

אוניברסיטת בר אילן

המחלקה לבלשנות וספרות אנגלית

הצעת מחקר לתואר השני

ריבוי שמות העצם בערבית הפלסטינית אצל ילדים עם התפתחות שפה תקינה וילדים עם לקות שפה התפתחותית

Plural Noun Inflection in Palestinian Arabic among Children with Typical Language Development (TLD) and with Developmental Language Disorder (DLD)

שם המנחה: פרופ' אלינור סאיג-חדאד

מוגש על ידי: האלה עבד אלחי

ת"ז 029801222

12/6/2018

| Contents | Page |
|---|-------------|
| 1. Introduction | 1 |
| 2. Literature Review..... | 2 |
| 2.1 Nominal Inflectional Morphology..... | 2 |
| 2.2 Arabic Pluralization Formation Process..... | 2 |
| 2.3 Children with Developmental Language Disorder..... | 3 |
| 2.4 Learning Abilities..... | 4 |
| 2.5 Acquisition of Pluralization in Palestinian Arabic..... | 4 |
| 2.6 Arabic Pluralization in DLD..... | 6 |
| 3. Research Questions and Hypotheses..... | 7 |
| 4. Methods..... | 8 |
| 4.1 Subjects..... | 8 |
| 4.2 Materials..... | 8 |
| 4.3Tasks..... | 9 |
| 5. Contribution of the Study..... | 10 |
| References..... | 11 |
| Appendix I..... | 15 |
| Appendix II..... | 16 |
| Appendix III..... | 18 |

1. Introduction

The Arabic plural system is well known for its richness and complexity (Albirini 2015). According to Saiegh-Haddad, Hadieh, & Ravid (2012), to form plurals in both Standard Arabic (SA) and Palestinian Arabic (PA) there are two morphological processes: linear and non-linear. While the nonlinear, so called *broken plural formation* (BP) requires the use of a plural morphological template, the linear or so-called sound plural formation procedure involves the linear attachment of a suffix to a nominal stem; in Palestinian Arabic the plural suffix is either the masculine plural suffix *-i:n* (*masculine sound plural* (MSP) or the feminine plural suffix *-a:t* (*feminine sound plural* (FSP)"(p.6). Albirini (2015) explains that the addition of the suffix *-i:n* consistently to the singular masculine noun *fallaḥ* sing. masc 'farmer' produces the plural form *fallaḥiin* pl. masc 'farmers', and attaching *-a:t* consistently to the singular feminine noun *fallaḥa* sing. Fem 'farmer' yields the plural form *fallaḥaat* pl. fem 'farmers'.

Very little research has been devoted to typical acquisition of plural forms in PA (however, see Saiegh-Haddad et al., 2012; Ravid & Farah, 1990) and even fewer studies have investigated noun plural formation in Arabic speaking children with developmental language disorder DLD, and the data they provide do not permit a systematic examination of the structure (Abdalla, Aljenaie & Mahfoudhi (2013). Among typically developing children TLD, the results highlight the early acquisition of sound feminine pluralization and the late acquisition of sound masculine forms. Broken plurals were found to vary greatly in their acquisition with some forms, especially those utilizing high-frequency broken plural templates, being acquired rather early (Saiegh-Haddad et al., 2012). Concerning DLD children, however, Abdalla et al., (2013) in a study which compared Kuwaiti Arabic-speaking TLD with DLD children in producing Arabic plural forms showed that DLD children were less accurate in producing the targeted plural forms. Moreover, they showed less preference to substitute FSP for both MSP and BP, and they produced more errors than their age-matched counterparts.

The current study aims to investigate the acquisition of the three types of noun plural inflections: feminine sound plural (FSP), masculine sound plural (MSP), and broken plural (BP) in Palestinian Spoken Arabic (of the Southern Triangle) focusing on one age group :5 years old children with and without language impairment. In addition to the influence of the type of pluralization morphological procedure, the study will also test the role of the singular noun stem familiarity, as well as the frequency of broken plural patterns on pluralization ability in the two groups of children: children with DLD and with TLD.

2. Literature Review

2.1 Nominal Inflectional Morphology

"Morphology is a process which underlies the productivity of the word-formation process and a word's fit into the syntactic frame of a sentence"(Feldman, 1994 p.1). There are two classes of morphological processes: inflectional and derivational.

To clarify the difference between the two classes, Booij (2016) compares between forming agent words *singer* and plurals *apples* in English. Whereas *sing* and *singer* are two different words, this is not the case for *apples*, which is an inflectional form of the word *apple*, as is the singular form *apple*. Word formation processes, as in the former, expand the lexicon of a language by creating new words. In terms of inflections, Spencer (2003) explains that inflections are grammatical or functional categories such as number (singular vs. plural) or tense as in the word *cats* which consists the root morpheme *cat* where the suffix morpheme *s* indicating plural is added.

Brown (1973) suggests that "because inflectional morphology is semantically regular and predictable, obligatory and generally applicable, it is produced early on in child language" (Laaha et al., 2006 p.2). Moreover, Brown (1973) insists that in young children's speech, plural marking is one of the first function morphemes to emerge (Soderstrom, 2002). Saiegh-Haddad et al., 2012 assures that "Although the plural system is typically a rather complex structure and is dependent on semantic features as well, its centrality in morphosyntactic development contributes to its early emergence in child language and makes it one of the earliest categories surfacing in child language development "(p.2).

2.2 Arabic Pluralization Formation Processes

Nouns in Arabic inflect for gender (مذكر *muḍakkār* 'masculine', مؤنث *muʔannaθ* 'feminine') and for number (مفرد *mufrad* 'singular', مثنى *muθanna:* 'dual', and جمع *jamʕ* 'plural') (Saiegh-Haddad & Henkin-Roitfarb, 2014 p.32). The plural is divided into 'sound' feminine and masculine ('*al-jam u s-saalimu*) and 'broken' ('*al-jam u l-mukassarū*) types (Boudelaa et al., 2002). Ben-Meir (2015) proposes the terms concatenative and non-concatenative for referring to sound and broken plurals, respectively. In the former, morphological units are combined together linearly (concatenative mode) whereas in the latter it is non-linear (non concatenative mode) and changes to the stem noun usually occur in the process (Albirini, 2015).

"The sound plural masculine suffixes *u:n(a)* or *i:n(a)* are used depending on case (e.g. *muʕallim-u:na* 'teachers', in the oblique cases (accusative and genitive) *muʕallim-i:na*" (Saiegh-Haddad & Henkin-Roitfarb, 2014 p.32). In spoken Arabic no case is marked and only one form is used *i:n*. The MSP suffix is less productive, less frequent, and less predictable than the FSP suffix

because it is restricted to human masculine nouns, and it applies only to certain categories within this class of nouns (Albirini, 2015).

On the other hand, "FSP morpheme *a:t* applies to both human and non-human nouns, and it is used with nouns grammatically marked as feminine by the suffix *-a* (*sa:ʕa* 'hour sing.fem.'-*sa:ʕaat* hours plur.fem.), semantically feminine nouns (*bint* 'girl sing.fem.' -*banaat* girls plur.fem.), and most loan words (e.g. *combuter* 'computer'-*combuteraat*). It is also used with some masculine nouns, such as the penta-lateral pattern CuCCaCaC (e.g. *muʕtamaʕ* 'society' - *muʕtamaʕaat*)" (Albirini, 2015 p.5).

The formation of BP is more complex and often irregular and thus more challenging (Goweder, 2008). Saiegh-Haddad et al., (2012) clarifies that the root is the key element that connects the singular and its plural in BP. "Broken plurals are formally represented as patterns (vocalic tiers) interdigitated by root consonants, indicated by C's" (p.6).

Saiegh-Haddad & Henkin-Roitfarb, (2014) explain that in BP, there are a variety of broken plurals patterns e.g., CCa:C *ʔaqla:m* 'pens' from *qalam*; CiCa:C *kila:b* 'dogs' from *kalb*; CuCuc *kutub* 'books' from *kita:b*; CuCu:C *mulu:k* 'kings' from *malik*; MaCa:CeC *maka:tib* 'offices' from *maktab*". Haddad, Hadieh & Ravid (2012) clarify that in BP "there is simultaneous root-and-pattern affixation, that is, interdigitating consonant-vowel patterns on the root radicals of the singular noun"(p.6). These morpho-phonological processes will exert changes on the singular noun such as long vowel insertion, consonant gemination, and the affixation of consonants besides those of the root as in *kalb* 'dog' - *kila:b* resulting in non-transparent forms due to phonological shifting.

Albirini (2015) states that the consonantal and/or vocalic structure of the singular stem is often *broken* through morphological processes within the stem when forming BP.

2.3 Arabic Speaking Children with Developmental Language Disorder (DLD)

Children with developmental language disorder DLD are diagnosed when a child has selective difficulties in mastering language, but are developing normally in other aspects (Bishop, 2002). One method to diagnose children with DLD is the use of criteria based on comparing between the child's language performance and what is expected according to his/her intellectual ability, as measured by IQ tests (Shaalan, 2010). Abdalla et al., (2013) raises the issue of the differences between languages in terms of two aspects: the course they take and the morphological processes used. He states that morphological development and delay differ from one language to another based on the complexity of the language in these aspects.

With children with DLD, particular impairments have been found for specific aspects of inflectional morphology and for some grammatical function words such as "difficulties with subject-verb agreement, auxiliaries, copulas, and definite and indefinite articles"(Van der Lely

et al., 1993 P.1). "Morphemes marking tense (e.g., third person singular –s, past tense –ed, copula *be*, and auxiliaries *be* and *do*) constitute the core of the morphosyntactic deficits in English speaking DLD children, while morphemes such as plural –s do not"(Shalan, 2010 p.19). It is then worth testing whether this is true also of Arabic in which pluralization is more complex because it can be non-linear.

2.4 learning abilities

When it comes to the number of skills, knowledge and learning abilities, research shows that DLD children have lower performance levels compared with their typically developed peers. Ulman, (2001) suggests that deficits in either Declarative memory which is associated with lexical acquisition or procedural memory which is responsible for learning several aspects of grammar, including the learning and use of rule-governed aspects of syntax, morphology, and phonology can lead to language impairments. Based on this assumption, Gabriel et al., (2013) assessed procedural learning abilities in serial reaction time (SRT) task. They suggested that procedural sequence-learning in children with DLD depends on the complexity of the to-be-learned sequence. In this task, forty-six children aged 7 to 11 were instructed to react as quickly and accurately as possible to the locations of stimuli that appear in one of four locations on a computer screen by pressing the corresponding keys on the keyboard. The results showed that children with DLD reacted more slowly than their TLD peers. Children with DLD did not show as much improvement across learning blocks in RT as did TLD participants. Furthermore, their sequential learning index did not differ significantly from chance. Therefore," the data from this study suggests that children with DLD exhibit reduced procedural learning in comparison to their TLD peers, which would therefore limit their ability to detect complex sequential information"(p.13).

2.5 Acquisition of Pluralization in Palestinian Arabic

Research shows that pluralization ability develops with age. For instance, Albirini, (2015) tested sixty Jordanian children, equally divided among six age groups (three to eight years). The participants were asked to complete two elicited oral production tasks. In the first task, the subjects were shown pictures representing singular nouns along with pictures corresponding to their plural forms. The target plural forms were divided equally into 20 sound and 20 broken plurals distributed equally among 8 categories: human feminine sound, non-human feminine sound, predictable masculine sound, unpredictable masculine sound, predictable broken pattern CaCaaCiC, and unpredictable broken, geminate broken, defective broken plurals. The term predictability refers to the expectations that the child will be able or not to produce the target plural forms based on his age and based on the frequency of the plural pattern.

As they viewed the pictures, the experimenter gave the participants the singular words orally, and they were asked to provide their corresponding plural forms. For the second task, singular unfamiliar objects/people were presented to the participants along with pictures corresponding to their plural forms. They were provided orally with nonsense singular nouns corresponding to the pictures, and were asked to generate their plural forms. The results showed that the participants follow three-phase characterization of the development of plural morphology (pre-morphology, proto-morphology, and morphology proper). The pre-morphological phase appears in the output of some of the three-year-olds who produced fewer correctly inflected plural forms. The four years old participants followed the proto-morphology where they produced more accurate words with preference to FSP. Although still making mistakes, the five and six years old participants showed ability to deploy the various plural morphemes. At the ages of seven and eight, the participants come close to the morphology proper stage where the children reached an approximate adult-like performance.

Pluralization ability in Arabic was shown to be affected by the morphological procedure (linear versus non-linear). Ravid and Farah (1999) studied 2-6 year old TLD children using a structured production task in which children were asked to give the plural form of 42 concrete noun stimuli (i.e. 14 SFP, 14 SMP, 14 PB). Children were given the singular form of the stimulus noun, and were asked to give its plural form, e.g., *"This is `a door". What are these? Many _____. How do you say many? Many _____."* "The test items were presented in three different orders and preceded by 3 training items: a regular masculine, a regular feminine and a broken plural"(p.8). They found that for the SFP, learning was already complete in the second youngest group, the 3-year-olds. By contrast, for the other two types: SMP and BP learning was more gradual, and was still taking place in the oldest group, the 5-year-olds. The authors argue that "the semantic restriction (agentive humans only) on sound masculine plurals, on the one hand, and the specific structural information necessary for the inflection of each broken class, on the other hand, constrain the formal space assigned to each plural type. They are both marked forms, and conditions for their application have to be learned, which takes time. In comparison, sound feminine plurals are less constrained semantically and structurally. (p.13).

Pluralization in Arabic is also affected by stem noun familiarity and by word pattern frequency. Saiegh-Haddad et al., (2012) tested the effect of familiarity with the stem and BP pattern frequency on pluralization in 36 3-8 years old TD monolingual native speakers of Palestinian Arabic. Three tasks were used to shed light on pluralization acquisition: repetition task, structured production task and semi- natural production task. In the first task, the experimenter asked the children to repeat the plural nouns. In the second task, the experimenter presented a singular word, and asked participants to give the plural form of this word. The final task was a play context in which the child was asked to instruct another child to complete a colored board with picture cards showing plural objects. Each

task presented 24 items divided equally between SFP and BP. According to the research, "the items in this study were divided into high familiarity and low familiarity based on the singular noun stem, and the plural patterns were also divided as high-frequency broken plural pattern or low-frequency plural pattern. The results show that in both production tasks the SFP produced more correct answers than did BP nouns. All age groups on both tasks produced SFP errors in the BP category showing SFP as the default category of pluralization in Palestinian Arabic. In terms of the familiarity effect, the authors state that in both production tasks, singular nouns high in familiarity yielded higher correct production scores than nouns low in familiarity; and BP nouns were more affected by familiarity than SFP nouns" (p.24). In terms of the effect of BP pattern frequency, the results showed "no effect of pattern frequency in the semi-natural production of either high- or low-familiarity items. Nonetheless, in both categories plural nouns with high-frequency plural patterns showed higher scores than those with low-frequency patterns—though the difference did not reach satisfactory levels of statistical significance. The interaction derives from the fact that high-familiarity nouns using high-frequency patterns scored significantly higher than low-familiarity nouns using low-frequency patterns, and also from the fact that high-familiarity nouns using low-frequency patterns scored significantly higher than low-familiarity nouns using high-frequency patterns"(p.18).

All this implies that the child's age, the morphological procedure (linear vs. non-linear) and the familiarity of the stem word affect the TLD children's acquisition of pluralization in Arabic. The following section will shed the light on the effect of the morphological procedure only on children with DLD.

2.6 Arabic pluralization in DLD

Abdalla et al., (2013) examined the production of the three types of noun plural inflections in Kuwaiti Arabic-speaking children with DLD and with a comparison group of children with TLD. A total of thirty-six Kuwaiti participants, twelve adults, twelve children with DLD and twelve typically developing age-matched controls (TLD) were presented with twenty-seven pictured stimuli of real and nonsense words. The participants were presented to a paper consisting of multiple images of a targeted object. Then, one image was revealed to the participant while being told "here is one(the object)". Next, the remaining images of the object were revealed, and the examiner would then ask "now we have five", and the participant is expected to tell the targeted plural form. The results revealed a significant delay in the performance of the children with DLD compared with age-matched TLD peers in the production of the three types of plural formation in Kuwaiti Arabic. This led to the conclusion that "the children with DLD aged 3;7 to 6;2 did not seem to have developed plural morphemes and therefore seemed to resort to other types of strategies (e.g. periphrastic expression of number) that occurred to a lesser extent in the typically developing sample because they seem to have

passed that stage"(p.23). The results also showed that the FSP was more accurate in real words, and it was the preferred choice in the nonsense context, especially in the TLD group.

Shalan (2010) conducted an expressive language test in which many linguistic structures were included based on language samples taken from more than 35 Gulf Arabic speaking children, whose age ranged between 2;11 and 4;11 years old. In terms of the plurals, the results showed that children with DLD performed relatively well compared to children with TLD on SFP nouns. However, they had more difficulties with plural forms that required morpho-phonological manipulation of the singular noun such as the BP patterns. In terms of SMP, both groups showed difficulties with this type of plural noun. Therefore, this initial examination of plurals in children with DLD showed that these children may not have difficulties with FSP at this age, but may have more problems using Arabic BP than their TLD peers.

As these two studies show, children with DLD lag behind their TLD peers when it comes to pluralization acquisition. The only effect was examined in these two studies is the morphological procedure (linear vs. non-linear). The current study will examine the effect of other two variables on both groups (TLD and DLD): the familiarity of the stem noun and the frequency of the plural pattern.

3. Research Questions and Hypotheses

This study aims to investigate the acquisition of pluralization in PA in typical and atypical language development. This will be done by examining the effect of three variables on the pluralization morphological process: the type of the pluralization morphological process, the singular noun stem familiarity (high versus low) and the frequency of plural patterns (high versus low) on the acquisition of SFP, SMP and BP noun pluralization in Palestinian Arabic by 5 years old children with DLD and in a comparison group of children with TLD. The following questions and hypotheses will be addressed:

1. Are there differences between Arabic speaking children with DLD and TLD in SFP, MSP, and BP pluralization ability?
2. Are there differences within each group (DLD, TLD) in pluralization acquisition according to type of pluralization procedure: SFP, MSF and BP?
3. Dose familiarity with the singular form affect pluralization ability in the two groups (DLD and TLD)?
4. Does the frequency of the BP pattern affect pluralization acquisition process by (DLD and TLD)?
5. Will the shared items across the three different tasks affect pluralization ability in the two groups (DLD and TLD)

The following hypotheses will be tested:

- a. TLD children will outperform in the three types of procedures.
- b. Sound Feminine Plural will be easier than the other two types by both groups, and it will be the default in pluralizing less familiar words.
- c. Pluralization for Familiar nouns will be easier than less familiar nouns regardless of morphological procedure.
- d. High Frequency BP patterns will be easier than the less Frequency BP patterns.
- e. The performance of the TLD group, but not of the children with DLD, will be affected positively by the shared items across the different tasks which indicates higher linguistic awareness and better learning abilities.

4. Methods

4.1 Subjects

Sixty 5:6-6:6 year old PA-speaking kindergarten children will be tested: 30 children with TLD, and 30 children with DLD. All participants will be native speakers of PA living in the Southern Triangle region in Israel. The ALEF (Arabic Language: Evaluation of Function) will be used to screen for DLD (Kornilov, S. A., Rakhlin, N., Aljughaiman, A., and Grigorenko, E., 2016). It includes eight tasks: word articulation, receptive vocabulary, expressive vocabulary, sentence comprehension, sentence completion, ran for colors, numbers and objects. Authorization by the ministry of education, schools' administrative staff and parents will be obtained.

4.2 Materials

In order to test for the effect of familiarity with the stem noun, we manipulated this variable across our items. To assess the familiarity of children with the stem nouns, 20 kindergarten teachers were asked to rank children's familiarity with the items using a five point Likert scale in which 5 = very much, 4 = quite a lot, 3 = so-so, 2 = not really, 1 = not at all. After calculating the averages, all the items in the middle range between 2.5 to 3.5 were excluded. In other words, items scaled less than 2.5 were considered as less frequent, and items more than 3.5 were considered as more frequent.

The frequency of the BP patterns was also manipulated. Frequency of the word pattern was determined based on an earlier research with native Arabic-speaking children (Ravid & Farah, 1999, 2009; Saiegh-Haddad et al., 2012). The following high-frequency BP patterns were targeted: *CCa:C* (e.g., *kla:b* 'dogs'); *CaCa:CeC* (e.g., *maʔa:sel* 'sinks'). The following low-frequency BP patterns were targeted: *CaCaCi:C* (e.g., *fanaˀ_ :n* 'mugs'); *CuCCa:C* (e.g., *ʔ umsa:n* 'shirts')

Within the SFP condition, three sub categories were targeted: 1. Morphologically transparent *MT* where there are no morphological changes applied on the stem when attaching the SFP plural morpheme *at* (e.g. */kadda:ha/* 'lighter'; */kaddaha:t/*). 2. Morphologically non-transparent *MNT* where the final vowel of the singular form *i* is deleted before the SFP morpheme *at* is added (e.g., */shabaki/*

'net'; /shabaka:t/. In both cases the singular noun ends in a grammatical feminine marker *a* or *i* (which parallels *taa marbuta* *تاء مربوطة* in Arabic). 3. Irregular SFP IR items where the SFP procedure is used even though the singular noun is not semantically feminine and even though no grammatical feminine marker is encoded in the singular noun (e.g., /mukaʃab/ 'cube'; /mukaʃaba:t/).

For each category 14 items were chosen divided by stem noun familiarity (7 for each low and high). 4 items out of the 7 were unshared items and 3 were shared items over the three tasks to check the learning abilities variable. The total items for each category is 30 items as the table below illustrates. The total number for the three categories is 180 items:

$$(4 \times 12 \times 3 = 144 \text{ un-shared items} + 3 \times 12 = 36 \text{ shared items})$$

The items (low and high frequency) for each task were randomized.

| SFP | | | | | | | | | | SMP | | | | BP | | | | | |
|----------------------------------|----------------|--------------------|----------------|-------------------------------|---|-----|---|-----------|---|-------------------------|---|--------------|---|------------------------|---|--------------|---|-----|---|
| Morphological Transparent | | | | Morphological non-transparent | | | | Irregular | | | | L.F Patterns | | | | H.F Patterns | | | |
| 7 Low Familiarity | | 7 High Familiarity | | L.F | | H.F | | L.F | | H.F | | L.F | | H.F | | L.F | | H.F | |
| 4 Un-Shared items | 3 Shared items | 4 Un-Shared items | 3 Shared items | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 |
| | | | | | | | | | | | | | | | | | | | |
| 4x3T | 3 | 4x3T | 3 | | | | | | | | | | | | | | | | |
| 12 | 3 | 12 | 3 | | | | | | | | | | | | | | | | |
| 15 items | | 15 items | | 15 | | 15 | | 15 | | 15 | | 15 | | 15 | | 15 | | 15 | |
| 90 items for SFP category | | | | | | | | | | 30 items for SMP | | | | 60 items for BP | | | | | |
| T = Task | | | | | | | | | | | | | | | | | | | |

4.3 Tasks

Three tasks will be used: a plural repetition task, prompted plural elicitation task (sentence completion) and an unprompted plural elicitation task.

The plural repetition task will require the participants to repeat the plural noun uttered by the experimenter who is a native speaker of the same dialect of PA spoken by the participants. The task will not require a high degree of metalinguistic manipulation. Neither will it require novel linguistic

production. For example, the experimenter will say *frogs*, the child is expected to repeat the plural stimulus (see appendix 1).

In the prompted plural elicitation task (sentence completion) task, the child will see a picture of an object introduced to him by the experimenter. The experimenter will say *this is a farmer* (the singular form of the noun). Then the child will be presented with a picture of four instances of the object, and will be asked to complete the sentence: these are (see appendix 2).

The third task will be designed as a game. The child will be expected to produce the plural form without being prompted. The task will be asked to fill in two lotto boards (with colored squares 48\36) with cards (of pictures of four instances of the same object) by matching the card's frame color with the square's one. The cards will be presented to the child on a computer screen (frame less). When he sees the card, he is expected to ask the experimenter to hand him the card by naming it e.g. give me the card of *shamṣa:t* 'candles'. The experimenter has the cards in front of her but colorfully framed. The child will match between the card's frame color and a square's color. If the child says a wrong plural form, he will be given the card. If the child doesn't know the plural form, the card will be put aside enduring the course of playing to the end of the game when the experimenter will help the child to figure out the plurals that he missed by giving him the singular form. (see appendix 3).

5. Contribution of the study

Children's acquisition of the plural noun system of Spoken Arabic has not been the topic of much empirical research (however, see Ravid & Farah, 1999; Ravid & Hayek, 2003 and Haddad et al., 2012). This study is expected to enhance our understanding of the properties of nouns which facilitate the acquisition of plural and in particular shed light on where children with TLD and DLD differ. The focus on the pluralization acquisition process by 5 years old Palestinian children with DLD has not been examined before and is expected to contribute to future diagnostic measures. Hopefully, the results of this study will be the baseline for future studies such as comparing different age groups to have more comprehensive understanding of the process of acquiring plurals by children with and without DLD.

References

- Abdalla, F., & Crago, M. (2008). Verb morphology deficits in Arabic-speaking children with specific language impairment. *Applied Psycholinguistics*, 29(02), 315-340.
- Abdalla, F., Aljenaie, K., & Mahfoudhi, A. (2013). Plural noun inflection in Kuwaiti Arabic-speaking children with and without Specific Language Impairment. *Journal of child language*, 40(01), 139-168.

- Abuleil, S., Alsamara, K., & Evens, M. (2002, July). Acquisition system for Arabic noun morphology. In *Proceedings of the ACL-02 workshop on Computational approaches to semitic languages* (pp. 1-8). Association for Computational Linguistics.
- Albirini, A. (2015). Factors affecting the acquisition of plural morphology in Jordanian Arabic. *Journal of child language*, 42(04), 734-762.
- Ben-Meir, N. (2015). *Patterns of the Urban Jordanian Arabic Broken Plural* (Doctoral dissertation, San José State University).
- Bickel, B., & Nichols, J. (2007). Inflectional morphology. *Language typology and syntactic description*, 3(2), 169-240.
- Booij, G. (2016). Morphology: The structure of words. *The Routledge handbook of linguistics*, 104-117.
- Bishop, D. V., Bishop, D. V. M., & Leonard, L. B. (2000). Pragmatic language impairment: A correlate of SLI, a distinct subgroup, or part of the autistic continuum. *Speech and language impairments in children: Causes, characteristics, intervention and outcome*, 99-113.
- Bortolini, U., Caselli, M. C. & Leonard, L. B. (1997). Grammatical deficits in Italian-speaking children with Specific Language Impairment. *Journal of Speech, Language, and Hearing Research* 40, 809–820.
- Boudelaa, S., & Gaskell, M. G. (2002). A re-examination of the default system for Arabic plurals. *Language and Cognitive Processes*, 17(3), 321-343.
- Brown, R. (1973). *A first language: the early stages*. Cambridge, MA: Harvard University Press.
- Bybee, J. L. (1985). *Morphology: A study of the relation between meaning and form* (Vol. 9). John Benjamins Publishing. Joseph H. Greenberg (ed.). 1963. *Universals of Language*. London: MIT Press, pp.73-113.
- Cowan, R., Donlan, C., Newton, E. J., & Llyod, D. (2005). Number skills and knowledge in children with specific language impairment. *Journal of Educational Psychology*, 97(4), 732.
- Dromi, E., Leonard, L. B., & Shteyman, M. (1993). The grammatical morphology of Hebrew-speaking children with specific language impairment: some competing hypotheses. *Journal of Speech and Hearing Research*, 36, 760-771.
- Dromi, E., Leonard, L. B., & Blass, A. (2003). Different methodologies yield incongruous results: a study of the spontaneous use of verb forms in Hebrew. In Y. Levy & J. Schaeffer (Eds.), *Language competence across populations: toward a definition of specific language impairment* (pp. 273-289). Mahwah, New Jersey: Lawrence Erlbaum.
- Eddington, D., & Lestrade, P. (2002). Are plurals derived or stored. *Unpublished University of New Mexico and Mississippi State University manuscript*.
- Fahim, D. (2005). *Developmental language impairment in Egyptian Arabic* (Doctoral dissertation, University of London).
- Feldman, L. B. (1994). Beyond orthography and phonology: Differences between inflections and derivations. *Journal of Memory and language*, 33(4), 442-470.
- Gabriel, A., Maillart, C., Stefaniak, N., Lejeune, C., Desmottes, L., & Meulemans, T. (2013). Procedural learning in specific language impairment: effects of sequence complexity. *Journal of the International Neuropsychological Society*, 19(3), 264-271.
- Glowered, A. M., Almerhag, I. A., & Ennakoa, A. A. (2008). Arabic Broken Plural Recognition Using a Machine Translation Technique.

- Goweder, A., Poesio, M., De Roeck, A. N., & Reynolds, J. (2004, July). Identifying Broken Plurals in Unvowelised Arabic Text. In *EMNLP* (pp. 246-253).
- Hashem-Aramouni, E. (2011). *The impact of diglossia on Arabic language instruction in higher education: Attitudes and experiences of students and instructors in the US* (Doctoral dissertation, CALIFORNIA STATE UNIVERSITY, SACRAMENTO).
- Holes, C. (2004). *Modern Arabic: Structures, functions, and varieties*. Georgetown University Press.
- Jaeger, J. J., Lockwood, A. H., Kemmerer, D. L., Van Valin, R. D., Murphy, B. W., & Khalak, H. G. (1996). A positron emission tomographic study of regular and irregular verb morphology in English. *Language*, 72, 451–497.
- Joanisse, M. F., & Seidenberg, M. S. (1998). Specific language impairment: a deficit in grammar or processing?. *Trends in cognitive sciences*, 2(7), 240-247.
- Laaha, S., Ravid, D., Korecky-Kröll, K., Laaha, G., & Dressler, W. U. (2006). Early noun plurals in German: regularity, productivity or default?. *Journal of Child Language*, 33(02), 271-302.
- Kornilov, S. A., Rakhlin, N., Aljughaiman, A., and Grigorenko, E. L. (2016). ALEF: Technical Report to the Ministry of Higher Education of the Kingdom of Saudi Arabia. New Haven, CT: Yale University.
- Leonard, L. (2009). Some reflections on the study of children with Specific Language Impairment. *Child Language Teaching and Therapy* 25, 169–71.
- McCarthy, J. J., & Prince, A. S. (1990). Foot and word in prosodic morphology: The Arabic broken plural. *Natural Language & Linguistic Theory*, 8(2), 209-283.
- Miceli, G., & Caramazza, A. (1988). Dissociation of inflectional and derivational morphology. *Brain and language*, 35(1), 24-65.
- Moawad, R. A. (2006). *The acquisition of the Arabic gender and number systems* (Doctoral dissertation, University of Wales, Bangor).
- Neme, A. A., & Laporte, E. (2013). Pattern-and-root inflectional morphology: the Arabic broken plural. *Language Sciences*, 40, 221-250.
- Omar, M., 1973, *The Acquisition of Egyptian Arabic as a Native Language*. The Hague: Mouton.
- Penke, M. (2012). The acquisition of inflectional morphology. *The Handbook of Morphology*.
- Pinker, S. & A. Prince. (1994). Regular and irregular morphology and the psychological status of rules of grammar. In S.D. Lima, R.L. Corrigan & G.K. Iverson (eds.) *The reality of linguistic rules*. Amsterdam: John Benjamins, 321- 351.
- Pinker, S., & Ullman, M. T. (2002a). The past and future of the past tense. *Trends in cognitive sciences*, 6(11), 456-463.
- Pinker, S., & Ullman, M. (2002b). Combination and structure, not gradedness, is the issue. *Trends in Cognitive Sciences*, 6(11), 472-474.
- Plunkett, K., & Nakisa, R. C. (1997). A connectionist model of the Arabic plural system. *Language and Cognitive processes*, 12(5-6), 807-836.
- Ratcliffe, R. R. (1998). *The broken plural problem in Arabic and comparative semitic: allomorphy and analogy in non-concatenative morphology* (Vol. 168). John Benjamins Publishing.

- Ravid, D. & Farah, R. (1999). Learning about noun plurals in early Palestinian Arabic. *First Language* 19, 187–206.
- Ravid, D., & Hayek, L. (2003). Learning about different ways of expressing number in the development of Palestinian Arabic. *First Language*, 23(1), 41-63.
- Rice, M. L. (2007). Children with specific language impairment: bridging the genetic and developmental perspectives. In E. Hoff & M. Shatz (Eds.), *Blackwell handbook of language development* (pp. 411-431). Oxford: Blackwell.
- Ruh, N., & Westermann, G. (2008). A single-mechanism dual-route model of German verb inflection. In *Proceedings of the 30th Annual Conference of the Cognitive Science Society* (pp. 2209-2216).
- Saiegh-Haddad, E., Hadieh, A., & Ravid, D. (2012). Acquiring noun plurals in Palestinian Arabic: morphology, familiarity, and pattern frequency. *Language Learning*, 62(4), 1079-1109.
- Saiegh-Haddad, E., & Henkin-Roitfarb, R. (2014). The structure of Arabic language and orthography. In *Handbook of Arabic literacy* (pp. 3-28). Springer Netherlands.
- Saiegh-Haddad, E., and Ghawi-Dakwar, O. (2017). Impact of diglossia on word and non-word repetition among language impaired and typically developing Arabic native speaking children. *Front. Psychol.* 8:2010. doi: 10.3389/fpsyg.2017.02010
- Schwartz, R. G. (Ed.). (2010). *Handbook of child language disorders*. Psychology press.
- Sereno, Joan A., and Allard Jongman. 1997. Processing of English inflectional morphology. *Memory and Cognition* 25.425-37.
- Shaalán, S., & Khater, M. (2006). *A comparison of two measures of assessing spontaneous language samples in Arabic speaking children*. Poster presented at Child Language Seminar 2006, University of Newcastle upon-Tyne, U.K, 19-21 July 2006.
- Shaalán, S. (2010). *Investigating grammatical complexity in Gulf Arabic speaking children with specific language impairment (SLI)* (Doctoral dissertation, University College London).
- Shamsan, M. A. H. A., & Attayib, A. M. (2015). Inflectional Morphology in Arabic and English: A Contrastive Study. *International Journal of English Linguistics*, 5(2), 139.
- Slobin, D. I. (1985). *The crosslinguistic study of language acquisition: Theoretical issues* (Vol. 2). Psychology Press.
- Soderstrom, M. (2002). The acquisition of inflection morphology in early perceptual knowledge of syntax. *Unpublished doctoral dissertation, Johns Hopkins University, Baltimore*.
- Spencer, A. (2003). Morphology. In *The handbook of linguistics*. Mark Aronoff and Janie Rees-Miller (Eds.), Oxford : Blackwell. 213-237.
- Ullman, M. T. (2001). A neurocognitive perspective on language: The declarative/procedural model. *Nature reviews. Neuroscience*, 2(10), 717.
- Van der Lely, H. K., & Howard, D. (1993). Children With Specific Language Impairment: Linguistic Impairment or Short-Term Memory Deficit?. *Journal of Speech, Language, and Hearing Research*, 36(6), 1193-1207.
- Van der Lely, H. K., & Christian, V. (2000). Lexical word formation in children with grammatical SLI: a grammar-specific versus an input-processing deficit?. *Cognition*, 75(1), 33-63.
- Versteegh, K. (1997). *The Arabic language*. Edinburgh, UK: Edinburgh University Press.

Appendix 1

Repetition Task

Randomized High & Low Frequency

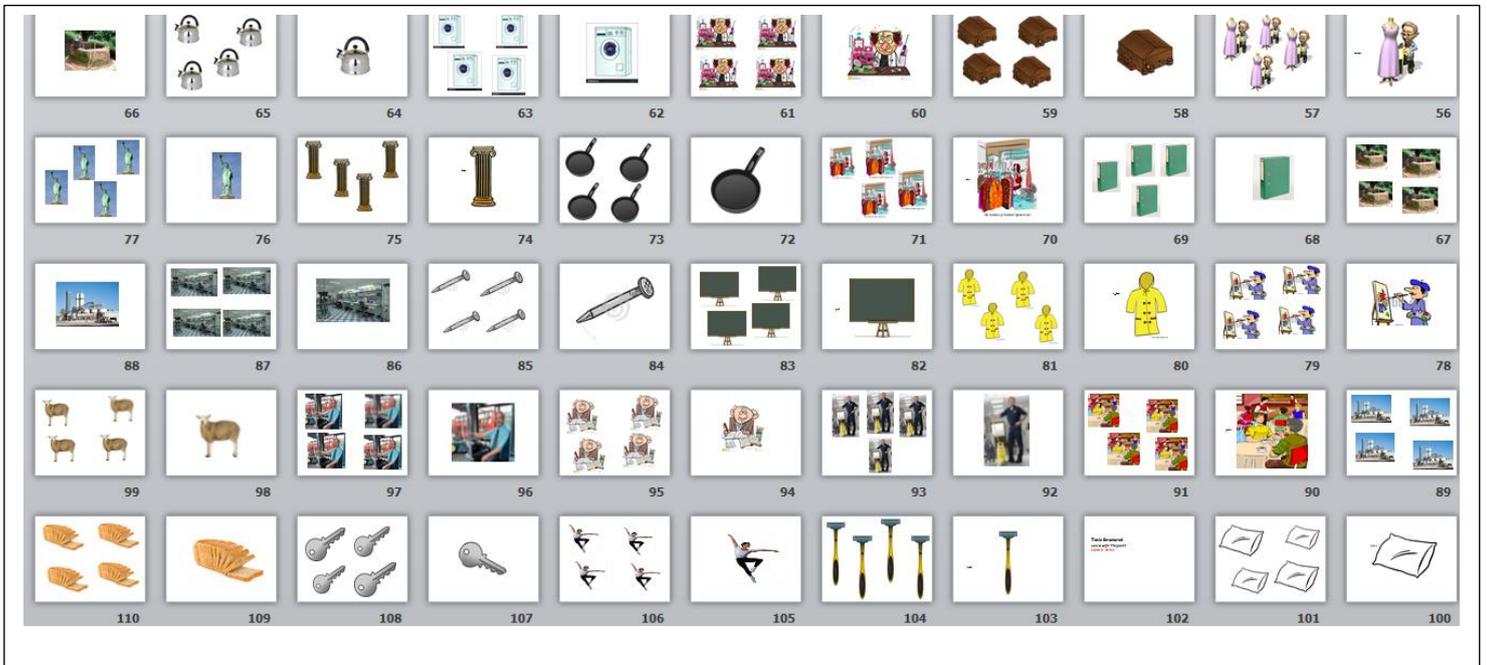
| التاريخ: رقم: | الأبجد: | تاريخ الميلاد: | الجنس: |
|------------------|---------|----------------|---------|
| 28 | | | مسلحات |
| 29 | | | حطابين |
| 30 | | | مسابقات |
| 31 | | | مربيات |
| 32 | | | مدارس |
| 33 | | | بوابات |
| 34 | | | رقاصين |
| 35 | | | حمامات |
| 36 | | | مفاتيح |

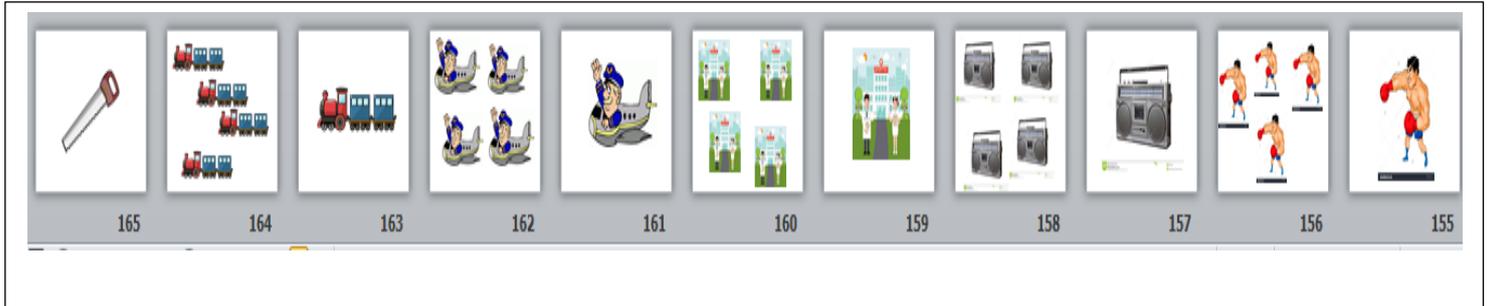
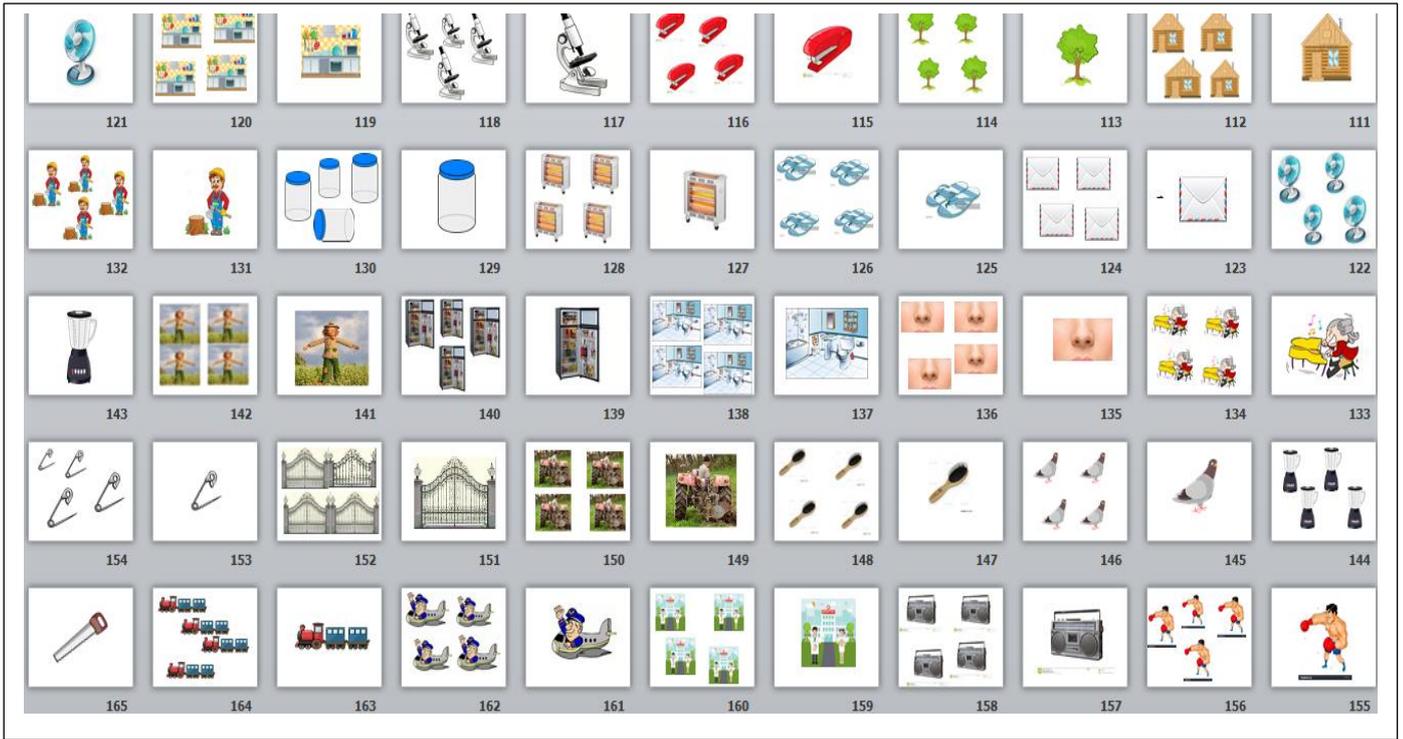
| التاريخ: رقم: | الأبجد: | تاريخ الميلاد: | الجنس: |
|--|---------|----------------|----------|
| Repetition Task | | | |
| High & Low Frequency Shared Items | | | |
| | -- | + | |
| 1 | | | قطارات |
| 2 | | | خلاطات |
| 3 | | | كواغ |
| 4 | | | ملاكمين |
| 5 | | | عقارب |
| 6 | | | مجاهر |
| 7 | | | هوايات |
| 8 | | | شفرات |
| 9 | | | جزابين |
| 10 | | | مطابخ |
| 11 | | | مكتيب |
| 12 | | | رغفان |
| 13 | | | متأخرين |
| 14 | | | فراغات |
| 15 | | | عازفين |
| 16 | | | مستشفيات |
| 17 | | | طيارين |
| 18 | | | مستشفيات |
| 19 | | | شجرات |
| 20 | | | فلاحين |
| 21 | | | قائم |
| 22 | | | كيسولات |
| 23 | | | حمامات |
| 24 | | | تلاجات |
| 25 | | | تدائيب |
| 26 | | | صويك |
| 27 | | | ديابيس |

| التاريخ: رقم: | الأبجد: | تاريخ الميلاد: | الجنس: |
|------------------|---------|----------------|-----------|
| 24 | | | تماسيح |
| 25 | | | شباب |
| 26 | | | مبارد |
| 27 | | | حلقات |
| 28 | | | علاقات |
| 29 | | | ضفادع |
| 30 | | | قداحات |
| 31 | | | جر احين |
| 32 | | | جندان |
| 33 | | | قطاعات |
| 34 | | | صوادين |
| 35 | | | نجمات |
| 36 | | | طيليات |
| 37 | | | مسطولات |
| 38 | | | غلايات |
| 39 | | | جرايات |
| 40 | | | بجامات |
| 41 | | | قضبانات |
| 42 | | | ديناصورات |
| 43 | | | منز هات |
| 44 | | | بشاكير |
| 45 | | | سباح |
| 46 | | | جنتونات |
| 47 | | | مهندسين |
| 48 | | | رقبات |

| التاريخ: رقم: | الأبجد: | تاريخ الميلاد: | الجنس: |
|---|---------|----------------|----------|
| Repetition Task | | | |
| Randomized High & Low Frequency Unshared | | | |
| | -- | + | |
| 1 | | | تمعات |
| 2 | | | جبال |
| 3 | | | يراكين |
| 4 | | | رزميات |
| 5 | | | مؤثفين |
| 6 | | | بحارين |
| 7 | | | محاسبين |
| 8 | | | امتحانات |
| 9 | | | غريبان |
| 10 | | | منجمين |
| 11 | | | مجانيف |
| 12 | | | عجال |
| 13 | | | عالم |
| 14 | | | مصاحف |
| 15 | | | غواصات |
| 16 | | | جرايات |
| 17 | | | مكعبات |
| 18 | | | محاضرين |
| 19 | | | ممرات |
| 20 | | | شيكات |
| 21 | | | رهان |
| 22 | | | ارضيات |
| 23 | | | خبازين |

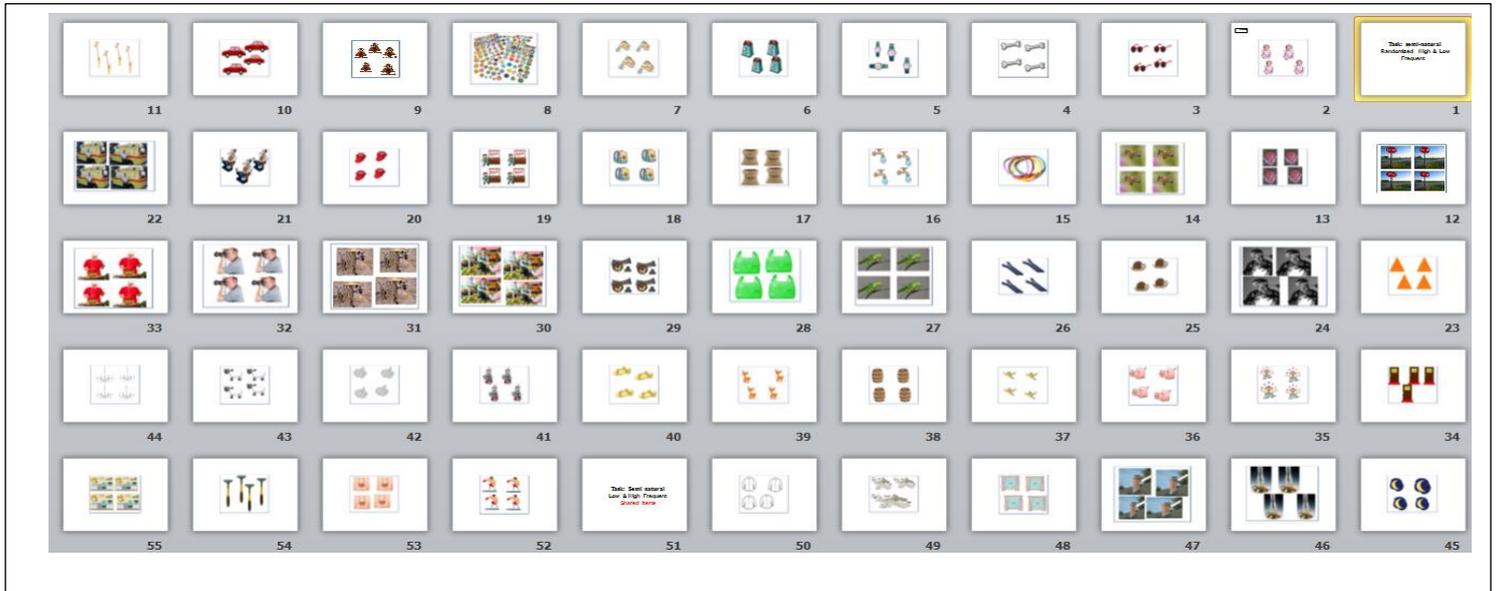
Structured Production Task (shared and unshared Items)

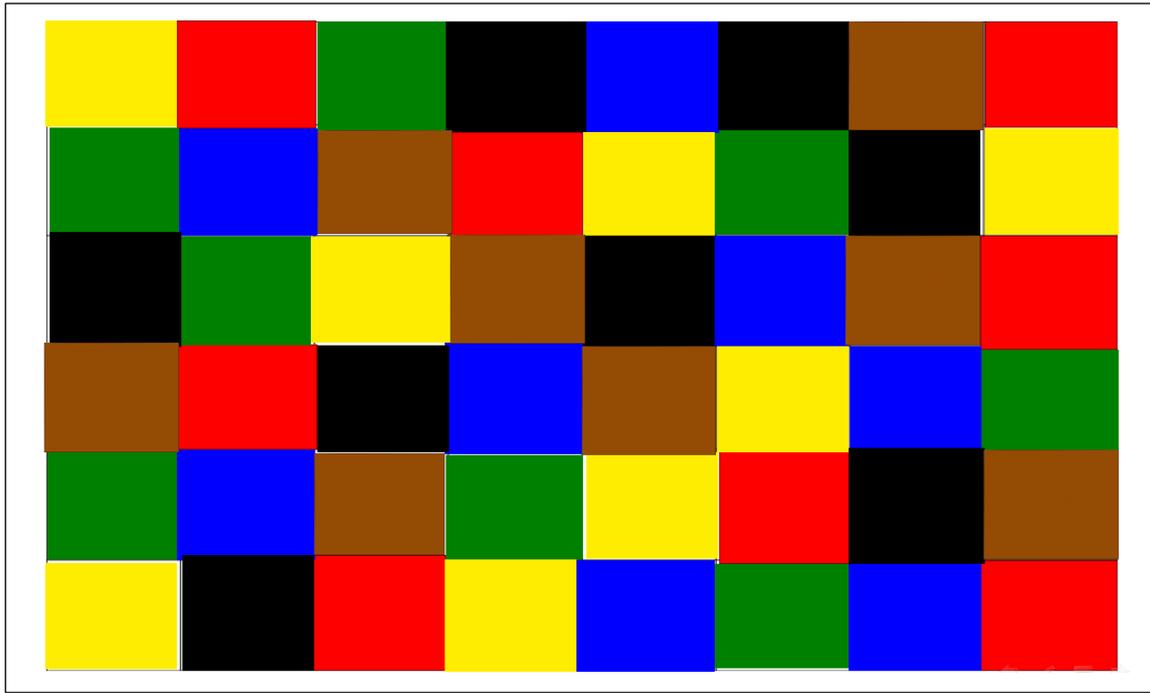




Appendix 3

Semi-natural Production Task





Cards for Lotto Board

4

3

2

1

7

6

5

130%

עברית "ערכת נושא Office" דן השקופות

130% עברית "ערכת נוסח Office" ן המשקופות