Supplementary Table S1

Qualitative evaluations by the Swedish speaking SLP (SW-SLP) and Arabic speaking SLP (AR-SLP) of the seven participants' performance in the dimension "Respiration and phonation".

	Participant 1		**Participant 2**		**Participant 3**		**Participant 4**		**Participant 5**		**Participant 6**		**Participant 7**	
Respiration and phonation – qualitative valuation	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**
Tired or out of breath when talking	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Rate of breathing when talking	Quick, irregular	Irregular	Normal	Irregular	Normal	Normal	Quick	Normal	Slow, irregular	Slow	Normal	Normal	Normal	Normal
Forced inspiration-expiration	No	Forced inspiration	No	Forced inspiration	No	Forced inspiration	No	Forced inspiration	No	No	No	Forced inspiration	No	No
Loudness	Low, monoloudness loudness decay	Low. mono-loudness	Normal	Low, loudness decay	Normal	Normal	Low, monoloudness loudness decay	Low, loudness decay	Low, mono-loudness	Low, mono-loudness	Low	Low	Low, loudness decay	Low
Pitch level	Low, monopitch	Low, monopitch	Normal	Low	Normal	Low	Low, monopitch	Low, unstable	Pitch fluctuation, monopitch	Low	Normal	Normal	Low	Low, monopitch
Voice quality in sustained phonation	Unstable, strained, vocal fry, breathy voice	Unstable, strained, strangled, vocal fry, breathy voice	Unstable, strained, vocal fry, breathy voice	Unstable, strained, strangled, harshness, vocal fry, pitch brakes	Unstable, strained, harshness	Unstable, vocal fry	Unstable, strained, harshness	Unstable, harshness vocal fry, breathy voice	Unstable, strained, strangled, harshness	Unstable, strained, Harshness, breathy voice	Unstable, vocal fry, breathy voice	Unstable, harshness, vocal fry	Strained, harshness, vocal fry, tremor	Unstable, strained, harshness
Voice quality in connected speech	Strained, vocal fry, breathy voice	Strained, harshness, breathy voice	Vocal fry, breathy voice	Strained, harshness, vocal fry	Normal	Vocal fry	Strained, harshness	Harshness, vocal fry	Strained, strangled, harshness	Harshness, vocal fry, breathy voice	Vocal fry, breathy voice	Strained, strangled	Strained, harshness, vocal fry	Vocal fry, breathy voice

Note: "Tired or out of breath when talking" is a question to which the participants can answer "Yes" or "No"

Swedish speaking SLP (SW-SLP) and Arabic speaking SLP (AR-SLP) qualitative valuations of the seven participants performance in the dimension “Oromotor and velopharyngeal function”.

	Participant 1		**Participant 2**		**Participant 3**		**Participant 4**		**Participant 5**		**Participant 6**		**Participant 7**	
Oromotor and velo-pharyngeal function - qualitative measures	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**	**SW-SLP**	**AR-SLP**
Face symmetry	Normal	Deviant right	Deviant left	Deviant left	Normal	Normal	Deviant left	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Facial expression	Hypomimia	Hypomimia	Normal	Hypomimia	Normal	Normal	Hypomimia	Normal	Hypomimia	Hypomimia	Normal	Normal	Hypomimia	Hypomimia
Drooling	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
Tongue	Atrophy, fasciculations	Deviation right	Normal	Deviation left	Normal	Deviation right	Big, tremor	Normal	Normal size, deviation left, tremor	Normal	Normal	Deviation right	Normal, tremor	Deviation, fasciculations
Tongue motor function	Slow, reduced range of motion, weak	Slow, reduced range of motion, weak	Reduced range of motion	Slow, uncoordinated, reduced range of motion	Reduced range of motion, weak	Normal	Slow	Slow	Slow, un-coordinated, reduced range of motion	Slow	Slow, uncoordinat ed	Normal	Slow, un-coordinated, reduced range of motion	Slow, reduced range of motion, weak
Diadochokinesis	Slow, imprecise articulation	Slow, imprecise articulation	Slow, imprecise articulation	Irregular, imprecise articulation	Normal	Normal	Slow	Irregular	Slow, irregular, imprecise articulation	Slow	Normal	Normal	Slow, irregular, imprecise articulation	Slow, irregular

Supplementary Table S2

Protocol for assessment of dysarthria in another language than Swedish

Date:_____

Instructions should in general, when applicable, be given in the same way as when administering the Swedish Dysarthria Assessment (Hartelius, 2015). Instructions may be repeated and the test-leader should model/say how the tasks should be performed. It is recommended to audio-record the assessment in order to be able listen after the session. You need a clock, pen and extra paper in case you need more space for notes than provided in the protocol. The interpreter also needs pen and paper to take notes. The interpreter fills out the 4-graded scale for assessment of listener comprehension. The test-person's significant other (if available) also fills out the 4-graded scale for assessment of listener comprehension. The participant rates the ability to make himself/herself understood using the 4-graded scale. You also need gloves, spatula and pen-flashlight for assessment of the oral cavity.

Instructions to the interpreter: We are going to do an assessment of the person's speech. I want you to listen to if you can detect any speech sounds that sound differently than speech sounds that are intended to be produced. You also need to listen to if the speech sounds deviating in terms of intonation, speech rate, nasality, phrase length, pausing or if palilalia occurs (explain clearly to the interpreter what the different terms mean). You should also rate how easy or hard it is for you to understand the person's speech. Take notes if you notice something that deviates from the expected.

Code number_____ Age_____ Male/Female_____

Language_____ Years of education_____ Years in Sweden_____

Occupation_____ Diagnosis_____ Assessor_____

Anamnestic information

Native language (if other than the language the assessment is completed in)
Do you speak any other language?
Which language/s do you use the most?
If several languages are used - which one is the strongest?
Do you use different language in different contexts? School, work, at home, social situations?

Anamnestic information, continued

General condition

Orientation, eye-sight, hearing, mobility, other health problems?

Speech problems

Do you think that your speech has changed?

When did it start? Number of months/weeks/days? _____

Did your speech problems have a sudden or gradual onset? Has your speech changed in any way since then?

Have you had speech problems earlier in your life? If so, when and what kind of speech problems?

What speech problems do you think that you have?

What is of most concern to you?

Where do you feel that the difficulties are located? Where would you place them (point to chest, larynx, mouth, head)?

Do the problems vary? In what way? (depending on time of day, emotions, general condition, different conversation partners, situations)

Does it happen that other people don't understand what you say?

How often? When?

What do you to then?

Does it help?

Language problems

Self-perceived difficulties, for example with word-finding. In cases of multilingualism, better/worse in any of the languages?

Swallowing problems? Describe how, when, what consistencies etc.

(goes down the wrong pipe, chokes often, coughs)

Other information – smoking, living conditions, information from significant other?

Inspection of the oral cavity – own teeth or other? Mucous membrane, excessive saliva/dry mouth, other observations of importance

Respiration and phonation

Use the following scoring for the items where is it possible to make such an assessment. Circle the number you find is most appropriate:
0 = no or insignificant deviation
1 = mild deviation
2 = moderate deviation
3 = severe deviation or absence of function

”Take a deep breath and sustain an ”sss” for as long as possible, like this”.
(Model a sustained ”s” with normal force and flow for a few seconds. Three attempts, rate the best)
Sustain ”s” for as long as possible Number of seconds: ____ ____ ____ **0 1 2 3**

”Sustain an ”s” and increase strenght suddenly, as if someone pushed you in the stomach, I will show you: ssSS”. *(Three attempts, rate the best)*
Increase strenght abruptly on ”s”: **0 1 2 3**

”Cough forcefully a couple of times, like this!”
Cough **0 1 2 3**

”Take a deep breath and then sustain an ”a” evenly and with normal loudness, I will show you!”
(Model a sustained ”a” with normal loudness and normal flow for a few seconds. Three attempts, rate the best).
Sustained ”a” for as long as possible Number of seconds: ____ ____ ____ **0 1 2 3**

”Sustain an ”a” and then increase loudness suddenly, as if someone pushed you in the stomach. I will show you: aaAA”.
(Try to sustain the ”a” without changing anything but the loudness. Three attempts, rate the best).
Increase loudness abruptly on ”a”: **0 1 2 3**

Respiration and phonation, continued

Questions:

Do you get tired or out of breath when you speak? Yes__ No__

Do you think you run out of air quickly? Yes__ No__

Is is easier to breathe and speak ……. in upright position___ lying down___ no difference___

Description:

Posture, sitting		*Speech breathing*		*Breath-frequency in speech*		*Inhalation/exhalation*	
Normal	__	Normal	__	Normal	__	Without stridor	__
Leaning forward	__	High	__	Rapid	__	With stridor	__
Leaning left	__	Shallow	__	Slow	__		
Leaning right	__	Uncoordinated	__	Irregular	__		
Varying	__						

Voice quality in sustained phonation		*Voice quality in speech*		*Pitch*		*Loudness in speech*	
Normal	__	Normal	__	Normal	__	Normal	__
Unstable	__	Unstable	__	High	__	High	__
Strained	__	Strained	__	Low	__	Low	__
Strangled	__	Strangled	__	Monotone	__	Monotone	__
Harsh	__	Harsh	__	Unstable	__	Unstable	__
Gratings	__	Gratings	__	Decaying	__		
Vocal fry	__	Vocal fry	__				
Breathy	__	Breathy	__				
Diplophonic	__	Diplophonic	__				
Tremourous	__	Tremourous	__				
Aphonic	__	Aphonic	__				
Pitch breaks	__	Pitch breaks	__				

Oral motor function

Model how to perform or produce the tasks. For syllable repetition the patient should first repeat slowly, model circa 2-4 "pa" ("ba" if Arabic"), "ta", "ka" per second for at least 3 seconds. Then model 6-7 "pa" ("ba" in Arabic), "ta", and "ka" per second for at least 3 seconds. Model 0,5-1 "pa-ta-ka" ("ba-ta-ka" Arabic) for at least 3 seconds, after that 2-3 "pa-ta-ka" ("ba-ta-ka" if assessment in Arabic) per second. Instruct the person to sustain at least 5 seconds during the tasks assessing range of movement. For assessment of syllable repetition and diadochokineses two attempts are noted, rate the best one.

"Pout your lips like this, I will show you" *(See instruction above. Three attemps, rate the best)*		**0 1 2 3**
"Spread your lips, as in a big smile, like this, I will show you" *(See instruction above. Three attemps, rate the best)*		**0 1 2 3**
"Smack your lips like this, I will show you" *(See instruction above. Three attemps, rate the best)*		**0 1 2 3**
"Say "pa-pa-pa" , I will show you *("ba-ba-ba" in Arabic. See instruction above*)	Calculate rate as syllables/second: _____	**0 1 2 3**
"Stick out your tongue" (*See instruction above. Three attemps, rate the best)*		**0 1 2 3**
"Stick your tongue at as far as you can to the right corner of your mouth, like this" *(See instruction above, Three attempts, rate the best)*		**0 1 2 3**
" Stick your tongue at as far as you can to the left corner of your mouth, like this" *(See instruction above, Three attempts, rate the best)*		**0 1 2 3**
"Move your tongue from side to side as quickly and evenly as possible, like this" *(Three attempts, rate the best)*		**0 1 2 3**
"Say 'ta-ta-ta' evenly, like this" *(See instruction above)*	Calculate rate as syllables/second: _____	**0 1 2 3**
"Say 'ka-ka-ka' evenly, like this" *(See instruction above)*	Calculate rate as syllables/second: _____	**0 1 2 3**
Say 'pa-ta-ka-pa-ta-ka-pa-ta-ka' evenly, like this" *("ba-ta-ka" in Arabic. See instruction above)*	Calculate rate as syllables/second: _____	**0 1 2 3**

Oral motor function, continued

Description:

Facial symmetry
Normal __
Abnormal left __
Abnormal right __

Diadochokinesis
Normal __
Reduced rate __
Uneven __
Imprecise articulation __

Facial expression
Normal __
Hypo-mimic __
Hyper-mimic __

Drooling
None __
A little __
A lot __

Tongue
Normal __
Large __
Atrophy left __
Atrophy right __
Deviation left __
Deviation right __
Fasciculations __
Tremor __

Tongue motor function
Normal __
Slow __
Uncoordinated __
Reduced range of motions __
Reduced strength __
Involuntary movements __

Articulation

For this task, the speech-language pathologist should rate if the articulation sounds deviating or not. Two attempts, rate the best.

Instruction to the patient:

”Now, say after me. You can produce each utterance twice”

Bilabial, nasal and plosive					*Alveolar fricative*				
po-po-po (bo-bo-bo)	**0**	**1**	**2**	**3**	sa-sa-sa	**0**	**1**	**2**	**3**
ma-ma-ma	**0**	**1**	**2**	**3**					
Labiodental fricative					*Alveolar lateral approximant*				
fi-fi-fi	**0**	**1**	**2**	**3**	lo-lo-lo	**0**	**1**	**2**	**3**
Alveolar plosive					*Palatal approximant*				
to-to-to	**0**	**1**	**2**	**3**	ja-ja-ja	**0**	**1**	**2**	**3**
Alveolar nasal					*Velar*				
ni-ni-ni	**0**	**1**	**2**	**3**	ko-ko-ko	**0**	**1**	**2**	**3**

Articulation continued

The following items should be answered by the interpreter, if possible, based on the conversation during anamnestic uptake and the test items completed. Also ask the interpreter if there are any/some sound that sound differently than the sounds intended to be produced. If there are deviations, are they present at the beginning, middle or end of the words? If there are for example nasal vowels in the language in question, ask the interpreter if any/some of them sound deviating and if so, which ones.

Nasality		*Articulatory difficulties*		*Irregular articulatory breakdowns*	
Normal	__				
Deviating	__	None	__	Not present	__
Hypernasal	__	Consistent	__	Present	__
Hyponasal	__	Inconsistent	__		

Prolonged speech sounds		*Articulatory precision*		*Distorted vowels*	
Present	__	Normal	__	Present	__
Not present	__	Indistinct	__	Not present	__
		Weak pressure	__		

Possible deviating speech sounds based on the interpreter's impression:

Ask the interpreter to rate the overall deviation of articulation on the 4-graded scale

0 = no or insignificant deviation **0 1 2 3**
1 = *mild deviation*
2 = moderate deviation
3 = severe deviation or absence of function

Prosody (assessed by the interpreter)

Instruction to the interpreter: Here is a task that you don't have to translate. The reason is that you should focus on assessing possible deviations in the speech, with descriptions below. Ask the person questions if the he/she does not elaborate much. Try to listen to if speech rate, phrase length, pauses, intonation or stress is deviating.Is there palilalia?

Instruction to the patient:
"Now tell me about something you like to do or something you are interested in"

Speech rate		*Phrase length*		*Pauses*	
Normal	__	Normal	__	Normal	__
Slow	__	Too short	__	Unmotivated	__
Fast	__	Too long	__	Prolonged	__
Increasing	__	Varying	__		
Decreasing	__				
Varying	__				

Stress		*Intonation*		*Palilalia*	
Normal	__	Normal	__	Present	__
Monotone	__	Monotone	__	Not present	__
Equalized	__	Stereotype	__		
Excessively varying	__	Excessively varying	__		

If the assessment is done in a tone language, the interpreter should also be asked the questions below

Contrasting tone		Which contrasting tones are deviating (if occuring)?
Normal	__	
Deviating	__	

Listener comprehension

Assessed by the interpreter

”Circle the number that best describes how easy or difficult it is for you to understand what the person says”

0= no difficulties to understand **0 1 2 3**
1= some difficulties to understand
2= moderate difficulties to understand
3= severe difficulties to understand

Listener comprehension

Assessed by significant other (if present)

”Circle the number that best describes how easy or difficult it is for you to understand what your significant other says”

0= no difficulties to understand **0 1 2 3**
1= some difficulties to understand
2= moderate difficulties to understand
3= severe difficulties to understand

The persons own rating of to what degree other people understand the person's speech

"Circle the number that best describes how easy or difficult it is for other people to understand what you say"

0= other people have no difficulties understanding what I say **0 1 2 3**
1= other people have some difficulties understanding what I say
2= It is quite difficult for other people to understand what I say
3= other people have major difficulties understanding what I say

The speech-language pathologist's assessment in summary and description of the most prominent perceptual deviations, possible dysarthria type if it can be determined, how easy or difficult it is to understand the person's spontaneous speech and degree of speech deviation:

Listener comprehension in spontaneous speech 0 1 2 3

0= no difficulties understanding
1= some difficulties understanding
2= moderate difficulties understanding
3= severe difficulties understanding

Degree of speech deviation 0 1 2 3

0 = no deviation
1 = mild deviation
2 = moderate deviation
3 = severe deviation