

**אוניברסיטת בר אילן**

**המחלקה לבלשנות וספרות אנגלית**

**הצעת מחקר לתואר שני**

**מיומנות זיכרון וחזרות על משפטים (SRep) אצל ילדים עם התפתחות שפה תקינה (TLD) וילדים עם לקות שפה  
התפתחותית (DLD)**

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# **BAR-ILAN UNIVERSITY**

**The Department of English Literature and Linguistics**

## **Thesis Proposal for Master's Degree**

### **Thesis Topic:**

Memory Skills and Sentence Repetition (SRep) among Arabic-Speaking Children with Typical Language Development (TLD) and Children with Developmental Language Disorder (DLD)

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## 1 Introduction

Little is known about the role of verbal versus nonverbal memory skills in sentence repetition (SRep) tasks among children with Developmental Language Disorder (DLD) in general, and among Arabic speaking children with DLD in particular. This study attempts to contribute to the current research by exploring DLD in Arabic through examining the performance of Arabic speaking children with DLD in SRep, and in verbal and non-verbal memory tasks. The current study aims to investigate what constraints on memory impair sentence repetition among Arabic speaking children with DLD and their age-matched peers with typical language development (TLD).

Children who meet the criteria of DLD have below-average language abilities; they have deficits in the production and comprehension of language despite their normal, intellectual and sensory functioning (American Psychiatric Association, 2013). The early language delays start to arise during the preschool years when language fails to develop properly; some children overcome their language difficulties while others continue to experience the language delay to adulthood (Poll, Betz, Miller, 2010). One important clinical marker of DLD is Sentence Repetition (SRep), which is also called sentence imitation and sentence recall as well. It is considered a reliable tool that has been used for decades to measure language abilities in children as well as to discriminate between children with DLD and their peers with TLD.

While SRep is broadly considered as useful measure of identifying children with DLD, there is still a hot debate about the origins of difficulties and the cognitive processes that are measured by SRep tasks (Riches, 2012). In his article, Riches (2012) presents many studies that aimed to investigate the cognitive mechanisms underpinning SRep; he shows that SRep is clearly multifaceted in which reflects different types of representations – syntactic, phonological, lexical and semantic- which are stored in long-term memory (LTM). He also shows that short-term memory (STM) and working memory (WM) also play a role in SRep.

Studies on DLD have primarily focused on the contribution of verbal memory to SRep. Verbal memory is the ability to encode, store and retrieve information for words and language. It is comprised of the phonological store and the articulatory control process; the first accounts for the retention of verbal information for a brief period of time, and the latter is responsible for refreshing the verbal information to prevent decay, and it is involved in translating visual information into verbal information. Non-verbal memory, on the other hand, reflects the ability to encode, store and retrieve information that is visual and spatial in nature (Baddely, 2000). The contribution of non-verbal memory to SRep was not widely investigated in DLD, since studies have showed no impairment of

non-verbal memory in children with DLD compared with their age-matched TLD peers (Alloaway & Gathercole, 2005; Lum et. al., 2012).

To determine the areas of breakdown in SRep in DLD, this study will use a variety of measurements that evaluate the relative contributions of verbal and non-verbal STM, WM, and LTM. To determine the role of STM, two tasks will be administered: verbal and non-verbal. The role of WM will be evaluated using two backward recall tasks; verbal and non-verbal. The role of LTM will be also investigated by conducting declarative and procedural memory tasks: verbal and non-verbal.

The data will be analyzed by comparing the performance of children with TLD and children with DLD on memory and SRep tasks. Moreover, correlation and regression analyses will be conducted to investigate which one of the six memory tasks will be most strongly associated with SRep to understand the construct that SRep taps into.

## **2. Literature Review**

### ***2.1 Sentence Repetition***

SRep task, which is also known as elicited imitation, is a simple paradigm that requires participants to repeat sentences verbatim after listening to them, and count their errors (Riches, 2012). SRep, as reported by many studies, is a better clinical measure for identifying children with DLD than other assessments like non-word repetition (Conti-Ramsden, Botting & Faragher, 2001; Archibald and Joanisse 2009, Polišenská, Chiat & Roy, 2015). These studies argue that SRep may be especially useful because they tap on a range of morphological and syntactic structures that might not be tested by other linguistic tasks designed for investigating comprehension and production of language.

Difficulties in repeating the sentence result in errors. Although a high error rate in SRep is widely considered as a clinical marker of DLD, SRep is poorly understood. Therefore, if the origins of SRep difficulties can be identified, SRep errors can be better interpreted by specialists and a proper treatment can be found (Riches, 2012).

Erlam (2006) shows that repeating sentences is very informative about the participant's language. It is argued that SRep is not a passive copy of the stimulus; it taps into the participant's implicit knowledge. In repeating sentences that are long enough, participants have to process, analyze and reconstruct meaning using their own grammatical and memory systems. On the other hand, repeating short sentences may allow passive copying since participants may only rely on their memory capacity. Therefore, SRep tasks usually include relatively long sentence that taps into the participants' grammatical system. (Marinis & Armon-Lotem, 2015).

In order to repeat the sentence, participants need the ability to process and analyze the sentence phonologically, morphosyntactically, and semantically, extract its meaning, then they use the production system to regenerate the meaning of the sentence from a conceptual representation, using activated lexical entries in long-term memory (Lombardi & Potter, 1992). Therefore, accuracy in repeating sentences verbatim, it is argued, depends on all processes and levels of representation related to comprehension and production and the ability to store and retrieve language material from memory (Marinis & Armon-Lotem, 2015). Riches (2012) also claims that errors in SRep mirror the linguistic competence of the participant such as representations stored in the long-term memory (LTM), and the capacity of short-term memory (STM) and working memory (WM).

## ***2.2 STM and DLD***

Short-term memory refers to the temporarily storage of information; thus, STM tasks measure the ability to hold information in mind for a brief period of time (Vance, 2008). Baddely and Hitch's (1974) model of memory distinguishes between storage of phonological and visuo-spatial information in STM tasks. Many studies have indicated that children with DLD are impaired on tasks of phonological STM; their capacity of temporal storage and processing verbal material such as forward digit span and non-word repetition is limited. (Archibald & Gathercole, 2006; Hick et al. 2005). Impairment in phonological STM may be explained by poor phonological representations, which enable the construction of entries in the lexical store in LTM (Baddely et al., 1998). Since impairments in phonological STM in DLD have been consistently confirmed, STM impairments are thought to be specific to phonological tasks. Therefore, STM impairment would not be expected in visuo-spatial STM tasks (Freed et al., 2012).

Most of the studies that aimed to investigate the effect of STM in DLD have showed no impairments in visuo-spatial tasks; tasks that measure the ability to remember images and information about locations (e.g. Archibald & Gathercole, 2006). However, a study by Hick et al (2005), showed that some children with DLD have visuo-spatial STM impairments as well. Freed et al (2012) argues that these contradictory findings about the visuo-spatial STM abilities in children with DLD is related to the choice of task used in the study; visual stimuli in one task can be better translated into verbal information, and thus stored more effectively than others. Consequently, children with DLD might be impaired in some visuo-spatial tasks and not on others (Johnston, 1994).

### ***2.2.1 STM and SRep***

The important role of STM in SRep was demonstrated in the early research of Panagos and Prelock (1982); in their study, the length of phonemes was manipulated by using longer words but controlling

for structure. The overall phonological load is claimed to be best explained by limitations in phonological STM. Willis and Gathercole (2001) also argued that impaired phonological STM which is assessed during non-word repetition accounts for SRep difficulties, and that children with DLD have phonological STM limitations. Adding to these studies, Alloway and Gathercole (2005) also highlighted the role of phonological STM memory. Their aim was to investigate links between STM phonological memory and short term sentence recall. Their results indicated that children with poor phonological STM make more frequent structural errors than children with good phonological STM matched on their nonverbal ability; they committed more lexical substitution errors, omission and insertion mistakes. Phonological STM, according to their explanation, facilitates the preservation of sentence structure such as word order and inflectional markers.

### ***2.3 WM and DLD***

Working memory refers to a multifaceted brain system that is dedicated to the temporary storage of information and the manipulation of the information necessary for complex tasks such as language comprehension, learning and reasoning (Baddely, 1992). According to Baddeley's model, the "central executive" controls the flow of information into two modality-specific slave system: the phonological loop which temporarily stores verbal information and the visuo-spatial sketchpad which temporarily stores visual-spatial. Many studies have indicated that children with DLD are impaired on tasks of verbal WM but not on tasks of visuo-spatial WM (Lum et. al., 2012, Alloway et al. 2009). It is suggested that children with DLD struggle with storing and processing verbal information rather storing verbal information only. It is also suggested that these impairments in verbal WM may be explained by impaired cognitive skills including deficits in vocabulary and language skills (Alloway et al. 2009). Since impairments in phonological WM in DLD have been consistently confirmed, WM impairments are thought to be specific to phonological tasks.

#### ***2.3.1 WM and SRep***

SRep difficulties appear to be linked with WM difficulties as well. According to Baddely and Hitch's revised model of working memory, chunks are stored in a limited capacity episodic buffer that requires attention for access (Baddely, 2000). The function of the episodic buffer is to "integrate information from temporary subsystem such as the phonological loop to support the verbatim recall of individual words and their order, with semantic information held in long-term memory" (Alloway & Ledwon, 2014). In this model of WM, the central executive is another mechanism that plays a role in SRep; it maintains the ability to remember and manipulate information, and it is assumed to be an attentional-controlling system (Baddely, 2000). Similarly, Cowan (2005) also assumes that forming new links in working memory requires attention to process chunks. In a study by Jefferies et al.

(2004), they showed an attention demanding task which was designed to disrupt the central executive, affected the performance TLD adults on SRep task whereas the performance on a word-list recall task was not affected. Their finding sheds light on the role of the central executive in integrating representations in STM and LTM.

Alloway and Ledwon (2014) confirmed previous findings which argued that impaired verbal WM accounts for SRep difficulties and children with DLD have verbal WM difficulties. Verbal WM was assessed, in their study, using two verbal working memory measures. The first is a listening recall task in which children were presented with a series of spoken sentences and they has to say if the sentences is true or false then they have to recall the final word of each sentence in a sequence. The second is a backward digit recall task in which the children were required to recall a sequence of digits in the reverse order. The study showed that verbal WM scores were significantly associated with SRep accuracy.

## **2.4 LTM**

Whereas working memory preserves information temporarily, long-term memory which is supported by declarative and procedural memory can store information for years (Lum & Conti-Ramsden, 2013). *Declarative memory* refers to personal experiences and general knowledge about the world. It also refers to the knowledge of words that were encoded, stored, consolidated and consciously recalled. This process of encoding information in the system can be fast. Repeated exposure to this stored information can re-encode the information and / or re-activate it via consolidation processes, thus, making it is less-likely to be forgotten. *Procedural memory* is also known as motor skills acquisition. It is involved in the implicit acquisition, storage and use of knowledge. Learning in procedural memory advances gradually; as the stimuli are repeated and skill is practiced, the learning proceeds (Lum & Conti-Ramsden, 2013). Studies on procedural memory suggest that procedural memory is involved in the learning, and use of rule-governed aspect of grammar (Ullman, 2001). Several studies have been conducted that have examined the learning and memory functions of the declarative and procedural memory systems in DLD.

### **2.4.1 Declarative Memory Functioning and DLD**

Declarative memory has been the focus of many studies; showing that individuals with DLD are poorer than age matched controls in the learning and retrieval of verbal information from declarative memory (Lum, et. al. 2012a, Baired et. al. 2010). This has been investigated using list learning or retrieval tasks. In these tasks, the examiner's ability to encode and recall pieces of verbal information (e.g., individual words, pairs of words) is assessed, after multiple exposures (Baron, 2004).

The ability of children with DLD to learn and retrieve non-verbal information from declarative memory has been investigated as well. Several studies have shown that children with DLD are not impaired on the tests assessing learning and retrieval of non-verbal information over multiple exposures compared to their age-matched peers with TLD (Lum et al. 2010; Baired et. al. 2010). Learning and retrieval of non- verbal information from declarative memory has been investigated using analogues of list learning and retrieval tasks described earlier using pictures that cannot be verbalized easily.

#### ***2.4.2 Procedural Memory Functioning and DLD***

Studies on procedural memory functioning in DLD show that verbal aspects of procedural memory are likely to be impaired in DLD (Evan et. al. 2009). On the other hand, findings about non-verbal aspects of procedural memory are mixed. (Lum & Ramsden 2013). Unlike declarative memory, there are no standardized tools that assess implicit learning and retrieval of information and verbal and non verbal information from procedural memory. For verbal procedural memory, children listened to tones while they are engaged in an activity like drawing a picture. After the exposure period, knowledge of the tones presented during the activity is assessed using a recognition task (Evan et. al. 2009). For non-verbal procedural memory, some studies used probabilistic classification tasks in which children have to learn association between cues and outcomes (Lum & Ramsden, 2013).

#### ***2.5 LTM and SRep***

The role of LTM in repeating sentence has been supported by many experimental studies which aimed to test if there is a syntactic role that affects SRep. In experimental studies (Slobin & Welsh, 1968; Hudgins & Cullinan, 1978; Kidd et al., 2007; Riches, et al., 2010) children, adolescents as well as adults were exposed to manipulated structures in which the length of the sentences was controlled; subject relative clauses that can be transformed to object relative clauses, in addition to canonical and non-canonical sentences. This manipulation affected SRep errors among the participants of all ages. Based on these findings, it was argued that SRep errors cannot be explained by STM since the length of the sentence was controlled. Thus, the syntactic representations in LTM are likely to play a role (Riches, 2012). Potter & Lombardi (1998) also supported the role of LTM since they found that that participants' responses in SRep are influenced by structural priming effects, which is widely assumed to reflect underlying syntactic representation (Pickering and Ferreira, 2008). For example, when adults were asked to repeat 'Joe fed the baby pudding (ditransitive) and sold some diapers to the neighbor' (prepositional dative), the first clause was recalled using prepositional dative; e.g. 'Joe fed the pudding to the baby' adopting the structure of the most recently heard clause (examples are from Riches, 2012: 500). Lombardi & Potter (1992) reported that structural priming can affect lexical-

semantic representations as well, and therefore is the reason behind making substitution (replacing a word with its synonym) errors during sentence recall among children. In the study, participants were first exposed to 'lure' items e.g words that overlap in meaning with words in the original sentence. For example, participants might change 'palace' to 'castle' if the latter was used as a 'lure' word (Riches, 2012). This effect of structural priming depends on meaning overlap; it must operate at the level of semantic representations in LTM and cannot reflect processes in phonological STM (Riches, 2012).

### **3. Research Questions and Hypotheses**

This study attempts to answer the following questions:

1. Are there any differences between children with DLD and TLD in the performance on a sentence repetition task?
2. Are there any differences between children with DLD and TLD in STM, WM and LTM functioning, verbal and non-verbal?
3. Is performance on SRep task differentially related to verbal versus non-verbal memory functioning (STM, WM, LTM) in the two groups of children: TLD and DLD?

The following hypotheses will be tested:

1. Children with TLD will fare higher on the SRep task than children with DLD.
2. Children with TLD will fare higher on verbal STM, WM and LTM than children with DLD but not on non-verbal STM, WM and LTM.
3. Performance on SRep task will be differentially related to verbal versus non-verbal memory functioning (STM, WM, LTM) in the two groups of children.

## **4. Method**

### ***4.1 Subjects***

55 children will be investigated; 30 TLD preschoolers and 25 DLD preschoolers. The age range of children in both groups will be from 5;6 to 6;6 years. All children with DLD will come from language preschools 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. Data collection will be authorized by the ministry of education, pre-schools administrative staff and children's parents.

### ***4.2 Material and Procedure***

#### **4.2.1 SREP**

A list of 36 sentences in Palestinian Arabic - PA (from Haj Yihye, 2013) will be used for SRep task. The sentences present a variety of syntactic structures based on similar tasks that have been conducted in other languages. The task includes three levels of structures: the first level includes SVO, negation, coordination, the second level includes questions, temporal clauses and the third level includes relative clauses and conditional sentences. The sentences will be embedded into a treasure hunt in order to make the task more engaging for the children. A bear will be shown in a Power Point presentation going through several locations in search of a treasure. The bear has to move from a stone to stone in order to reach the treasure. On each stone, the child will hear a recorded sentence; the child has to repeat the sentence so the bear can move to the next stone.

#### **4.2.2 STM Functioning**

To assess STM functioning, two tasks will be administered:

*Forward Digit Span (FWD for verbal memory-* FWD is a repetition task which measures verbal – short term memory. It is considered a task of short-term auditory memory, sequencing and simple verbal expression (Rosenthal, Riccio, Gsanger & Jarratt. 2006). The children will be presented with a recorded random string of digits (2-7 digits). The children will be asked to respond by repeating back the same series of digits in the same order (i.e., 9–1–7 for 9–1–7). Studies have reported its efficiency in discriminating between monolingual children with and without DLD (Rispen & Baker 2012). (See appendix A- FWD Task).

*Forward Hand Movement Test for non-verbal memory* - The hand movement measure from the sequential subtests of the Kaufman Assessment Battery for Children (K-ABC, Kaufman & Kaufman, 1983) will be used to assess short- term memory span. It is essentially a serial recall task in which the test items – hand movement comprised with palm and fist – are organized approximately in an increasing movement complexity pattern (Frencham, Fox & Maybery, 2002). The items used in the hand movement task will be four hand postures made on a flat surface with the right hand. Children will be asked to imitate the hand movement in the right order. The test starts with a sequence of two hand postures and then each following sequence is increased by one hand posture. (See appendix B – FWD Hand Movement Test).

#### **4.2.3 WM Functioning**

Working memory functioning will be assessed by a backward digit span (BWD) and a backward hand movement test.

*Backward Digits Span (BWD) for verbal information:* This task is basically the same as the FWD, however, in this task children will be asked to repeat the string of digits in a reversed order. (See appendix C – BWD Task).

*Backward Hand Movement Test for non-verbal information:* This task is basically the same as the Forward Hand Movement Test described above,. However, in this task, children will be asked to repeat the string of hand movements in a reversed order (See appendix D – BWD Hand Movement Test).

#### ***4.2.4 LTM Functioning***

Declarative memory for verbal information will be assessed using the Word Pairs subtests from Children's Memory scales (CMS, Cohen, 1997). Children will be asked to learn a single list of five semantically unrelated word pairs across three trials. The pairs of words (e.g., nurse-fire) are presented in a list. All the words are in Arabic and they are composed of three letters c-v-c. (See Table 4.3 for the Pairs used in the Word Pairs Task for verbal declarative memory). (See Appendix E – Word Pairs Task).

Declarative memory for non-verbal information will be assessed using the Paired Picture-Object Learning Task. It is similar to the Word Pairs task; however instead of learning a word list the child has to learn a list of paired unknown symbols paired with pictures of unknown objects across three trials that are hard to verbalize (the unknown symbols and pictures were adapted from the study of Deak and Toney, 2013) (See Figure 4.2 –The unknown symbols and objects used in the t Picture-Object Learning Task). (See Appendix F – Paired Picture-Object Learning Task).

#### ***Non-verbal Procedural Memory***

Procedural memory for non-verbal information will be evaluated using "The invented letter task" used by Adi-Japha and her colleagues (2011). It is a dot connecting task which requires children to repeat the production of a new letter quickly and accurately (See Figure 4.3, The Invented Letter Task). This task will be used in the current study, however, the experiment will be held on the same day with two hours retention. (See Appendix F – The Invented Letter Task).

#### ***4.3 Procedure***

The experiments will be conducted on three successive days. Tasks will be administered in the following order: On the first day, (a) The Invented Letter Task, (b) Forward Digit Span, (c) Word

Pairs Task and (d) Forward Hand Movement Task. On the following day: (e) Backward Digit Span, (f) Backward Hand Movement and (g) Picture-Object Learning Task. On the third day: (h) SRep task.

#### ***4.4 Data Analysis***

The performance on the different memory tasks will be scored by coding correct and wrong answers. No partial scores or error analysis will be conducted. For SRep, the sentences will be scored correct and wrong for verbatim repetition as well as for structure. Further analyses will be conducted for error patterns in SRep. Between group and within group data will be analyzed for each score of the tests using correlation tests and regressions.

#### ***5. Screening for DLD: ALEF Tasks***

Prior to conducting the tasks in the current study, necessary measures will be held to ensure the diagnosis of TLD and DLD. For this purpose, we will use ten subtests of the ALEF (*Arabic Language: Evaluation of Function*), a language screening battery created by a US team led by E. 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, Nonword 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, E. personal communication with Saiegh-Haddad). Ten ALEF tasks will be used to screen for DLD: Word Articulation Task, Receptive Vocabulary Task, Expressive Vocabulary Task, Sentence Comprehension Task, Sentence Completion Task, Sentence Imitation Task, and Pseudo Word Repetition Task. These subtests have been recently adapted to PA and used in screening for DLD among speakers of PA in Israel (Ghawi-Dakwar, 2017; Saiegh-Haddad & Ghawi-Dakwar, 2017, in *Frontiers in Psychology*).

#### ***6. Contribution of the study***

DLD in Arabic has not been studied broadly like in other language (Abdalla & Crago, 2008). Therefore, this study is ground-breaking in studying DLD in Arabic because it attempts to bring more understanding to DLD in Arabic. The current study sheds light on the effect of memory on language learning in Arabic children with DLD. Thus, it will be beneficial for understanding the source of deficits of children with DLD that might hinder their language acquisition. These manifested deficits in language skills might be predicted by specific memory skills; consequently, alternative teaching methodology can be built to help and treat these children.

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## Appendix A

### Forward Digit Span - FWD

#### Answer Sheet      \*Record Forward Digit Span

Name \_\_\_\_\_ LastName \_\_\_\_\_ Gan \_\_\_\_\_  
Age \_\_\_\_\_ Date \_\_\_\_\_ Experimenter \_\_\_\_\_

Practice:

## **Test Protocol in English for FWD**

### **Equipment for each participant:**

- Computer/Laptop
- Power Point presentation
- Earphones that enable the participants to hear the digits clearly
- Cell phone to record the participants' repetitions of digits
- Stopwatch that enables the measurement of RT in the training session
- 1 page for the answer sheet that includes 16 lists of digits
- A prize (stickers)

**Instructions:**

"Today we will play a fun and nice game with numbers"

You will hear a list of numbers, you need to try your best to remember the numbers you hear and repeat them out loud.

For example if I say : " six, three "– you have to say: " six, three "

"Okay dear? Now you try as an example – four, five"

"What do you have to say?"

"You are doing great!"

"Let's do another one – six, ten

What do you have to say?

Great, let's continue"

"You should focus and try your best to be accurate and fast."

**Training Session**

The child starts the training session, the child hears two lists of two digits – one list at a time - and he is asked to recall the digits he/she hears. The child has a chance to correct if he /she is mistaken in the training session.

"3,1"

"1,0"

"great"

**In the experimental session**, each child is presented with 16 lists of digits – the list begins with two digits, and increases in length by one digit. After each session of the experimental session, the child sees a smiley face on the computer screen – and then we say "you are such a hero! You are doing wonderfully! Let's continue"

We have to encourage the child after each list so he/she will be motivated to continue. We should use words such as "hero" and "great" instead of using "good" and "correct".

We have to fill with V if the child repeats the digits correctly, in all the 16 lists. The need to be recorded for further analysis.

## Test Protocol in Arabic for FWD

### معدات لكل مشترك:

- حاسوب
- شريحة Power Point
- سماعات للأذنين لكي يستطيع المشترك سماع الارقام بشكل واضح
- هاتف خليوي من اجل تسجيل تكرار المشتركين للارقام
- هاتف خلوي / ساعة من اجل قياس طول وقت رد الفعل للمشاركين
- ورقة نتائج
- جائزة (ملصقات)

## تعليمات:

"اليوم رح نلعب لعبة حلوة وممتعة مع الارقام"

"انت رح تسمع/ي ارقام من 1-9 – انت لازم تجرب/ي تتذكر/ي هاي الارقام وتعيدها من وراي:

مثلا اذا انا بقول : ستة، ثلاثة انت لازم تقول/ي: ستة ثلاثة"

طيب حبيبي/حبيبتي؟ نع/تعي نجرب كمان مثال

اذا انا بقول " اربعة ، خمسة – انت شو لازم تقول/ي؟

"حلو!"

كمان مثال :

اذا انا بقول ستة عشرة – انت شو لازم تقول/ي؟

رائع! يلا نكمل!

**مرحلة التمرين** (المشارك يسمع قائمتين بواسطة الحاسوب – كل قائمة مكونة من رقمين - يمكن للطفل/ة تصحيح الاخطاء)

تذكير المشترك:

"رح تسمع ارقام كمان مرة – لازم تتذكر/ي الارقام وتحكيهن حسب الترتيب اللي انت سمعته/ا

"3,1"

"1,0"

كثير حلو!

## مرحلة الامتحان

كل طفل يسمع من خلال السماعات 16 قائمة من الارقام – كل قائمة على حدة – القائمة تبدأ برقمين وتنتهي بتسعة ارقام.

بعد كل قائمة يظهر وجه ضاحك

يجب قول كلمات تشجيعية للاطفال

مثلا

"انت رائع! كثير حلو!"

ولا نقول جيد او هذا صحيح

بعد ذلك نقوم بتعبئة ورقة النتائج

نقوم بتسجيل الاجابات لتحليل النتائج

Appendix – B

Hand Movement Test – FWD

Answer Sheet

Hand Movement Test

Name: \_\_\_\_\_ Last name: \_\_\_\_\_ Gen: \_\_\_\_\_  
Age: \_\_\_\_\_ Date: \_\_\_\_\_ Experimenter: \_\_\_\_\_

Practice:



1. \_\_\_\_\_



2. \_\_\_\_\_



1



2

## **Test Protocol in English for Hand Movement Task**

### **Equipment for each child:**

Prize- (stickers)

Scoring sheet and pencil

### **Instructions:**

"We are going to play a game with our hands – we are going to do some hand movements together and see how many of them you will remember"

"I will do some different shapes on the surface of the table; you have to try to remember the shape that I will do and try to do the same using your hand"

"I will use my right hand and so do you"

"This is my right hand – what about you? Where is your right hand?"

"Great – let's try the shapes together"

"Let's try this shape :



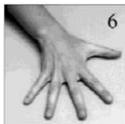
"Nice, let's try another one"



"Very nice! Let's try one more"



"You are a hero! Let's try the last one"

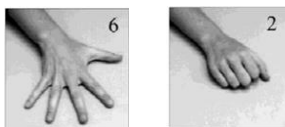


"Wonderful!"

"After you got to know the four shapes – we will move the second level of the game"

"Now – I will do two hand-shapes one after the other – you have to try your best to memorize the two shapes and your best to imitate them in the right sequence:

For example – If I did



"What are you supposed to do?"

"Very nice!"

The experimenter has to correct the child if he/she did and mistake"

"It's ok if you did a mistake – don't be afraid you can correct it"

"Are you ready to continue?"

"Great let's move on!"

### **Practice session:**

"Again, you will see two shapes – Pay attention- you can correct yourself"

1.



After each trial, the experimenter has to encourage the child with words

"Very nice"- "You are such a hero"

"Now you will see two more hand shapes"

2.



"Wonderful! – I see that you have understood the rules of the games – so we will continue playing!  
You need to focus again!"

### **Test session**

"Let's continue – are you ready?"

The experimenter has to say nice words after each sequence

#### **Sequence of two hand movements.**

"Great! Nice! Wonderful!"

#### **Sequence of three hand movements**

"Now we will move up to the last level! I want you to say focused and pay attention the order /sequence"

The experimenter has to say nice words after each sequence

#### **Sequence of four hand movements**

"Very nice! I am proud of you"

The testing session stops when the child cannot remember two trials in each sequence correctly.

## Test Protocol in Arabic for Hand Movement Task

### معدات لكل مشترك:

جائزة – (ملصقات)

ورقة نتائج وقلم رصاص

### تعليمات:

"اليوم رح نلعب لعبة بايدينا – رح نعمل حركات ونشوف اديش منتذكر من هاي الحركات"

"انا رح اعمل اشكال مختلفة بأيدي على الطاولة، وانت لازم تجرب تتذكر الشكل اللي انا عملته وتعمل مثله باستعمال ايدك"

"انا رح استعمل ايدي اليمين وانت كمان لازم تستعمل/ تستعلمي ايديك اليمين"  
"انا هاي ايدي اليمين وانت وين ايديك اليمين؟"

"حلو!"

"تعال/تعالني نجرب الاشكال اللي رح تشوفها/تشوفوها مع بعض"



"يلا نجرب هاذ الشكل :

حلو ممتاز!

يلا نجرب كمان شكل:

حلو كثير!

يلا نجرب كمان شكل :



حلو بطل!

ضل عنا اخر شكل:

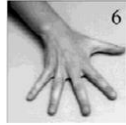


رائع!

بعد متعرفنا عالاربع اشكال اسا لازم ننتقل للمرحلة الثانية من اللعبة

انا اسا رح اعمل شكلين ورا بعض وانت لازم تجرب/ي قد مبتعذر/ي تتذكر/ي ايش الشكلين اللي انا عملتھن - وانت لازم تعمل/ي مثلھن  
وبنفس الترتيب :

مثلا اذا انا عملت هيك:



"انت شو لازم تعمل/ي؟"

"حلو كثير"

يجب اعطاء امكانية التصليح للاطفال

"ما تخاف/تخافي اذا غلطت بنفع تصلح/ي"

يلا جاهز/جاهزة نكمل؟"

"حلو يلا نكمل"

### فترة التمرين:

"اسا رح تشوف/ي كمان شكلين - انتبه/ي منيح - بنفع تصلح/تصلحي حالك اذا تخربطت"



1.

بعد كل سلسلة يجب تشجيع الطلاب "حلو كثير" "انت بطل/ة"

"اسا رح تشوف/ي كمان شكلين - انتبه/ي منيح - بنفع تصلح/تصلحي حالك اذا تخربطت"



"كثير حلو – انت اسا فهمت/ي القوانين منيح – رح نكمل اللعبة – ركزي منيح طيب حبيبي/حبيبي؟"

### فترة الامتحان

"يلا نكمل! جاهز/ة؟"

سلسلة مكونة من حركتين

يجب تشجيع الطالب بعد كل سلسلة

سلسلة مكونة من 3 حركات

"رائع! كثير حلو!"

سلسلة مكونة من 3 حركات

"اسا رح ننتقل لآخر مرحلة - رح نشوف 4 اشكال ورا بعض – بدي اياتك تضل/ي مركز/ة منيح وانتبه/ي للترتيب"

يجب تشجيع الطالب بعد كل سلسلة

"رائع! كثير حلو! انا فخورة فيك/ي"

الاختبار يتوقف عندما لا يستطيع الطفل تذكر الاربع محاولات في سلسلة معينة بشكل صحيح

## Appendix C

### Backward Digit Span – BWD

Answer Sheet      \*Record  
Backward Digit Span

Name \_\_\_\_\_ LastName \_\_\_\_\_ Gen \_\_\_\_\_  
Age \_\_\_\_\_ Date \_\_\_\_\_ Experimenter \_\_\_\_\_

Practice:

3 \_\_\_\_\_ 1 \_\_\_\_\_ RT \_\_\_\_\_  
1 \_\_\_\_\_ 0 \_\_\_\_\_ RT \_\_\_\_\_

Tick (✓) if it is correct:

1.	9 _____ 2 _____
2.	6 _____ 4 _____
3.	6 _____ 8 _____ 3 _____
4.	2 _____ 1 _____ 6 _____
5.	7 _____ 1 _____ 4 _____ 3 _____
6.	8 _____ 5 _____ 1 _____ 6 _____
7.	9 _____ 3 _____ 2 _____ 4 _____ 8 _____
8.	6 _____ 8 _____ 1 _____ 2 _____ 5 _____
9.	4 _____ 7 _____ 1 _____ 9 _____ 8 _____ 3 _____
10.	3 _____ 8 _____ 4 _____ 6 _____ 9 _____ 7 _____
11.	8 _____ 3 _____ 2 _____ 4 _____ 7 _____ 1 _____ 5 _____
12.	3 _____ 6 _____ 1 _____ 2 _____ 5 _____ 8 _____ 9 _____
13.	3 _____ 6 _____ 7 _____ 9 _____ 5 _____ 4 _____ 8 _____ 1 _____
14.	4 _____ 5 _____ 1 _____ 3 _____ 6 _____ 7 _____ 9 _____ 2 _____
15.	9 _____ 6 _____ 4 _____ 2 _____ 1 _____ 7 _____ 8 _____ 3 _____ 5 _____
16.	5 _____ 3 _____ 8 _____ 7 _____ 1 _____ 9 _____ 6 _____ 2 _____ 4 _____

## Appendix D

### Backward Hand Movement Task

# Answer Sheet

## Backward Hand Movement Test

Name: \_\_\_\_\_ Last name: \_\_\_\_\_ Gen: \_\_\_\_\_

Age: \_\_\_\_\_ Date: \_\_\_\_\_ Experimenter: \_\_\_\_\_

Practice:



1. \_\_\_\_\_



2. \_\_\_\_\_



















1. \_\_\_\_\_



2. \_\_\_\_\_

Tick (V) if it is correct:

1	1. _____ 2. _____			
2	1. _____ 2. _____			
3	1. _____ 2. _____ 3. _____			
4	1. _____ 2. _____ 3. _____			
5	1. _____ 2. _____ 3. _____ 4. _____			
6	1. _____ 2. _____ 3. _____ 4. _____			

→ Span Score:  $1 + (\text{number of correctly recalled sequences}) / 4 =$

## Appendix E

### Word Pairs Task

Answer Sheet

\* Record

Word Pairs

Name: \_\_\_\_\_ Last name: \_\_\_\_\_ Gen: \_\_\_\_\_

Age: \_\_\_\_\_ Date: \_\_\_\_\_ Experimenter: \_\_\_\_\_

**Practice:**

"drank – sky": شرب - سما: \_\_\_\_\_

"walked – grapes": مشى - عنب: \_\_\_\_\_

Tick (V) if it is correct:

	Repeat (twice)	Trial 1	Immediate recall trial 1	Repeat at	Trial 2 Same order		Trial 3 Different order	Immediate recall trial 2
1. ate – sea اكل بحر		—	—		—	كتب - شيبين	—	—
2. ran – bed ركض - تخت		—	—		—	لعب - قمر	—	—
3. heard – pencil سمع - قلم		—	—		—	اكل بحر	—	—
4. wrote – sun كتب - شيبين		—	—		—	سمع - قلم	—	—
5. played – moon لعب - قمر		—	—		—	ركض - تخت	—	—
<b>Total</b>								

**Test Protocol in English for Word Pairs Task**

**Equipment:**

- Cell phone to record the participants' repetitions of the words in case the experimenter missed anything
- 1 page for the answer sheet that includes a list of five word pairs.
- A prize - Stickers

**Instructions:**

"Today we will play a memory game with words"

"You will hear five word pairs –two words that go together in each pair – you need to listen carefully and try your best to remember which two words go together in each pair. "

"For example if I say

"drank – sky"

That means that these two words go together during throughout the game

So of I say "drank" you have to say "sky"

"do you understand?"

"You need to say answer loud enough so I can hear you."

"Let's have one more example"

"walked – grapes"

"If I say "walked" what do you have to say?"

"wonderful!"

The examiner corrects the child if he/she was incorrect.

After we make sure that the child understands the task, he/she can start the experimental session.

**Trial 1**

In the experimental session, each child is presented with 5 pairs of semantically unrelated words –in three trials.

"Now you will hear five pairs of words – I want you to repeat the words in which you hear"

"Are you ready?"

"I know you can do it!"

"1. ate-sea

2. ran - bed

3. heard – pencil

4. wrote – sun

5. played – moon"

"Great!"

We will do the same things again – I will say the words and you have to repeat what I say

I want you to focus and try your best to learn which two words go together"

"Now I will say the first word and you have to tell me the word that goes with it"

Ok ?

1. Ate          2. Ran          3. Heard          4. Wrote          5. Played

The experimenter ticks in the answer sheet in case the answer is correct.

### **Immediate call (1) after the first trial**

"Can you recall the pairs that you have just listened to by yourself – without my help?"

The experimenter ticks the correct recalls, and records the answers for further analysis.

### **Trial 2**

Again, each child is presented with the same 5 pairs in the same order.

"Now, you will hear the list again, I want you to repeat the pairs and pay attention – you need to try to remember what words go together.

"1. ate-sea

2. ran - bed

3. heard – pencil

4. wrote – sun

5. played – moon"

"One more time, I will say the first word and you have to tell me the word that goes with it"

"Great! Let's continue"

### **Trial 3**

For the last time, each child is presented with the same 5 pairs but with a different order.

"Now, you will hear the list for the last time, pay attention"

"1. wrote – sun

2. . played – moon

3. ate-sea

4 heard – pencil

5. ran - bed "

"One more time, I will say the first word and you have to tell me the word that goes with it"

1. Wrote            2. Ate            3. heard            4. Played            5. Ran

"Great! Let's continue to the last level"

**Immediate recall 2( after the third trial)**

This is the last level of the game, you are about to win a prize – I want you to pay attention so you can win the prize.

"Can you recall the pairs that you have learned by yourself?"

The experimenter ticks the correct recalls, and records the answers for further analysis.

We have to fill with V if the child recalls the pair of words correctly in all the three trials.  
The children are recorded for further analysis.

"Great! We've finished this game!"

**Test Protocol in Arabic for Word Pairs Task**

**الادوات:**

- هاتف خلوي لتوثيق تكرار الطلاب لازواج الكلمات
- ورقة اجابات التي تحتوي على ازواج الكلمات

### التعليمات:

"اليوم رح نلعب لعبة ذاكرة باستعمال الكلمات"

"رح تسمع/ي ازواج كلمات يعني رح تسمع/ي كلمتين اللي رح يكونوا مع بعض وانت لازم تجرب/ي تتذكر/ي شو الكلمات اللي يكونوا مع بعض

يعني اذا انا بقول

"شرب – سما"

يعني هذول الكلمات رح ييجوا دايمًا مع بعض باللعبة

اذا انا بقلك شرب انت لازم تقول سما

مفهوم؟

لازم تحكي الجواب بشكل واضح عشان اسمعك منيح  
تعال نعمل كمان مثال:

"مشى – عنب"

اسا اذا انا بقلك "مشى" انت شو لازم تحكي؟

"ممتاز!"

يجب على المختبر ان يقوم بتصحيح اخطاء المشترك.  
بعد التأكد من ان الاطفال فهموا المهمة – عندئذ يمكن الانتقال لمرحلة الامتحان.

### المحاولة الاولى- Trial 1

المختبر يعرض – بشكل شفهي – الخمسة ازواج من الكلمات للاطفال ثلاث مرات  
(الازواج الكلمات غير مرتبطة مع بعضها من ناحية المعنى)

"اسا انت رح تسمع/ي 5 ازواج من الكلمات – اخرة مرة يعني كل كلمتين يكونوا مع بعض – بدي اياك تعيد/ي من وراي شو يتسمع/ي  
تركز/ي منيح وتجرب/ي تتذكر/ي أي كلمتين ييجوا مع بعض"

"جاهز/جاهزة؟"

"انا عارفة انك بتقدر/ي تنجح!"

اكل بحر

ركض - تحت

سمع – قلم

كتب – شمس

لعب – قمر

"رائع!"

كمان مرة – رح احكي الكلمات وانت لازم تعيد/ي من وراي - تركز/ي منيح وتجرب/ي تتذكر/ي أي كلمتين ييجوا مع بعض"

"كثير حلو"

"اسا انا رح احكي اول كلمة وانت لازم تقلي ايش الكلمة اللي لازم تيجي معها"

1. اكل 2. ركض 3. سمع 4. كتب 5. لعب

المختبر يقول بتسجيل الاجابات الصحيحة

### التذكر الفوري للكلمات - Immediate call (1) after the first trial

"اسا بدى اياتك تجرب تتذكر ايش ازواج الكلمات اللي مرقت معنا لحالك بدون مانا احكي اشي؟ يعني بدى تقلى كل كلمتين كانوا مع بعض"

المختبر يقوم بتصحيح الاجوبة ويقوم بتسجيل الاجابات الصحيحة

### **Trial 2 – المحاولة الثانية**

"كمان مرة – انت رح تسمع ازواج الكلمات وانت لازم تعيد/ي من وراي - تركز/ي منيح وتجرب/ي تتذكر/ي أي كلمتين بيحوا مع بعض"

"بطل/بطللة!"

" اسا انا رح احكي اول كلمة وانت لازم تقلى ايش الكلمة اللي لازم تيجي معها"

1. اكل 2. ركض 3. سمع 4. كتب 5. لعب

"رائع! يلا نكمل"

### **Trial 3 - المحاولة الثالثة**

"رح احكي ازواج الكلمات لآخر مرة انتبه/انتبهى منيح"

كتب – شمس  
اكل بحر  
سمع – قلم  
لعب – قمر  
ركض – تخت

"كمان مرة - اسا انا رح احكي اول كلمة وانت لازم تقلى ايش الكلمة اللي لازم تيجي معها"

1. كتب 2. اكل 3. سمع 4. لعب 5. ركض

"ممتاز! يلا ننقل لآخر مرحلة"

### **التذكر الفوري للكلمات - Immediate recall 2( after the third trial)**

"هاي اسا احر مرحلة من اللعب – يلا ركز/ي منيح عسان تربحي هدية – بهاي المرحلة لازم تتذكر/ي وتحكي لي الازواج اللي مرقت معنا لحالك بدون مانا احكي اشي- أي كلمتين كانوا مع بعض"

المختبر يقوم بتسجيل الاجابات الصحيحة v في ورقة الاجابات.

وهيك اللعبة خلصت! ممتاز!"

## **Appendix F**

### **Picture-Object Learning Task**



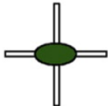

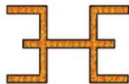





## Answer Sheet

### Picture-Object Learning Task

Name: \_\_\_\_\_ Last name: \_\_\_\_\_ Gen: \_\_\_\_\_

Age: \_\_\_\_\_ Date: \_\_\_\_\_ Experimenter: \_\_\_\_\_

**Tick (V) if it is correct:**

	Trial 1	Immediate recall trial	Trial 2 Same order	Trial 3 Different order	Immediate recall trial
 	_____	_____	_____	_____	_____
 	_____	_____	_____	_____	_____
 	_____	_____	_____	_____	_____
 	_____	_____	_____	_____	_____
 	_____	_____	_____	_____	_____
<b>Total</b>					

Word Pairs Total Score: \_\_\_\_/25

### Test Protocol in English for Picture-Object Learning Task

#### Equipment:

- Cards 10-cm<sup>2</sup>

- 1 page for the answer sheet that includes the pictures of unknown objects and symbols.
- A prize - Stickers

### Instructions:

"Today we will play a memory game with cards; each card has one picture - all you have to do is to match pictures"

"You will see 10 pictures – each two pictures go together– you need to look carefully and try your best to remember which two pictures go together "

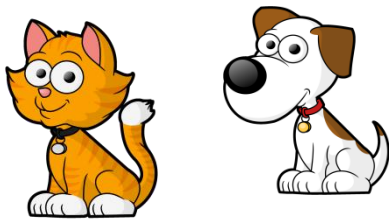
The experimenter shows the child three pictures:

"here are three pictures as an example:



"For example;

These two pictures go together:



"I will take this picture and you will take this picture."

So these pictures go together - If I show you this picture then what goes with it?

"wonderful!"

"do you understand the game?"



After we make sure that the child understands the task, he/she can start the experimental session.

**Before the experimental session begins:** the experimenter familiarizes the children with the pictures in order to make sure that the children do not know the objects and symbols that will be used in the experiment.

### **Trial 1**

In the experimental session, each child is presented with 5 pairs of pictures (unknown symbols and objects).

"Now you will see what two pictures go together – I take one and you take one - I want you to focus and try your best to learn which two go together"

"Are you ready?"

"I know you can do it!"

While showing the cards to the children, the experimenter says "This picture goes with this object"

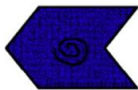

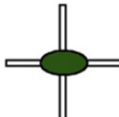

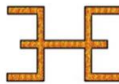





Say with me – this picture goes with this picture

I take this and you take this

The experimenter takes the five unknown symbol and gives the child the picture that goes with it.

Here is mine

Here is yours

1.  
2.  
3.  
4.  
5.  

Now, I have pictures and you have pictures.

Let's do it again.

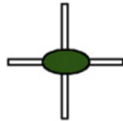
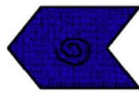
Give me the pictures.

This picture goes with this picture, here is mine and here is yours.

Trial One

"Now I will show you a picture and you have to tell me what goes with it"

Ok ?



The experimenter can correct the child's mistakes.

The experimenter ticks in the answer sheet in case the answer is correct.

### **Immediate call (1) after the first trial**

"Can you recall the pairs that go together by yourself without my help?"

The experimenter ticks the correct recalls, correct the mistakes and records the answers for further analysis.

### **Trial 2**

Again, each child is presented with the same 5 pairs in the same order.

"Now, you will see the pairs, pay attention"

This picture goes with this picture, I take one and you take one

"One more time, I will show you a picture and you have to pick the picture that goes with it"

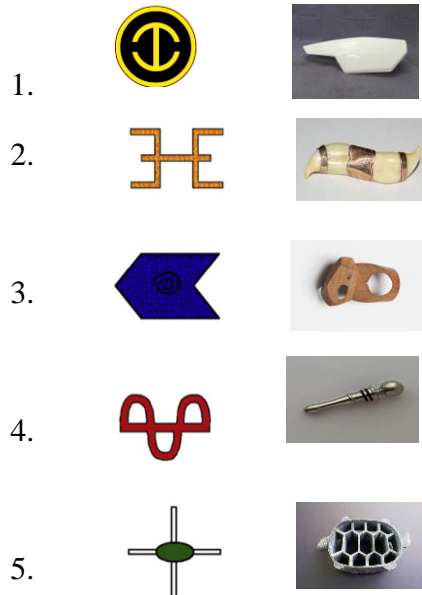
"Great! Let's continue"

### **Trial 3**

This is the last level of the game, you are about to win!

For the last time, each child is presented with the same 5 pairs but this time with different order.

"Now, you will see the pictures for the last time, pay attention"



"Here is mine, here is yours"

"One more time, I will show you a picture and you have to pick the picture that goes with it"

"Great! Let's continue to the last level"

**Immediate recall 2( after the third trial)**

"Can you recall the pairs that you have learned?"

The experimenter ticks the correct recalls.

We have to fill with V if the child recalls the pair of words correctly in all the three trials.

"That's it! Wonderful! Thank you dear, you are a hero here, here is your prize!"

"Did you enjoy the game?"

**Test Protocol in English for Picture-Object Learning Task**

- بطاقات 10-cm<sup>2</sup>
- ورقة اجابات التي تحتوي على ازواج الصور
- جائزة- ملصقات

#### التعليمات:

"اليوم رح نلعب لعبة الذاكرة بالبطاقات – عكل بطاقة في صورة – يعني لازم تلائم/ي كل صورتين مع بعض"

"رح تشوف/ي ازواج صور يعني كل صورتين رح يكونوا مع بعض وانت لازم تجرب/ي تتذكر/ي شو الصور اللي يكونوا مع بعض مثلاً – هون في 3 صور



انا بفلك هذول الصورتين يكونوا مع بعض :



انا بدي اوخذ هاي الصورة وانت توخذ هاي الصورة

يعني هذول الصورتين يجوا مع بعض  
اذا انا بورجيك هاي الصورة



انت شو لازم تورجيني؟  
"حلو!"

"مفهمة اللعبة؟"

يجب على المختبر ان يقوم بتصحيح اخطاء المشترك.  
بعد التاكيد من ان الاطفال فهموا المهمة – عندئذ يمكن الانتقال لمرحلة الامتحان.

**ما قبل مرحلة الامتحان:** يقوم المختبر بعرض ال 10 صور على الطفل للتأكد ان الطفل لا يعرف الاشكال والاعراض المعروضة في الصور.  
يقوم المختبر بتغيير الصورة في حالة ان الطفل قام بالتعرف عليها

#### المحاولة الاولى- Trial 1

المختبر يعرض الخمسة ازواج من الصور للاطفال  
(صور غير معروفة لاغراض و اشارات)




"اسا انت رح تشوف/ي 5 ازواج من الصور – اخره مرة يعني كل صورتين يكونوا مع بعض – انا رح اوخذ صورة وانت صورة - بدي اياك تركز/ي منيح وتجرب/ي تتذكر/ي أي أي صورتين يجوا مع بعض"  
"جاهز/جاهزة؟"

"انا عارفة انك بتقدر/ي تنجح!"

عند عرض الصور يجب ان يقول المختبر  
 "هاي الصور بتروح مع هاذ الشكل"  
 ويجب على الطفل ان يعيد الجملة للتأكد من انه منتبه  
 "عيد وراي هاي الصورة مع هاذ الشكل"  
 وهكذا المختبر ياخذ 5 اشكال والطفل/ة ياخذ 5 صور

1.  
2.  
3.  
4.  
5.  

"اسا انا رح احكي اورجيك صورة وانت لازم تختار الصورة المناسبة اللي لازم تيجي معها"

1. 
2. 
3. 
4. 
5. 

المختبر يقوم بتسجيل الاجابات الصحيحة ويصحح الاخطاء اذا تواجدت

### التذكر الفوري للكلمات - Immediate call (1) after the first trial

"اسا بدني اياتك تجرب تتذكر لخالك ايش ازواج الصور اللي مرقت معنا بدون مساعدتي؟ يعني بدني تقلي كل صورتين كانوا مع بعض"  
 المختبر يقوم بتصحيح الاجوبة ويقوم بتسجيل الاجابات الصحيحة

### المحاولة الثانية - Trial 2

"كمان مرة - انت رح تشوف نفس"  
 يلا -  
 مع كل الصورة المختبر يقول

"هاي الصورة بتيجي مع هاذ الشكل – هاي الي وهاي الك"  
 "كمان مرة - اسا انا رح اورجيك الشكل وانت لازم تقلي ايش الصورة اللي لازم تيجي معها  
 "رائع! يلا نكمل"

### **Trial 3 - المحاولة الثالثة**

هاي اسا اخر مرحلة – وبعد هاي المرحلة انت رح توخذ / توخذي جائزة"

"رح اورجيك/ي الصور لآخر مرة انتبه/انتبهني منيح"

"هاي الصورة بتيجي مع خاذ الشكل – هاي الي وهاي الك"

- |    |  |  |
|----|--|--|
| 1. |   |   |
| 2. |   |   |
| 3. |   |   |
| 4. |   |   |
| 5. |  |  |

"كمان مرة - اسا انا رح اورجيك الشكل وانت لازم تقلي ايش الصورة اللي لازم تيجي معها"

"ممتاز! يلا ننقل لآخر مرحلة"

### **التذكر الفوري للكلمات - Immediate recall 2( after the third trial)**

"اسا بدي اياتك تجرب تتذكر لحالك ايش ازواج الصور اللي مرقت معنا بدون مساعدتي؟ يعني بدي تقلي كل صورتين كانوا مع بعض"

المختبر يقوم بتسجيل الاجابات الصحيحة v في ورقة الاجابات.

"وهك اللعبة خلصت! ممتاز! شكرا حبيبي/حبيبتي وهاي الجائزة الك سا بطل/بطلة!"

"حببت اللعبة؟"

## **Appendix F**

### **The Invented Letter Task**

Two experimental blocks



**ציוד לכל נבדק:** 4 דפי חימום עם משימה (על חצי עמוד)

12 חצאי דפים של המשימה ממוספרים מראש

4 חצאי דפים של המשימה שיועברו לאחר שעתיים

עפרון HB 2

פלאפון עם סטופר שמאפשר לציין זמן של הקפה (לשורה) וסה"כ זמן של 3

הקפות (דף=בלוק)

פרס

**הנחיה:**"היום נלמד לכתוב אות שמישהו המציא, בשפה אחרת.

יש לחבר בין הנקודות, כאשר אתה מתחיל מלמעלה. עשה זאת מהר (להדגיש את ה"מהר") ומדויק. לא מפסיקים באמצע ולא מתקנים.

במטלה הזו נעבוד בלי מחק. אם תרצה לתקן, בסוף נאפשר לך לתקן בדף נוסף.

אתה רואה את שלושת הנקודות (מצביעה על שלושת הנקודות) אתה צריך לאסוף את כל שלושת הנקודות בפעם אחת, מבלי להרים את העיפרון, הקו צריך להיות רצוף.

מזכירה לך שיש לעשות זאת הכי מדויק שאתה יכול והכי מהר שאתה יכול, זאת אומרת שאתה עובר בכל שלושת הנקודות

אתה מתחיל במשבצת הימנית וממשיך למשבצת הבאה עד שאתה מסיים את כל הצורות. לא לשכוח לעשות את זה מהר ומדויק.

במהלך ההעברה, יש לעודד. אפשר להזכיר "תזכור להיות מהיר ומדויק", אבל ללא התייחסות ספציפית לביצוע.

מגשים לילד את דף החימום ומוודאים שהוא מחבר קו אחד-

**לא מתקבל אם הקו חצוי לשניים או הקו לא עובר דרך נקודת האמצע (מזכיר קו ישר)**

נותנים לילד לתרגל עד שהוא מצליח שורה אחת מושלמת- בדרך כלל לוקח כעמוד חימום אחד.

אחרי שמסיים את השורה אומרים "ממש אלוף אתה, אתה עובד יפה, בוא נמשיך"

לאחר החימום מחדדים את ההנחיה ואומרים "עכשיו אני רוצה שננסה להעביר קו כמה שיותר מהר וכמה שיותר מדויק, אתה מוכן?", אני אסתכל כאן בשעון לראות כמה אלוף אתה"

יש לעודד את הילד לאחר כל דף- העידוד יגרום לו להמשיך במשימה. העידוד צריך להיות ע"י שימוש במילים "אלוף" ולא להשתמש במילים כמו 'נכון' 'וטוב'.

- יש נטיה במטלה לאבד דיוק, יש לשים לה, ולבקש להיות מהיר ומדויק כשרואים ירידה בדיוק.

- לפני הבדיקה החוזרת, להדגיש כמה שצריך להיות אלוף.

יש לתעד את הזמן שלוקח לכל שורה ולאחר מכן של כל דף(דף=בלוק) מתוך ה 12 הבלוקים. סה"כ 36 תיעודים של שורות ו12 תיעודים של בלוקים.

**לאחר שעתיים:** יש לחזור לילד ולבקש שיבצע את המשימה קודם על גבי דף חימום ולאחר מכן על 4 בלוקים ובאותה צורת עידוד ותיעוד.

שוב התיעוד של הזמן יעשה לכל שורה ולכל דף בנפרד, כלומר 12 תיעודים של שורה ו4 תיעודים של בלוקים.

- במקרה של ה ISF, אפשר לקחת את הילדים הנבדקים ולהריץ על כולם את משימת הבומרנג, לאחר מכן להמשיך עם קלסר הניסויים עם כל נבדק ולאחר שעתיים לקרוא להם אחד אחד לסיום 4 הבלוקים הנוספים.

**קידוד שגיאות בשלב יותר מאוחר** (לא קשור להעברת המשימה): נכון- אם הקו רצוף, ואם עובר דרך נקודת האמצע, לא נכון- אם מדלג על נקודת האמצע. בנוסף, יש להתאים ילדים לפי ה BASELINE שלהם לילדים אחרים.

