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Thesis Proposal for Master's Degree

Thesis Topic:

Specific language impairment (SLI) effect on word and non-word repetition

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1. Introduction

To be able to repeat a completely unfamiliar word is often considered an easy undertaking and one that is taken for granted. Archibald and Gathercole (2007) point out that the ability to repeat a novel phonological form is one of the most basic and essential language abilities. They argue that every word we now know was once unfamiliar to us, and was learned partially through such a repetition attempt. It is evident that non-word repetition is highly associated with language learning abilities. Consequently, individuals who find significant difficulty in non-word repetition typically struggle to learn the phonological forms of language. In addition, children's non-word repetition abilities are related to the speed of learning new words and expanding the lexicon. Severe deficits in non-word repetition have been proven to characterize **Specific Language Impairment** (SLI) in addition to several other populations with particularly marked impairments of language learning (Gathercole & Baddeley, 1990).

The current study aims to investigate the potential differences in word and non-word repetition performance between Arabic speaking children with SLI and their age-matched peers with typical language development (TLD). Furthermore, the study examines whether the distinction between nouns and verbs as two primary lexical categories is reflected in word and non-word repetition performance among the two groups of children. For each lexical category, the effect of frequency of the word pattern morpheme and the influence of the presence of consonant sequence on children's performance will be explored. Arabic is a Semitic language that certainly differs from other widely studied languages like English and other Indo-European languages. The difference lies in various aspects particularly in the morphological aspect such as its rich nonconcatinated morphology and other major ways that will be extensively explained later. Therefore, more studies ought to be conducted in Arabic in order to investigate the potentially operative factors in word repetition that are specific to Arabic, and to examine non-word repetition measure in particular. The current study attempts to contribute to current research by exploring SLI in Arabic through examining the non-word repetition performance of SLI Arabic speaking children and investigating other factors that may be specific to performance of this task in Arabic.

2. Literature review:

2.1 Specific Language Impairment

Leonard (2014) defines **SLI** as a significant deficit in language ability in the absence of impairments in hearing, low nonverbal intelligence, or neurological damage. This deficit is identified among approximately 7% of the child population. In most of the cases, individuals are diagnosed with SLI during their preschool years and continue to exhibit relatively weak language skills as adults. It is vastly agreed that children with SLI demonstrate general delays in language development. Moreover, many of these children exhibit unusual weaknesses in specific areas of language (Leonard, 1998) and can be manifested as significant deficits in expressive and/or receptive verbal communication (Shaalán, 2010). Children with SLI show deficits in the areas of syntax, morphology, phonology, lexical-semantics, and pragmatics. Bishop & Leonard (2000) suggest that inflectional morphology is an area of language that is considered a significant obstacle for many children with SLI. For instance, Leonard (1998) argues that numerous studies documented difficulties in marking finiteness (tense and agreement inflections on verbs) in children with SLI speaking English and other languages. Abdallah & Crago (2008) elaborate that English speaking children with SLI are less accurate than their matched peers with TLD in using a range of grammatical morphemes such as copula *be* forms, present tense third person singular -*s* inflection, and regular past -*ed* verb forms (Leonard, Eyer, Bedore, & Grela, 1997; Redmond, 2003; Rice, Wexler, & Cleave, 1995). Shaalan (2010) discusses studies of morphosyntactic deficits in children with SLI in Arabic and Hebrew and emphasizes varying results with regard to whether these children have significant deficits with inflectional morphology. Dromi and her colleagues (Dromi, Leonard, & Shteiman; 1993; Dromi, Leonard & Blass, 2003) for example, demonstrate that Hebrew speaking children with SLI do not have special difficulty in most inflectional morphemes. However, Abdalla (2002) found that Arabic speaking Saudi children with SLI showed deficits in tense and agreement markers. Furthermore, she found a significant difference on both person and gender, but no significant difference on past or present agreement inflections (Shaalán, 2010).

2.2 Non-word repetition

Different tools are employed in order to identify SLI. One tool that has been often used and in which this study is mainly interested is **non-word repetition**. Non-word repetition is a tool that has received considerable attention in relation to language impairment (Botting & Conti-Ramsden, 2001) since it appears to be sensitive to some of the underlying cognitive difficulties of SLI (Gathercole, 1995), probably those associated with working memory, phonological

memory or long-term word knowledge. Many studies have demonstrated that English-speaking children with SLI perform significantly lower than their peers with TLD on non-word repetition measures (Kamhi et al., 1988; Gathercole and Baddeley, 1990; Bishop et al., 1996; Weismer et al., 2000; Marton and Schwartz 2003). Furthermore, research suggests that non-word repetition is a measure that reflects children's processing ability as much as or even more than their language knowledge. For instance, non-word repetition measures successfully identifies English speaking children with SLI from their peers with TLD even among speakers of other English dialects such as African-American English (Dollaghan and Campbell 1998, Oetting and Cleveland 2006). The widely agreed interpretation for this poor performance of children with SLI on such tasks is that children with SLI have significant limitations in phonological memory. These limitations may be accompanied by other working memory problems, which have a detrimental effect on children's ability to form the necessary phonological representations to learn words and longer linguistic units. (Bortolini et al., 2006) On the other hand, Bortolini et al. (2006) suggest that symptoms of SLI are not the same across languages. At the same time, research has shown that the nature of the grammatical deficit in children with SLI, error profiles, and their relationship with typical language learners and some of the potentially operative factors are universal, whereas others are language specific. Most of the studies on SLI have focused on English, Abdalla & Crago (2008) reports that there is a dearth of research on language impairment in Arabic.

2.3 The structure of words in Arabic

Boudelaa et al., (2009) discuss elaborately the difference between **Semitic languages and Indo-European languages** which are strikingly different in various aspects, particularly the morphological aspect. Semitic morphology provides a sharp contradiction with the more widely studied Indo-European morphologies. The difference between Arabic and English is particularly striking (Saiegh-Haddad & Henkin-Roitfarb, 2014). These two languages differ in at least three major ways with regard to morphology. First, many English words have no morphological structure (e.g., car, caravan, table), whereas in Arabic, the great majority of content words, and even some function words are morphologically comprising at least two abstract bound morphemes, a root and an interwoven word pattern, which vary in their form, function, and distributional features, that is, how frequently they combine (Boudelaa et al., 2009). Wright

(1995) points out that roots and word patterns have a completely different phonological make-up and different morphological functions. Roots consist only of consonants and convey semantic meaning, while word patterns are mainly consisted of vowels but can consist of consonants as well, and perform as a phonological template that conveys semantic and in some cases also syntactic information. Both roots and word patterns play a significant role in processing spoken and written Arabic words (Saiegh-Haddad, 2013, 2017a, 2017b.; Saiegh-Haddad & Taha, in press; Saiegh-Haddad & Geva, 2008; Saiegh-Haddad, Hadieh & Ravid, 2011; Taha & Saiegh-Haddad, 2016, 2017) and are an important organizing principle of the lexicon of adult and young Arabic speakers alike (Boudelaa, 2014; Shalhoub-Awwad & Leiken, 2016).

A second essential difference between Arabic and English morphology is related to the construction of the surface word forms and how these forms are related to the relevant constituent derivational morphemes. Morphemes in English are **attached linearly (concatenated) one after the other**, for instance, dark + -ness = darkness, and the root/stem morpheme is often a real word free morpheme that has a reality as a real word. Arabic also relies sometimes on concatenative morphology, but is unique in its non-concatenative morphology. In Arabic, a root like {KTB} an **abstract** consonantal root denoting a family of words all related to writing is interleaved in fixed slots within another abstract word pattern like CaCaC such that they surface in a **discontinuous nonlinear manner** in a word like /*katab*/ 'write' (Saiegh-Haddad & Henkin-Roitfrab, 2014). Therefore, many Arabic morphemes are not explicit independent phonetic entities in the language and must rather be deduced from underlying distributional patterns.

The third difference relates to the way the two languages use morphology to encode different aspects of meaning. English depends least often on the morphological option in order to encode meaning, using instead auxiliaries or particles, whereas Arabic relies mostly on morphological procedures. In order to clarify this point, Boudelaa and his colleagues exemplify the concept of **causativity**, the process of causing someone to do something, or causing something to happen. In English, there are three main linguistic procedures that can be used to convey the meaning of this concept. The first is completely lexical, using particular lexical items that indicate to causal concepts (e.g., feed, cause to eat). The second procedure is a syntactic one, namely using phrases that stand for causal volition (e.g., make someone happy). The third is a morphological procedure which integrates stems and specific causative morphemes to form morphological

causatives (e.g., weaken, shorten). In addition to another method called zero morphology, e.g. the students marched up the hill vs. the teacher marched the students up the hill. Of these three procedures, English depends least often on the morphological procedure. In contrast, Arabic relies merely on morphological procedures, so that in order to express the concept of causativity, a root is combined with a causative word pattern (e.g., CaCCaC active, perfective, causative) to create forms like /*kattab*/ 'cause to write', /*ʔallam*/ 'cause to learn'. These morphological features are compatible with psycholinguistic evidence showing that morphological composition and decomposition appear to be compulsory processes in Arabic language production and language comprehension.(Boudelaa, 2014; Boudelaa et al., 2009; Sahlhoub-Awwad & Leiken, 2016) and that morphological processing is strongly implicated in reading and spelling development in Arabic (Saiegh-Haddad, 2013, 2017; Saiegh-Haddad & Taha, in press; Taha & Saiegh-Haddad, 2016, 2017). In turn, these features **might also affect non-word repetition** and its components, and thereby create a difference of how speakers of a Semitic language versus an Indo-European perform on this task, especially when the non-word is formed by altering a real word in their language. **These characteristics make Arabic specifically valuable for determining universal versus language-specific aspects of non-word repetition in SLI.**

2.3.1 Nouns & Verbs

Another variable on which the current study sheds light is the potential effect of lexical category, verbs versus nouns, on repetition. Tyler, Bright, Fletcher and Stamatak , (2004) suggest that the difference between nouns and verbs is in their semantic representations. Nouns are more concrete and/or have more perceptual features than verbs (Breedin et al.,1998; Marshall, Chiat, Robson, & Pring, 1996a; Marshall,Pring, Chiat, & Robson, 1996b) .However, Wise et al., (2000) argue that abstract nouns are acquired later in life. Whereas others claim that nouns and verbs differ mainly in terms of their grammatical roles in sentences (Saffran, Schwartz, & Marin, 1980) or in terms of their lexical functions (Shapiro & Caramazza, 2003).On the other hand, Black & Chiat (2003) argue that the syntactic difference between nouns and verbs goes together with phonological and semantic distinctions Furthermore, Bleser and Kauschke (2003) point out to a large body of research demonstrating the superiority of nouns over verbs in terms of age of acquisition and their emergence in children's early vocabulary (Bates et al., 1994).; Caselli et al., 1995; Dromi, 1987 Gentner, 1981, 1982).Therefore, the current study aims to investigate whether the distinction between verbs and nouns affects the repetition of the non-words that are

derived from Arabic verbs and noun. It is noteworthy that Arabic verbs are always formed in patterns, while nouns are formed in various strategies. This could have important implications on the research.

3. Research questions

The present study aims to answer the following questions:

- a.** Are there any differences between children with typical language development (TLD) and children with specific language impairment (SLI) in terms of word and non-word repetition performance?
- b-** What would impact performance on word and non-word repetition? Is the distinction between nouns and verbs reflected in word repetition and non-word repetition? Does the frequency of the morphological template/word pattern and/or phonological complexity of the items (i.e., number of syllables or consonant clusters) affect repetition?

The following hypotheses will be tested:

- 1- Children with typical language development will outperform children with specific language impairment in both word and non-word repetition tasks.
- 2-The distinction between verbs and nouns will be reflected in the word and non-word repetition performance among both groups of participants.
- 3-The phonological complexity of the items as well as the frequency of the morphological template will have a robust effect on word and non-word repetition among children with SLI. The performance of word and non-word repetition children with TLD will not be influenced by frequency of the morphological templates or phonological complexity of the items.

4. Method

4.1.Subjects

55 kindergarten children will be tested; 30 children with TLD and 25 children with specific language impairment (SLI). The age range of children in both groups will be from 5;6 to 6;6. All Children with SLI will come from language kindergartens which are located in the north of Israel. Participants will be native speakers of the local dialect of Palestinian Arabic spoken in the

north of Israel. Participants with hearing problems or social communication impairments will be excluded. Testing of the children will be authorized by the ministry of education, schools' administrative staff and parents.

4.2 Material and Procedure

Three tasks that examine repetition are employed in the study: Word and non-word repetition tasks, and a quasai universal non-word repetition task. These tasks will be complemented by SLI screening tasks.

4.2.1 Word repetition task

In this task, children will be presented with the words orally through a PowerPoint presentation in which they have to build the parts of destroyed houses through repeating each word they hear accurately. Each word in the presentation will not be repeated more than once.

The word repetition task is comprised of seventy bi-syllabic words in Palestinian Arabic. The words were taken from a spoken corpus which was generated from 5-year-old children from three Arab regions in Israel, Nahef, Nazareth, Kufur Qarea. The words were elicited through connected recording devices to the children while they were playing outdoors. The corpus consisted of approximately 11,300 words in different lexical categories, verbs, nouns, pronouns, adjectives, determiners, proper nouns, propositions, Wh words, numbers, and adverbs, and were ranked according to their frequency of appearance in the corpus. For the sake of the study, only nouns (N items in the corpus= 257) and verbs (N items in the corpus= 385) were addressed. In addition, since participants of the study speak a northern dialect of Palestinian Arabic, lexical items that are not used in this vernacular were excluded as well. Furthermore, mono-syllabic words (N items= 18) were excluded as well since studies showed that children have no difficulty repeating monosyllabic words. In addition, verbs and nouns that are formed according to the CaCaC template (N items: verbs=73; nouns=27) were excluded due to their rather very high frequency. Next, the items, verbs and nouns were ordered according to their frequency in the corpus. Then they were classified according to their pattern categories. Eventually, ten pattern categories of high and low frequency were included, five verbal patterns and five nominal patterns. For each of the ten patterns seven items were picked out, hence yielding the seventy items used in the word repetition task. It is noteworthy that the study is interested in testing the

impact of the frequency of the pattern category not the frequency of the words of each pattern category. Therefore, the chosen items of each pattern category were matched for word frequency and were chosen from medium frequency. In this way, the effect of the frequency of the word is controlled. Due to the rather small number of items with low frequency verbal pattern in the corpus, there was a need to ask ten pre-school teachers to assess the frequency of 36 verbs of four low frequency verbal pattern categories (تفاعل *tfaʕal*, تفعل *tfaʕʕal*, أفعل *afʕal*, فاعل *faʕal*) on a scale from 1 (very familiar) -5. The choice of the four low frequency verbal patterns was based on a study (Laks, 2011). I came up with verbs following these patterns and asked the teachers to rank them. Hence, other items of low frequency verbal patterns were included in the chosen items in the tasks as well.

4.2.2. The non-word repetition task:

The same words used in the word repetition task were used to create a non-word repetition task. However, each of these words was turned into a non-word by changing the medial consonant of the root to a consonant that yields a non-existent root in Arabic. In this task, children will be presented with the non-words orally through a PowerPoint presentation in which they have to move beads in a necklace by repeating the magic words they hear. This task tests the ability of children to repeat novel words that could be Arabic words.

4.2.3. Quasai universal non-word repetition task:

This task was described by Chiat (2015) and used in *Methods for assessing multilingual children: Disentangling bilingualism from language impairment* book (2015). The task includes 31 words that are made up from no roots/stems in any language. The child listens to each word once through a PowerPoint presentation, and he/she must repeat what he hears. This task is designed **to test the ability to repeat strings of sounds regardless of the language** since the words employed in the task are not words and have no roots or templates in PA.

4.2.4. SLI Screening tasks:

As the study is interested in investigating Arabic speaking children with SLI, we ought to make sure that these children have specific language impairment. Since we do not know how the children were diagnosed in the absence of standardized tools, we shall use some subtests of the ALEF (*Arabic Language: Evaluation of Function*), a language screening battery created by a US

team led by Grigorenko and validated based on a normative sample of children 3-9 years of age from Saudi Arabia. Preliminary psychometric analysis of seven ALEF subtests (Receptive Vocabulary, Sentence Imitation, Word Articulation, Non-word Discrimination, RAN, Digit Span, and Nonword Repetition) based on the performance of 118 children (*Mean* age = 7.21, *SD* = 1.06) revealed high reliabilities for all subtests (Grigorenko, personal communication). The following ALEF tasks will be used to screen for SLI These subtests have been recently adapted to PA and used in screening for SLI among speakers of PA in Israel (Ghawi-Dakwar, 2017; Saiegh-Haddad & Ghawi-Dakwar (submitted).

Word Articulation Task. The experimenter shows the child a picture via PowerPoint presentation and asks him\her to name what he\she sees is in the picture based on the sentence that the experimenter starts with. Eventually, the child is supposed to say 46 words. Each word includes a specific sound that is targeted to be articulated by the child.

Receptive Vocabulary Task. The experimenter shows the child three pictures via PowerPoint presentation, and asks him\her to point to the picture that is relevant to the target word. This task aims to detect receptive vocabulary.

Expressive Vocabulary Task . The experimenter shows the child pictures via PowerPoint presentation, and asks him to say what he sees in each picture. This task aims to test expressive vocabulary .

Sentence Comprehension Task . The experimenter shows the child three pictures via PowerPoint presentation and says a sentence that describes one of the three pictures in the slide. The child is asked to point to the picture that matches the sentence he/she heard. This task tests the oral language comprehension ability of the child.

Sentence Completion Task . The experimenter shows the child a couple of pictures via the PowerPoint presentation. The experimenter describes the first picture, then s/he starts describing the second one and then asks the child to continue the description of the second picture. This task tests the ability of the child to use the plural\singular forms and other grammatical features.

Sentence Imitation Task .The experimenter says a complete sentence and asks the child to repeat the exact same sentence as he/she heard it. It aims to test the verbal long term memory.

Pseudo Word Repetition Task The experimenter says loudly novel words and asks the child to repeat the same novel words as he/she heard them. It tests verbal \ phonological short term memory.

Pseudo Word Discrimination Task The experimenter says loudly two pseudo words, and asks the child is to decide whether the two words he/she heard are similar or different. This task tests the ability to discriminate between phonological forms.

Digit span task. The experimenter says loudly a random string of digits, and asks the child to repeat the digits he heard but with the opposite order. This task is called backward digit span measures verbal short term-working memory.

Rapid automatized naming (RAN) The experimenter shows the child a row of 5 colours or pictures of objects repeated fifty times and asks the child to name what he\she sees one after the other as fast as he can. The experimenter measures the time taken by the child to name the whole set of 50 items. The task includes two trials: picture/object naming and color naming.

5. **Contribution of the study**

Abdalla & Crago (2008) pointed out to the dearth of research on SLI in Arabic. Therefore, the importance of this study lies in its interest to investigate SLI in Arabic. Thus, it joins to the limited number of studies that examined specific language impairment among Arabic speaking individuals, by attempting to contribute to this area of research by bringing more understanding in SLI in Arabic. Since the present study investigates the possible impact of different factors, the phonological complexity of the items versus the frequency of the morphological templates of the items on the performance of word and non-word repetition task. Testing the effects of these factors would detect the limitation or the source of difficulty among Arabic speaking children with SLI. Consequently, it will assist in providing a more thorough identification and efficient means of adjustment or hopefully treatment among Arabic speaking children. Furthermore, this study comes up with un-preceded list that presents the most to the least frequent words and their word pattern among children in their spoken Palestinian Arabic.

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Appendix:

Test Protocol:

Setting: child and experimenter are sitting next to each other in a quiet room in the kindergarten. The laptop is open and the PowerPoint presentation shows a colourful necklace.

The first task: Non-word repetition task: (collecting the beads)

: **Experimenter**

مرحبا يا شاطراه كيفك؟

Hello darling? How are you?

Experimenter: "شوف/ي هاد العقد ..حلو؟...بس شوف شو صار.. انفرطو الخرزات...انا حابه تساعدني ونجمعهن مع بعض ؟ شكرا .. طيب عشان نقدر نجعم الخرزات احنا لازم نعيد كلمات سحريه.. بتعرف كلمات سحريه؟ حلو..الكلمات السحريه هي مش كلمات حقيقيه بس احنا لازم نعيدهن عشان نجعم الخرزات مع بعض ..كلما نجعم خرزه رح نسمع/ي كلمة سحريه ..لما نعيد الكلمه السحريه الي بتسمعها بتيجي الخرزه الثانيه ..ماشي؟ يعني بدني اياك نعيد كل كلمه بتسمعها ماشي؟

Experimenter: look at this necklace... is it beautiful?.. but look what happened, the beads in the necklace are scattered .. I would like you to help me collecting them. ?.. thank you!...in order to collect the beads we need to repeat magic words. Do you know some magic words? Nice. The magic words are not real words but we have to repeat them to get the beads back together. With each bead you will hear a magic word. When you repeat it the next bead shows up. Ok? I just want you to repeat each word you hear ok?..

Experimenter: "يلا نبليش.. هاد العقد فاضي اسا بدنا نعبي وانت بدك تقولي/تقوليلي شو بتسمع/ي....

Experimenter: "let's start collecting the beads..look here is the necklace and it is empty without beads.. so let's collect it and you will say what you hear.

بعد سماع كل كلمه ويكررها الطفل يتم تشجيعه ومدحه مثل: شاطرة/يا بطله/... (: ..

Each time the child repeats the words he hears he will be reinforced and complemented by words like: good boy, you are a hero ... ☺

Experimenter "طيب عنا هون كمان اسواره حلوه بس انفرطت وبدنا نجمعها شو رايك؟ وانت كمان مره بدك تقولي/تقوليلي شو بتسمع/ي طيب؟..شاطر/ه ☺" ...

Experimenter: "Here we have a beautiful bracelet and we want to collect together.. what do you think? Ok and you will repeat the word you hear okay?.. good boy/girl ☺.."

وهكذا يتم المرور على كل الخرزات ويتم تشجيع الطفل في كل مره يكرر الكلمه التي قد سمعها.

In this way, we will go through all the beads and letting the child repeating every word said. The child will be reinforced and complemented each time he repeats the word he hears.

The second task: word repetition (building destroyed houses):

Experimenter "طيب شوف/ي عنا هون حاره فيها بيوت كثير.. حلوه؟... طيب بس يا حرام اجا الهوا وخرب البيوت واسا احنا بدنا نبنيها مع بعض تبنيها معاي؟..شكرا يا بطل!... واحنا عم نبنيهن رح تسمع/ي كلمات بتعرفيهن .. انا بدي تقولي شو بتسمع ماشي؟".....

Experimenter: "...Look at this neighborhood, there are a lot of houses there.. Is it beautiful?.. But unfortunately the wind rose and destroyed the houses. And now we are going to build the houses together what do you think? ..good boy/girl thank you!.. while we are building these houses together you will hear words that you know ..I want you to tell me what you heard okay?..let's start.."

ويتم تشجيع ومدح الطفل في كل مره يكرر الكلمه التي يسمعها ..وبعد ذلك يتم عرض بيوت اخرى ذات لون مختلف.

And so on.. the child will repeat the words he\she hears and he will be complemented by words like :good boy\girl ☺... then other houses with a different color will be shown to the child

Experimenter "طيب اسأ شوف/ي عأا هون كمان بيوت حلوه صح؟ بس الهوا اجت وخربتهن يا حرام .. شو رأيك
نساعدهن ونبني البيوت كمان مره؟ ..شكرا شاطر (:!..طيب أنت اسأ رح تسمع/ي كمان مره كلمات بتعرفهن وتقولي شو
بتسمع ماشي؟!.."

Experimenter: “..ok now look ..here we have other beautiful houses right?.. but unfortunately the wind rose and destroyed them ☹,, let’s help them and build their houses too what do you think?.. thank you ..good boy\girl !!..ok now you are going to listen to other words that you know and I want you tell me what you heard okay?..”

The third task: Non-word repetition (quasi universal- alien):

Experimenter "طيب شوف اسأ هأا ... عأرف شو هأا؟!.. هأا وأاأ جأي من الفضاء..يقولولو كائن فضائي هو رح يقول
كلمات بس أأنا مش رح نفهم عليه بس أنا بدي منك تقولي شو بتسمع حتى لو منعرفش هأي الكلمات طيب؟!"

Experimenter:” look at this..do you know what this is? It is a someone who came from the space ..they call it an alien..he will say words but we won’t understand... but I want you to tell me what you hear even though you don’t know the word ok?”

يتم اسماع الطفل الكلمة تلو الأخرى ويتم تشجيع الطفل ومدحه في كل مره يكرر الكلمة التي يسمعها.

The child will listen to the words and he will be reinforced after he repeats each word.

Child`s Name:	Experimenter:
Gan: regular/ language	Date:
Gender:	City:

Non-word repetition task:

The child`s utterance	The word	
	ʕakeen	1
	ʕawil	2
	ʔ neeb	3
	azzar	4
	Aʕram	5
	adˁlaħ	6
	aħbar	7
	Ballad	8
	Baneed	9
	Dabbar	10
	Dama ʔ	11
	Faʕʕar	12
	Fasaah	13
	ʕalsˁa	14
	ʕameel	15
	ʕemetˁ	16
	ʕokfi	17
	ħanal	18
	ħasˁab	19
	Jasˁab	20
	jokli	21
	katˁas	22
	karrab	23
	Layza	24
	Lawta	25
	Losbi	26
	nafal	27
	naffetˁ	28
	raffaz	29
	Nefel	30
	Rakkam	31
	Rasˁid	32
	Rawsˁa	33
	Redeb	34
	Safeeʕ	35
	Salad	36
	ʕafʕa	37

	fafil	38
	fefeb	39
	fobli	40
	T ^{amee} ?	41
	Tfarab	42
	Tkawar	43
	Wanid	44
	Tonbi	45
	Tmawar	46
	Wafil	47
	warit	48
	Fana?	49
	Tnajal	50
	fekeh	51
	nat ^{af}	52
	S ^a ra	53
	Fefem	54
	Sajah	55
	Was ^a ?	57
	Xotmi	58
	Sa2ha	59
	sakkal	60
	Akraḥ	61
	Hetel	62
	Tratal	63
	Xonzi	64
	Fazzan	65
	tnamal	66
	Arfab	67
	Tnaraf	68
	Asfab	69
	azil	70

Word repetition task:

Child's utterance	word	
	ʔreeb	1
	ʔrrar	2
	Akil	3
	Ajbar	4
	Bareed	5
	Asʕlah	6
	Barrad	7
	Fereh	8
	Dayaʔ	9
	ʔorfi	10
	Jomle	11
	ʕaʔil	12
	Fakkar	13
	Tnaʔaf	14
	Rasam	15
	Kabbas	16
	Tʕawar	17
	Waʔit	18
	Safha	19
	ʔaseel	20
	Asʕad	21
	Fannan	22
	Hemel	23
	Lahza	24
	Sareef	25
	Arʕab	26
	ʔalta	27
	Nawal	28
	Thawar	29
	Akram	30
	Fallah	31
	Tʔatal	32
	Jarrab	33
	Kazab	34
	Naʕeetʕ	35
	Hawal	36
	Rawda	37
	Saʕad	38

	fehem	39
	Atʕab	40
	Dawwar	41
	Fayaʔ	42
	Saxra	43
	Xotbi	44
	ʃereb	45
	Wahil	46
	Samah	47
	Lawha	48
	Xobzi	49
	Yelet	50
	Rakid	51
	ʕajeen	52
	Nadʕaf	53
	Warid	54
	Rakkaz	55
	Tnazal	56
	Torbi	57
	Tʕawar	58
	Tareeʔ	59
	akil	60
	Wafaʔ	61
	Tʕamal	62
	sajjal	63
	Tharab	64
	ʃamʕa	65
	ʃoʕli	66
	Afrah	67
	Tharab	68
	nezel	69
	loʕbi	70

Non-word repetition quasi universal

Child's utterance	word	
	Fuk	1
	Lafi	2
	Kafib	3
	Flablu	4
	Bufaki	5
	Fla	6
	Kib	7
	Bukli	8
	Kifabu	9
	Blaklu	10
	Kuflabi	11
	Baf	12
	Faku	13
	Kabufik	14
	Flukif	15
	Blufa	16
	Kubafli	17
	Biklafu	18
	Fablu	19
	Bukif	20
	Fliku	21
	Klu	22
	Fikubla	23
	Bli	24
	Klifak	25
	Bilu	26
	Flibuka	27
	Kabi	28
	Bifakub	29
	Klibafu	30