- 60 minutes each. Nine of the native speakers were female, and two were male. After consultation of the native speakers, 29 words were judged to be very suitable (see table 10). There was a certain amount of disagreement and doubt among the native speakers regarding 11 words, and it was decided to keep these words and to evaluate this decision after the pilot studies. These words concerned words that can be used in singular or in collective plural, such as [læmu:n] for 'lemons' (collective plural) instead of [læmu:na] for 'a lemon' (singular). The native speakers were not certain as to which of these two possibilities a child would choose. The same goes for [mo:z] / [mo:za], [χ o:χ] / [χ o:χ a] and [χ ɪ:jar] / [χ ɪ:jara]. Because the singular only requires an extra vowel "a", while the consonants remain the same, these words were still considered suitable. The Egyptian equivalents for 'baby', 'fig' and 'horse' and were not judged as suitable by the native speakers. The EA word for 'baby' was deleted because people nowadays mostly use the English word *baby*. For the word for 'fig' naming and pronunciation were unambiguous but most native speakers agreed that young children in the Netherlands would probably not know the word, because in the Netherlands fresh figs are not as common as in Egypt. The word [ħus^sa:n] (horse) was deleted, because the /s^s/ is an emphatic consonant. Five other words were deleted because their phonemes already appeared a few times in other words ('clock', 'telephone', 'car', 'tiger' and 'bike'). One extra word ('hedeja' - gift) was added because there were no words containing the /h/. An overview of the categorization by the native speakers is presented in table 9.

Table 9:
Classification of the words after consultation of native speakers

generally accepted words		doubtful but remains in the list	too difficult or too many alternatives	redundant words
ʔi:d (hand) ʔæsæd (lion) duʃ (shower) sillim (stairs) muftæ:ħ (key) tɪlɪfɪzjɔ:n (television) kælb (dog) ʔæ:læm (pen) fi:l (elephant) hedɛja (gift) χ aru:f (sheep) ʃebbæk (window) nigma (star) ʔutubi:s (bus) widn (ear) boʔ (mouth)	wælæd (boy) fɑ:r (mouse) ʃɑgɑrɑ (tree) ko:ra (ball) kubbæ:ja (drinking glass) mænæ χ i:r (nose) ʃæms (sun) læbæn (milk) ʃe:n (eye) ʃɪnæb (grapes) æssæ:la (washing machine) kursi (chair) ʃɑʃr (hair)	ʃe:ʃ (bread) læmu:na (lemon) χ o: χ a (peach) sitt (woman) ge:b (bag) ʃæ:j (tea) murge:ħa (swing) mo:za (banana) di:k (rooster) χ i:jɑrɑ (cucumber) bærbæ:æn (parrot)	ħusʕa:n (horse) ti:n (fig) nunu (baby)	sæʃa (clock), tɪlfo:n (telephone) ʃarabijja (car) nimr (tiger) ʃægæla (bike)

In total, a number of 40 words were selected for Egyptian Arabic. The distribution of phonemes in these words is presented in table 10.

Table 10:
Distribution of phonemes in the EA words of the screening tool

frequency	1-2 occurrences	3-4 occurrences	≥ 5 occurrences
place			
syllable initial	z, w, ʁ, g, ħ, h	ʔ, d, t, n, j, f, k, χ, ʃ	s, b, l, m, ʃ, r
syllable final	ʔ, t, b, l, m, ʃ, j, f, k, ʁ, g, ħ	d, r	n

4.4 Scoring form and selected photos

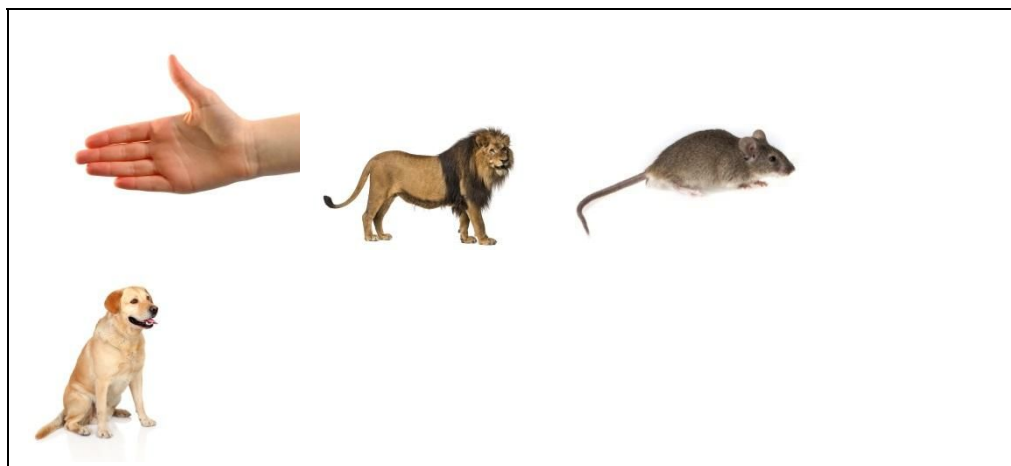
SLT's who have little experience in listening to the sounds of either MA or EA need extra input to be able to identify speech sound errors in those languages. Target transcription of

the words (see picture 1), and an audio recording of an adult model were constructed for this purpose.

Word						Repetition?	Remark
ʔi:d (hand)	ʔ	i:	d				
ʔæsæd (lion)	ʔ	æ	s	æ	d		
fɑ:r (mouse)	f	ɑ:	r				
kælb (dog)	k	æ	l	b			

Picture 1: schematic representation of the scoring form in Egyptian Arabic, a few words as examples

In picture 2 the matching photos are shown. All photos contain a figure on a white background, to avoid distraction.



Picture 2: four picture examples of the screening tool

An example of what a partly filled out scoring form looks like, is given in picture 3. In this case, the child repeated the first word, instead of being able to name it, but the repetition was phonologically correct. The second picture was named correctly by the child, and the

word was pronounced correctly. The final consonant of the third word was deleted (phonological process: deletion of final phoneme). In pronouncing the last word the child replaced the /k/ by a /t/ (phonological process: fronting).

Woord						Repetition?	Remark
ʔi:d (hand)	ʔ	i:	d			√	
ʔæsæd (lion)	ʔ	æ	s	æ	d		
fɑ:r (mouse)	f	a:	r				r ⇒ ∅
kælb (dog)	k	æ	l	b			k ⇒ t

Picture 3: example of a part of the filled out form of the screening tool in Egyptian Arabic

5. Further development

A company specialized in devices with a game-like interaction was hired to work on the development of the electronic application. At this moment (July 2016) the third trial version is ready to be tried out in two diagnostic teams. The plan is to develop it further by using feedback from SLT's, to adapt the words (if necessary), try again etc., until a satisfactory level of usefulness is reached. A free version will hopefully be available in the App store by the end of 2016, and also a website containing background information, instructions for use, forms to download, will be launched by that time.

The SLT will be able to listen to an audio file of the target words pronounced by an adult native speaker, in the application. As a consequence, the SLT will be able to compare the realization of the child to this adult model. Lockart & McLeod (2013) found that such a

model, combined with information about the phonology of the language in question (such as transliteration in IPA), increases the accuracy of assessing the child's speech considerably. Holstvoogd (2015) found that the inter-rater reliability between a native speaker and a linguist who does not speak the language, with the help of the information as stated above, is very high: the interrater-reliability for the Polish version of the screening tool was 91.3% with a kappa coefficient of .76. This coefficient was established after the comparison of over a 1,000 articulated consonants pronounced by young Polish children. This level of agreement is substantial (Landis and Koch, 1977).

For all languages involved a group of TD children speaking the target languages, and living in the Netherlands, will be tested in the near future with the second versions of the word lists. We will then assess if the selected words / photographs are suitable for the elicitation of the target words.

As soon as the word lists and photographs are finalized, they will be added to the electronic application. Workshops will be developed in which SLT's can learn how to work with the application. Trials with children with a possible language impairment will teach us more about the usefulness in practice in a clinical setting and will hopefully in time lead to a validated tool for the assessment of speech sound disorders in bilingual children in the aforementioned seven languages.

6. Conclusion

Studies involving the development of a screening tool for bilingual children are complicated. Bilingual children follow a developmental path that is not always the same as that of

monolingual children. TD bilingual children always form a heterogeneous group, mostly due to variation in quality and quantity of the language input they receive. It is therefore an extreme challenge to develop tools that help us assess what is typical and what is not. The first phase (studying language development of the L1 of the target group or building on normed tests in the L1) was made harder because of the diglossia situation. The second phase involves the experts. These are, on the one hand, native speakers who rely on their intuitions and, on the other hand, scientists who studied the involved languages and who rely on a combination of knowledge of and experience with the language. Their judgments were sometimes not consistent and at times contradictory, and choices had to be made in order to come to an acceptable and workable word list and collection of photographs. We succeeded at producing these lists for the two dialects described here, and will now move on to the third phase, trials with groups of TD children. After that, new cycles will start, involving the interpretation of the data that we will gather and the possible adjustment of the lists and trials with children with speech sound disorders.

In the field of applied linguistics and bilingualism good collaboration between linguists, native speakers and the clinical professionals in the field is essential. The study presented here is an example of such a collaboration. It is an enormous challenge, especially in the case of non-codified Arabic dialects, to answer the questions that need to be answered to get a clear picture of the phonological system, phonological development and symptoms of articulation disorders in these languages. By using expert advice and native speakers as informants, the lists were validated as much as possible. There are many more languages,

dialects, and language combinations for which monolingual or multilingual screening tools are unavailable (McLeod & Verdon, 2014). A lot of work still needs to be done.

Project team

Mirjam Blumenthal, senior researcher at Royal Dutch Kentalis is project leader of the team. Imke Pott-den Ouden, Nienke Lam, Eefje van der Linden-Graafland and Naomi van Leeuwen participated as research assistants, working as SLT's daily with the target group. Three students of the Applied Linguistics master's programme at Free University Amsterdam, assisted in this project as part of their traineeship: Liesbeth Holstvoogd, Elianne de Ruiter and Barbara Giannuzzi. The students were supervised by dr. Petra Bos, Arabist and assistant professor of Applied Linguistics at Free University Amsterdam. After graduation Liesbeth Holstvoogd joined the team as co-researcher.

Acknowledgements

The project was supported by Royal Dutch Kentalis and was an initiative of Eefje van der Linden-Graafland who works at the Kentalis Audiological Centre in The Hague. Many thanks to dr. Abderrahman el Aissati (Tilburg University/Utrecht University), dr. Maarten Kossmann (Leiden University), Sarah Michiel MA, speech language therapist and translator Arabic-French (Belgium), dr. Mieke Beers, (University of applied sciences, Utrecht) and dr. Eva Kristina Salameh (Lund University, Sweden) for their expert help in our project. Many thanks also go to the informants, who offered their time free of charge.

The researchers are aware that, due to their limited time and limited access to experts, misinterpretations and mistakes are possible. Please feel free to comment on this article if

you find any mistakes that need our attention or if you have additional information on the languages involved that might help us ameliorate our screening tool.

Correspondence: Mirjam Blumenthal: m.blumenthal@kentalis.nl

Literature

- Abo-Ras, Y., Aref, S., El-Raghy, A., Gaber, O. & El-Maghraby, R., (2009). *Comprehensive Arabic Language test as tool for assessing delayed language impaired Egyptian children*, Retrieved August 2, 2016, from <http://www.alexorl.edu.eg/alexorlfiles/pptorl2009/014003.pdf>
- Abou-Elsaad, T., Baz, H., & El-Banna, M. (2009). Developing an Articulation Test for Arabic-Speaking School-Age Children, *Folia Phoniatica et Logopaedica*, 61, 275-282.
- Ait Cherif, A., Boukbout, M., Mahmoudi, M., & Ouhmouch, A. (2011). *Moroccan Arabic Textbook*, Moroccan Peace Corps, Rabat, Morocco.
- Ammar, W. (1992). *Articulation Disorders in Arabic*. Unpublished PhD thesis, University of Alexandria, Egypt.
- Ammar, W. (2002). Acquisition of syllable structure in Egyptian Colloquial Arabic. In F. Windsor, M. Kelly, N. Hewlett. *Investigations in Clinical Phonetics and Linguistics*. Mahwah: NJ: Erlbaum. pp. 153–160.
- Ammar, W., & Morsi, R. (2006). Phonological Development and Disorders: Colloquial Egyptian Arabic. In: Hua, Z. (ed.) *Phonological Development and Disorders in Children*. GBR: Multilingual Matters Limited, 204-232.
- Beers, W. (1995). *The Phonology of Normally Developing and Language-Impaired Children*. PhD-thesis, University of Amsterdam, Amsterdam: IFOTT.
- Benkirane, T. (1998). Intonation in Western Arabic (Morocco). In: Hirst, D., & Di Cristo, A. (Eds.). *Intonation systems. A survey of twenty languages*. Cambridge, United Kingdom: Cambridge
- Blumenthal, M. (2012). *Statistiek in verband met keuze talen in Articulatielotto*. Unpublished manuscript, Royal Dutch Kentalis.
- Blumenthal, M., Vandewalle, E., Scharff Redtfeldt, W., Muller, C., Grech, H., Letts, C., & Saleme, E. (2015), *Position Statement on language impairment in multilingual children*, Online

publication, retrieved August 9, 2016 from

<https://drive.google.com/file/d/0B6RqEu2lr8wpYTFDclY4dndOZms/view?pli=1>

Boerma, I. (2005). *Woordenschatontwikkeling van jonge Marokkaanse kinderen in Nederland*, Master's thesis, University of Amsterdam.

Grosjean, F. (1989). Neurolinguists, beware! The bilingual is not two monolinguals in one person.

1

Brain & Language, 36(1), 3-15.

Holstvoogd, L. (2015). *Beoordeling van de spraakontwikkeling van Poolse peuters door een niet-moedertaalspreker met behulp van de Meertalige Articulatielotto*. Master's thesis, Free University Amsterdam.

Holm, A., Dodd, B., Stow, C. en Pert, S. (1999). Identification and differential diagnosis of phonological disorder in bilingual children. *Language Testing*, 16 (3), 271-292, doi: 10.1177/026553229901600303

International Expert Panel on Multilingual Children's Speech (2012). *Multilingual children with speech sound disorders: Position paper*. Bathurst, NSW, Australia: Research Institute for Professional Practice, Learning and Education (RIPPLE), Charles Sturt University. Retrieved August 9, 2016 from <http://www.csu.edu.au/research/multilingual-speech/position-paper>

Landis, J.R. & Koch, G.G. (1977). The measurement of observer agreement for categorical data. *Biometrics* 33 (1), 159-174.

Langdon, H.W., & Cheng, L.R. (2002). *Collaborating with interpreters and translators: A guide for communication disorders professionals*. Eau Claire, WI: Thinking Publications.

Law, J., Garrett, Z., Nye, C., & Dennis, J. A. (2012). Speech and language therapy interventions for children with primary speech and language delay or disorder: Update. *Cochrane Database of Systematic Reviews* 2003, 3, CD004110.

Lockart, R., & McLeod, S. (2013). Factors that enhance English-speaking speech-language pathologists' transcription of Cantonese-speaking children's consonants. *American Journal of Speech-Language Pathology* 22, 523-539.

McLeod, S., & Verdon, S. (2014). A review of 30 speech assessments in 19 languages other than English. *American Journal of Speech-Language Pathology*, 23, 708-723.

Omar, M.K. (2007). *The acquisition of Egyptian Arabic as a Native Language*. Paris: Mouton.

Omar, M. K., & Nydell, M. K. (2007). *The acquisition of Egyptian Arabic as a native language*. Georgetown University Press.

Salameh, E.-K. , Nettelblatt, U., Norlin, K. (2003). Assessing Phonologies in bilingual Swedish-Arabic children with and without language impairment. *Child Language Teaching and therapy* 19, 338-364.

Saleh, M., Shoeib, R., Hegazi, M., & Ali, P. (2007). Early Phonological Development in Arabic Egyptian Children: 12-30 Months, *Folia Phoniatrica et Logopaedica*, 59, 234-240.

Schlichting, L. (2006). *Lexiconlijst Marokkaans-Arabisch – Nederlands*. Uitgeverij JIP, Amsterdam.

Simcock, G. & DeLoache, J. (2006). Get the picture? The effects of iconicity on toddlers' reenactment from picture books. *Developmental Psychology*, 42, 1352-1357.

Stow, C., & Pert, S., (1998). The development of a bilingual phonology assessment. *International Journal of Language and Communication Disorders*, 33 (S1), 338-342.

Watson, J. (2002). *The Phonology and Morphology of Arabic*. New York: Oxford University Press. Retrieved August 9, 2016 from <http://www.kamal-osman.com/wp-content/uploads/The-Phonology-and-Morphology-of-Arabic-watson.pdf>

Williams, C. J., & McLeod, S. (2012). [Speech-language pathologists' assessment and intervention practices with multilingual children](#). *International Journal of Speech-Language Pathology*, 14(3), 292-305.

Consulted websites:

<http://meertaligheids taalstoornissen.vu.wikispaces.com/MarokkaansArabisch>

<http://www.dummies.com/how-to/content/how-to-pronounce-arabic-sounds.html>

http://www.omniglot.com/writing/arabic_moroccan.htm

https://www.nsf.gov/news/special_reports/linguistics/dialects.jsp