Al-Hasad
Issue 8 2018

Al-Hasad
Issue 8 2018

Editor-
Sami Mahajna

Subject-non-subject discrepancy in relative clause comprehension in Palestinian Arabic (PA)

Reem Bshara

ABSTARCT

The present study tested for the subject-non-subject discrepancy in comprehension of relative clauses (RCs) in PA-speaking children aged 3-4, 5-6, 8-9, and a group of adults. It looked into movement-based and non-movement-based factors plausibly determining the difficulty (or ease) with certain types of relative clauses as compared to other types. As in previously conducted comprehension studies (e.g., Günzberg-Kerbel, N., Shvimer, L., Friedmann, N., 2008), the subject-object discrepancy was also found in the early stages of acquisition of PA in this study (in the 3-4 and 5-6 year olds but not in the 8-9 year olds and adults). This finding was explained by a number of exisiting acounts, such as wrong thematic assignment (Gunzberg-Kerbel, N., et al., 2008), and the Intervention account (Friedmann, N., Belletti, A. & Rizzi, L., 2009), according to which, the intervening subject between the relative head and its gap in the merge position makes the comprehension of non-subject relative clauses more difficult for children. The study also revealed a graded difficulty in comprehension of the different relative clause types where the VPP RCs are the most difficult to process. A main cause of this graded difficulty was proposed to be the availability of A'-movement -- relative clauses might involve cyclic movement -- in the RCs that the children heard as was suggested for the production of

relative clause in Palestinian Arabic (Botwinik, I, Bshara R., & Armon-Lotem, Sh., 2014). The study concluded that the subject-non-subject comprehension discrepancy and the graded difficulty in processing the non-subject RCs in PA can be explained by universal properties of RCs comprehension (thematic-assignment) and Semitic languages' specific properties of RC derivation (the availability of A'-movement).

Introduction

Comprehension of relative clauses (RCs), embedded clauses which modify a nominal phrase in the matrix sentence, in children has been cross-linguistically investigated, accenting mainly the discrepancy existing between the comprehension of subject RCs and that of direct object RCs. While RCs are produced as early as 2;6 years (Berman, 1997; Crain, McKee, & Emiliani, 1990; de Villiers, & Hoban, 1994; Diessel & Tomassello, 2000; Labelle, 1990, 1996; McKee, McDaniel, & Snedeker, 1998; Varlokosta & Armon-Lotem, 1998), they are fully comprehended two or three years later, at around the age of 5 or 6 (de Villiers et al., 1994; Friedmann & Novogrodsky, 2004; Kidd & Bavin, 2002; McKee et al., 1998; Roth, 1984; Sheldon, 1974; Tavakolian, 1981). Furthermore, when the comprehension of subject relatives was compared to that of non-subject relatives, specifically object relatives, studies resulted in a developmental discrepancy between them, with the object relatives being harder to comprehend (see Adams, 1990; Berman, 1997a ; Brown, 1972; Correa, 1982, 1995; de Villiers et al., 1994; McKee et al., 1998; Roth, 1984; Sheldon, 1974; Tavakolian, 1981). This reported discrepancy was attributed to movement and/or non-movement explanatory factors.

Movement factors

The Conjoined Clause Analysis of RCs by Tavakolian (1981), suggested that till the age of 5;0, children interpreted embedded sentences, such as 'The horse hits the sheep that kisses the duck', as if they were conjoined sentences, i.e., 'the horse hits the sheep and kisses the duck' (Sheldon, 1974; Tavakolian, 1981). Alternatively, Wexler (1992) suggested that the ability to co-index an operator that moves to a non-argument position with an element in the matrix clause matures late.

Based on the movement-based account proposed by Friedman &

Novogrodsky (2004) suggested that children aged 4;0 to 5;0 have not mastered the construction of long distance dependencies and transfer of thematic roles via movement chains. That is, children at this age did not possess the ability to process movement, by which they were supposed to create a link between the clausal head and its role in the sentence, resulting in a chance performance in the case of object relatives (the granny that the girl kisses) since both the clausal head (the granny) and the subject of the clause (the girl) get an Agent role, leading the child to randomly choose between the correct interpretation and the incorrect one (Arnon, 2005).

Manipulating different linguistic hints as to check whether they could facilitate the understanding of object RCs by the children, Gunzberg-Kerbel, N., Shvimer, L. and Friedmann, N., (2008) explored how the same Hebrew-speaking children, aged 3;9 to 5;5, produce and comprehend subject and object RCs and whether there is a difference between them at the early stages of acquisition. The RCs that were tested in the comprehension task were of the simplest kind and very similar to those produced by children at this age (as observed in Diessel & Tomassello 2000, 2005) in that they included at most two DPs and expressed a single statement and right branch embedding, as illustrated in examples (1-2) below (Gunzberg et al., 2008, p. 23).

(1)   tar'e li et ha-yeled she-mecalem et ha-yalda (Subject RC)

    show me acc   the-boy that-photographs   acc the-girl
    'Show me the boy that is photographing the girl'

(2)   tar'e li et ha-yeled she-ha-yalda mecalemet (Direct Object RC)

    show me acc the-boy   that-the-girl   photographs
    'Show me the boy that the girl is photographing'

The study showed that while subject relatives were produced and comprehended quite well at the age of 4, comprehension of object relatives was at chance level. This finding, which is consistent with those of Friedman & Novogrodsky (2004) and Van der Lely (1994), was ascribed to the fact that in subject RCs the canonical positions of the Agent and the Theme do not change despite the syntactic movement that the structure undergoes. In object RCs, however, the canonical po-

relative clause in Palestinian Arabic (Botwinik, I, Bshara R., & Armon-Lotem, Sh., 2014). The study concluded that the subject-non-subject comprehension discrepancy and the graded difficulty in processing the non-subject RCs in PA can be explained by universal properties of RCs comprehension (thematic-assignment) and Semitic languages' specific properties of RC derivation (the availability of A'-movement).

Introduction

Comprehension of relative clauses (RCs), embedded clauses which modify a nominal phrase in the matrix sentence, in children has been cross-linguistically investigated, accenting mainly the discrepancy existing between the comprehension of subject RCs and that of direct object RCs. While RCs are produced as early as 2;6 years (Berman, 1997; Crain, McKee, & Emiliani, 1990; de Villiers, & Hoban, 1994; Diessel & Tomassello, 2000; Labelle, 1990, 1996; McKee, McDaniel, & Snedeker, 1998; Varlokosta & Armon-Lotem, 1998), they are fully comprehended two or three years later, at around the age of 5 or 6 (de Villiers et al., 1994; Friedmann & Novogrodsky, 2004; Kidd & Bavin, 2002; McKee et al., 1998; Roth, 1984; Sheldon, 1974; Tavakolian, 1981). Furthermore, when the comprehension of subject relatives was compared to that of non-subject relatives, specifically object relatives, studies resulted in a developmental discrepancy between them, with the object relatives being harder to comprehend (see Adams, 1990; Berman, 1997a ; Brown, 1972; Correa, 1982, 1995; de Villiers et al., 1994; McKee et al., 1998; Roth, 1984; Sheldon, 1974; Tavakolian, 1981). This reported discrepancy was attributed to movement and/or non-movement explanatory factors.

Movement factors

The Conjoined Clause Analysis of RCs by Tavakolian (1981), suggested that till the age of 5;0, children interpreted embedded sentences, such as 'The horse hits the sheep that kisses the duck', as if they were conjoined sentences, i.e., 'the horse hits the sheep and kisses the duck' (Sheldon, 1974; Tavakolian, 1981). Alternatively, Wexler (1992) suggested that the ability to co-index an operator that moves to a non-argument position with an element in the matrix clause matures late.

Based on the movement-based account proposed by Friedman &

50% to 25%.

Arnon (2005) assessed the full performance rang, undermining thus the validity of the picture- selection task in its previous usage and the validity of the movement-based accounts that solely predicted thematic reversal errors. Moreover, she tested both the comprehension of DO RCs without a resumptive pronoun and DO RCs with a resumptive pronoun which were not analyzed as involving movement in Hebrew (Borer, 1984). This, Arnon claimed, would imply the existence of additional difficulties which are not related to movement.

In one experiment, comprehension of subject and object RCs was tested using a modified version of the picture selection task used by Friedmann and Novogrodsky (2004). Namely, children with a mean age of 4;7 had to choose a referent rather than a picture.

Similarly to previous studies, Arnon (2005) found a discrepancy between subject and object RCs in comprehension, but not in production. Besides, the results showed the novel Agent error as a newer type of error in addition to the errors of thematic reversal reported by Friedmann & Novogrodsky (2004), which implied that the children had two points of difficulty with object RCs: mastering the modifying nature of the clause (Agent error), and assigning the thematic roles correctly (Reversal error). The existence of the novel error meant that children's 51% correct performance was above chance.

According to Arnon (2005), if children's difficulty is due to their inability to process movement, and if relatives with a resumptive pronoun are analyzed not as involving movement but rather as involving co-indexation between the clausal head and the resumptive pronoun (Borer, 1984), then children should not have difficulty processing non-subject relatives. However, if children still have difficulty with resumptive relatives, movement-based factors can not alone account for this difficulty.

In her second experiment, Arnon (2005) tested seven of the children who participated in the first experiment and who made Reversal and Agent errors using the same test items but with the addition of a resumptive pronoun (e.g., 'Please put a sticker on the granny that the girl is kissing her'). The results showed that resumptive relatives were still difficult even though they did not involve movement according to Borer (1984). The children made relatively less Reversal errors but

sitions of the Agent and the Theme are reversed as a result of movement. Gunzberg-Kerbel et al. (2008) argued that in sentences in which movement resulted in a non-canonical order of constituents, as in object RCs, the difficulty to understand such type of structure was greater.

As concluded by Arnon (2005), the movement-based account made four predictions about the children's difficulty in comprehending object RCs. First, there will always be a discrepancy between subject and object RCs in children. Second, children show chance performance on object relatives. Third, the errors that children make are of thematic reversals only, and fourth, children should not have difficulty with object relatives that do not involve movement.

Non-movement factors

Questioning the predictions made by the movement-based approach about the children's difficulty in comprehending object RCs, a number of studies looked for other factors besides movement that can explain the reported problem without necessarily being related to maturation.

Arnon (2005), argued for the existence of potential methodological flaws in previous support for the movement-based approach. She claimed that the picture-selection task used to test comprehension of subject and object RCs by Friedmann and Novogrodsky (2004), among others, hindered the detection of the full performance range (i.e., correct answer, reversal error, agent error, and other). Asking the child to point to the picture rather than to the referent (the granny that kisses the girl vs. the granny that the girl is kissing) was misleading since we cannot determine with utmost certainty whether the child pointed to the correct or the incorrect referent. Arnon (2005) claimed that detection of the full performance range is important for the predictions of the movement-based accounts for two reasons. First, it could imply that the children's difficulty in comprehending object relatives was not only due to their difficulty with movement, if they pointed at the girl instead of the granny (in the right picture) after they heard "point to the granny that the girl kissed". Rather, this error could be due to the incomplete mastery of the modifying nature of the clause. Second, this would affect the numerical value of chance level. Pointing to one of the four referents and not to one of two pictures changes the chance level from

the cow   that ____ kisses the chicken

D NP$_1$ R ... ____$_1$ …   D NP$_2$

b.   Headed object relative

the chicken   that the cow kisses ____

D NP$_1$ R   D NP$_2$ …   ____$_1$

In both structures in (3a) and (3b), R designates the relative com-plementizer, and [D NP] designates a nominal expression introduced by a determiner. Under this acount, Friedmann et al. (2009) expected that manipulating the structural constitution of the elements involved should facilitate the understanding of the given structure, as suggested in Arnon's (2005) work.

Botwinik (2008) also addressed the subject-object discrepancy, of-fering a different account of Gunzberg-Kerbel et al.'s (2008) findings in terms of Externalization. She argued that children, unlike adults, derived their RCs via theta-role externalizing. She suggested that the mature mechanism of (null) operator movement or operator-binding in-volved in relative clause formation might be preceded by a pre-operator stage where children view a relative CP as a simple modifier, i.e., a constituent with a slot (x), which generates modification. Furthermore, Botwinik (2008) suggested that this slot is derived by the externaliza-tion of one of the verb's theta-roles. In other words, a theta-role is ex-ternalized if it is not assigned within the IP, thus becoming a slot (x) of the relative CP.

Depending on Prichett's processing theory (1992), Botwinik (2008) suggested that two processing options are involved in parsing the object relative clause as in (4) (Botwinik, 2007, p. 4) below.

(4)   tar`e li   et   ha-para   she-ha-tarnegolet   menasheket
       Show to-me   acc   the-cow   that-the-chicken   kisses
       'Show me the cow that the chicken kisses'

The first option leads to incorrect parsing: while θ1, the Agent of 'kisses' is externalized (x) to generate modification, θ2, the Theme of

almost the same amount of Agent errors. Arnon (2005) argued that this result suggested that there was a connection between the addition of the resumptive pronoun and the facilitation of thematic assignment, but the addition of a resumptive pronoun did not facilitate comprehension of the modifying nature of the clause. She argued that this fact undermines the movement-based accounts and calls a search for additional factors.

Arnon (2005) proposed an alternative processing-oriented account of the subject-object discrepancy, according to which, the reason for children's difficulty with object relatives was not that they involved movement but rather because of the interfering NP ('the girl' in 'the granny that the girl is kissing'), which made thematic assignment to the clausal head harder. She suggested that manipulation of the referential properties of the interfering NP might reduce the difficulty associated with object relatives. Manipulation of the referential properties of the interfering NP, such as using more accessible interfering NP pronouns (Warren and Gibson, 2002) and manipulating the animacy of the NP (Mak, Vonk & Schriefers, 2002; Traxler, Morris & Seely, 2002) were reported to have a positive effect on adults' comprehension of object RCs. Arnon (2005) argued that the Agent errors represent a developmental stage unique to children when they have not yet mastered the modifying nature of the clause. The Reversal error reflects a magnified version of the difficulty adults experience with object relatives.

Another alternative account was presented by Friedmann, Belletti, and Rizzi (2009), who proposed accounting for the discrepancy in terms of intervention. Intervention occurs when the terms to be connected in the dependency are separated by an intervener (a position which could be involved in the A' relation, e.g., the subject), the A' dependency becomes harder to process.

As for RCs, Friedmann, et al. (2009) argued that the presence of an intervening constituent in object RCs (NP_2 in 3b) was the reason for the children's difficulty in processing it. With subject RCs, there was no overt embedded subject to intervene between the relative head and the gap in the original position. This is illustrated in (3 a-b) (Friedmann, et al., 2009, p. 8).

(3)   a.   Headed subject relative

    'the woman to whom Mahmood gave a flower'

8)   `iz-zalami  `illi   l-walad xa:f   minn-*(u)   VPP RC
       the-man   that the-boy feared   from-*(him)
      'the man that the boy feared'

Purpose

The present study aims at testing for the availability of subject-object discrepancy in comprehension of RCs in PA, and if found, explaining it in light of the existing movement- based and non-movement-based accounts in the literature. It explores, as well, the degree and age of comprehension of different types of RCs (subject and non-subject RCs) in PA, examining, namely, the difference between the comprehension of various types of RCs and checking whether, like in other languages, non-subject RCs are more difficult to process than subject RCs,

Hypothesis

As in previous studies, it is expected that subject RCs will be comprehended better than non-subject RCs. This is in line with most theoretical accounts. Gunzberg-Kerbel et al. (2008) predicted that since the performer of the action and the recipient in subject RCs are posited in the canonical order despite the movement, subject RCs are easier to comprehend than object RCs where the canonical order is reversed (and probably also easier than the other non-subject types for the same reason). Following the Intervention theory suggested by Friedmann et al. (2009) it is expected that the discrepancy would exist not only between subject and object RCs but also between subject and all non-subject RCs as one category and as distinct categories. That is because of a) the intervening subject between the head relative, and b) the gap in the original merge position, especially when the embedded subject and the relative head/moved element are lexically restricted (i.e., are of the same type). All non-subject RCs in the present comprehension study have an intervening DP.

It is further expected that there would be a graded difficulty in the comprehension of the different types of non-subject RCs based on

'kisses' is assigned to the chicken. This results in interpreting θ1, the Agent of 'kisses', as 'the cow' (known as the Reversal error). The second option leads to correct parsing: while θ1, the Agent of 'kisses', is assigned to the chicken, θ2, the Theme of 'kisses' is externalized (x).

Relative clause structure in PA

All RCs in Adult PA[1] are formed with the complementizer `illi 'that', which is morphologically distinct from the declarative complementizer `inno 'that' (while `inno can host a subject clitic suffixed onto it, e.g., `inn-ha 'that-she Nom', `illi cannot). Resumptive elements in PA relatives are clitics, which are always suffixed onto the verb (direct and indirect object clitics), or the the preposition. Examples (5-8) below illustrate the types of RCs by extraction site tested in this study (Subject (S), Direct object (DO), Indirect object (IO) and prepositional RC with the preposition selected by the verb (VPP)). Resumptive pronouns are obligatory in all types of RCs expect in subject RCs of high position:

5)   `il-mara[2] `illi(*-ha) jjawwazat   maḥmu:d S RC
       the-woman   that*-she Nom. married-3sg.fm   Mahmood
       'the woman that married Mahmood'

6)   `il-mara     `illi maḥmu:d jjawwaz-*(ha)   DO RC
       the-woman   that Mahmood   married-*(her)
        'the woman that Mahmood married'

7)   `il-mara `illi maḥmu:d `a'ṭa:-*(ha) wadri   IO RC
       the-woman that Mahmood gave*(her)   flower

---

1   Botwinik, Bshara & Armon-Lotem, (2014) investigated the production of RCs by PA-speaking children aged 3-4, 5-6 and 8-9, in light of Aoun and Choueiri (1996)'s proposal that non-subject RCs can be derived both by movement and by binding that give rise to the same spell-out (i-ii)). Botwinik, et al. (2014) observed unique errors in the production of RCs and attributed them to the nature of the element occupying Spec-CP (pro) and its function being nominal feature-checking rather than an operator binding a variable, as assumed for RC derivation in other languages. Botwinik, et al. (2014) analysed the two unique errors, subject fronting and complementizer doubling (see Botwinik, et al., 2014, pp. 49-50), and showed that both the A'-movement of pro to Comp, as proposed by Aoun and Choueiri (1996) for adult Lebanese Arabic (i) and the binding strategy suggested by Shlonsky (1992) for adult PA RCs (ii) are plausibly implemented in relative clause derivation in PA speaking-children. Example (i) shows the derivation of an object relative clause 'the giraffe that the boy hugs' involving movement of pro to Spec-CP and example (ii) is its binding variant. (i) Movement derivation of 'the giraffe that the boy hugs' Base-generation: [DP `iz-zara:fi [CP illi[+def], [φ], [Case] l-walad [ ḥazan-hai proi ]] Spell-out: [DP `l-mara [CP proi illi[+def], [φ], [Case] mahmood jjwazhai ti]](ii) Binding derivation of 'the giraffe that the boy hugs' Base-generation/Spell-out: [DP `iz-zara:fi [CP proi illi[+def], [φ], [Case] l-walad ḥazan-hai proi]]

2   See Appendix B for the Arabic transcription conventions

Table 1

presents the number, gender, and mean age of participants in the different groups.

Group	Male	Female	Total	Mean Age (SD)
y.o 3-4	8	12	20	(3.7) 07;3
y.o 5-6	10	10	20	(3.3) 06;5
y.o 8-9	10	10	20	(3.1) 07;8
Adults	4	6	10	(8.1) 01;31

Procedure

Each age group of participants was tested on their comprehension of subject vs. non-subject (DO, IO and VPP) RCs using a picture-cued task[3]. The task used seven pictures (from Cohen-Ilan, 2008) to test each participant on 17 different RCs: eight subject RCs and nine non-subject RCs (comprised of three DO, two IO and four VPP RCs). Each picture contained two identical characters and a third different one. The different character always appeared in the middle of the two identical characters receiving an action from the first character and performing the same action onto the second character simultaneously, as in (9) below.

(9)

---

[3]   *The task did not control for the gender of the two NPs in the sentence. That is, in most sentences the relative head and the subject or object of the sentence were of a different gender and in some they were the same, which could have influenced the results (Friedmann, et al., 2009). To be more specific, of the eight subject RCs only two had the same gender, and of the nine non-subject RCs only three (all of which were with a VPP relative head) had the same gender. Yet, since gender of the NPs was not controlled for testing and, in retrospect, did not influence the results, it will not be addressed in the analyses. All of the sentences included full NPs with lexical restriction meaning the intervener and the moved element were definite NPs of the same type.*

a) Aoun and Choueiri's analysis (1996) which suggests that the depth of embedding might have an effect on children's derivations at certain developmental stages, and b) Botwinik et al., 2014 analysis of children's production of PA RCs which suggests that constructions involving A'-movement (like VPP) are harder to derive by children. Namely, it is expected that the LPP and VPP RCs be harder to comprehend than DO and IO RCs, since the resumptive element is directly cliticized on the V in DO and IO RCs, while it is cliticized on a preposition heading a PP in the LPP and VPP RCs, and that VPP is especially harder for the avilability of A'-movement is such a RC.

Method

Participants

The study tested the comprehension of subject and non-subject relative clauses (subject (S) , direct object (DO), indirect object (IO), prepositional phrases with the preposition selected by the verb (VPP) in three child groups (3-4, 5-6 and 8-9 year olds) and a control group of adults (20-40 year olds) using a picture-cued task. The children were all monolingual PA-speaking from two kindergartens and an elementary school in an Arabic speaking town in the center of Israel. The adults were also PA native speakers from the same town and were tested to validate the task. PA is the dominant and only naturally acquired language of the participants and is used most dominantly by all inhabitants in the town, on a daily basis as a means of communication in any informal situation (e.g., shopping, socializing, etc.). Modern Standard Arabic (MSA) is taught at school in a structured and systematic way, starting at the age of 6-7 (in first grade) for reading and writing. MSA is the written and spoken formal language and is hardly ever used in everyday interactions. The two languages (PA and MSA) are different at all linguistic levels (phonology, morphology, lexicon and syntax) (Saiegh-Haddad, 2003; Somekh, 1980).

Subject RCs vs. non-subject RCs- a comparison

Figure 1

Comparison of SRs and non-SRs in level of accuracy in the different age groups

	3-4 y.o	5-6 y.o	8-9 y.o	Adults
■ SRs	88%	95.60%	100%	100%
non-SRs	54%	70%	93%	100%
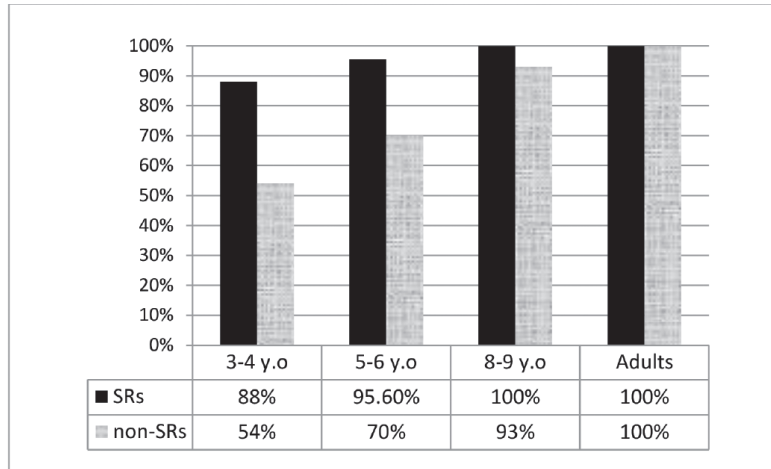
The within-group comparison using a one-way ANOVA shows that in all child groups the comprehension of the non-SRs, treated as one catogory, is significantly worse than that of the SRs (F(38)=76.82,p<0.0001, in the 3-4 year olds, F(38)=25.56,p<0.0001, in the 5-6 year olds, and F(38)=12.22, p=0.0024, in the 8-9 year olds). That is, the comprehension of SRs in the three child groups is better than that of the non-SRs. The adults' performance is at ceiling in both types of RCs.

Two items (two illicited RCs from the pictures) in the non-SRs were inconsistent with the other items targeting the same relative clause: one instace of DO and one instance of VPP. This inconsistency is influenced either by general world knowledge, or by slight differences between the supposedly identical characters in the picture. Children scored almost at ceiling in these two items while in the other items of the same categories (DO and VPP), their performance was much poorer (see detailed discussion on p. 11-13 below).

The participant was asked to point to the character that the sentence describes. All the sentences were presented in the more frequent OSV order, where the subject precedes the verb (e.g.,`il-binit `illi sit-ha ḥaẓnat-ha 'the-girl that her-grandma hugged-her'). The other possible order of PA object RCs, the OVS, where the verb precedes the subject (e.g., `il-binit `illi ḥaẓnat-ha sit-ha 'the-girl that hugged-her her-grandma', was not used at all. Comprehension of different types of RCs was tested using the same picture. For example, the picture in (9) was also used to test the comprehension of a Subject relative clause using the prompt: 'Point to the man who is throwing water on (wetting) the boy'. The different RCs were randomly ordered making sure that no picture appeared twice in a row and no structure appeared more than twice in a row. All children were presented with the items in the same randomized order.
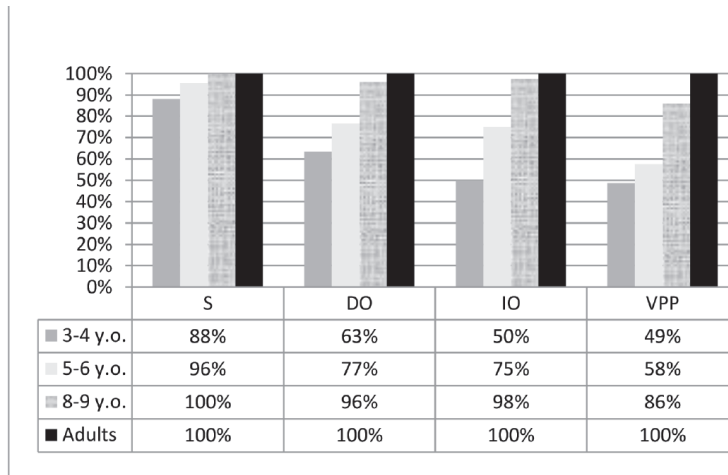
Results

In order to test the subject-object assemytry found in the previous comprehension studies (e.g., Friedmann et al., 2009), the comprehension of subject RCsand that of non-subject RCswas compared as one category. For this specific purpose only a within-group analysis is conducted in such a preliminary analysis. This is followed by a comparison of subject RCsand non-subject RCsas distinct RC types in order 1) to explore whether the different age groups vary in their comprehension of RCs (testing for a developmental gap) and 2) explore which relative clause types are easier or harder to comprehend in each of the four age groups (seeking whether any adiscrepancy is found between S RCs any specific non-Subject relative clause type). In this analysis, the findings are presented first as a comparison of the age groups (between-group analysis) followed by a comparison of the various RCs types (within-group analysis).

the level of accuracy of the different relative clause categories (S, DO, IO and VPP) for the four age groups.

Figure 3

Level of accuracy vs. relative clause category in the four age groups

	S	DO	IO	VPP
■ 3-4 y.o.	88%	63%	50%	49%
□ 5-6 y.o.	96%	77%	75%	58%
▨ 8-9 y.o.	100%	96%	98%	86%
■ Adults	100%	100%	100%	100%

A between-group comparison per category using a one-way ANOVA analysis shows that the four groups of participants were significantly different in the comprehension of all four types of RCs: S (F(66)=9.17, p<0.0001), DO (F(66)= 12.92, p<0.0001), IO (F(66)= 11.52, p<0.0001) and VPP (F(66)= 18.78, p<0.0001). Post-hoc Tukey HSD tests traced the significant difference in the comprehension of SRs to the difference between the youngest group of children and each of 5-6 year olds (p<0.05), 8-9 year olds (p<0.01) and the adults (p<0.01). However, post-hoc Tukey tests show no difference between the 5-6 year olds and each of the 8-9 year olds and the adults, nor between the 8-9 year olds and the adults. In the comprehension of DO RCs, these tests traced the significance to the gap between the 3-4 year olds and the 8-9 year olds (p<0.01), between the 3-4 year olds and the adults (p<0.01) as well as between the 5-6 year olds and the adults (p<0.05). Similarly, post-hoc Tukey HSD tests show a difference in comprehension of IO RCs between the 3-4 year olds and the 8-9 year olds (p<0.01), between the 3-4 year olds and the adults (p<0.01) and between the 5-6 year olds and

Figure 2

Comparison of SRs and non-SRs as one category in level of accuracy in the differentage groups

	3-4 y.o	5-6 y.o	8-9 y.o	Adults
■ SRs	88%	95.60%	100%	100%
non-SRs	44%	65%	91%	100%
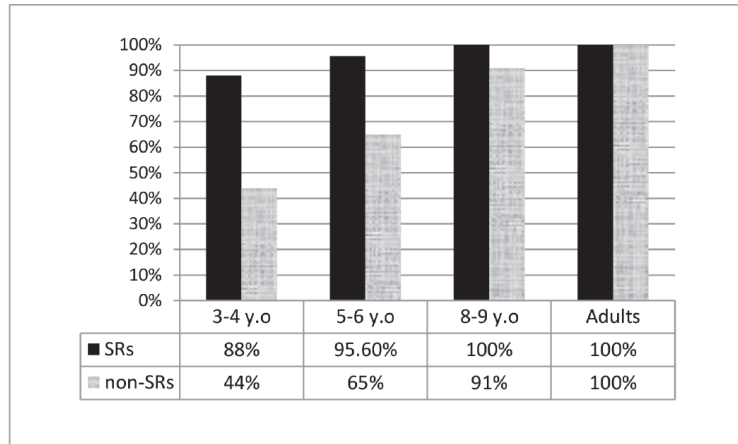
The within-group comparison using a one-way ANOVA shows a significant difference in all child groups between the comprehension of the SRs and that of the non-SRs as a whole (F(38)=108.4, p<0.0001, in the 3-4 year olds, F(38)=24 ,p=0.0001, in the 5-6 year olds, and F(38)=110.48, p=0.004, in the 8-9 year olds). That is, in all child groups the accuracy level of subject RCs is still better than that of the non-Subject RCs. However, a chance performance is not found in any of the child groups. The adults' performance is at ceiling in both categories.

Overall, it is shown that before and after excluding the two items, the performance of all child groups is significantly better on SRs than on non-SRs when treated as one category, with a bigger gap in the young-est groups. No chance level is found on the non-SRs as a whole

.

### Subject RCs compared to the different types of non-subject RCs

In order to test for a developmental gap, the non-SRs are treated here as distinct types comparing them to the SRs and to eachother. A between-group comparison is followed by a within-group comparison in what follows.

Starting with a between group analysis, Figure 3 presents in percent

11 children did so). However, in the other two categories (DO and VPP) there was always one item with a significantly higher success rate than the others with 18-20 children giving the correct response. On other items in these categories children gave only 6-9 correct responses (e.g., in DO, 9 children gave a correct response on two of the pictures and 18 children did so on the third pictures). Figure 4 shows the distribution of the scores for the 9 non-subject items.

Figure 4

Distribution of the scores for the 9 non-subject items
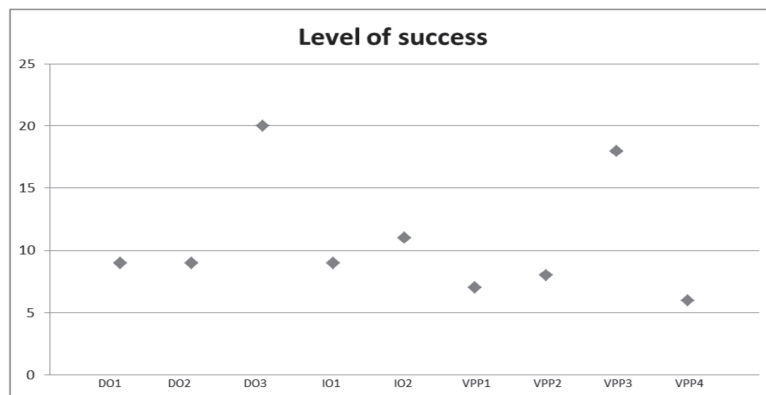
A Dixon's Q-test for the detection of a single outlier in a small sample (Dean and Dixon 1951) was conducted for all 9 non-subject RCs. These same two sentences were found to be outliers (with 95% confidance level, Q=0.64 for the DO RC outlier and Q=0.5 for the VPP RC outlier). This also was true in the 5-6 year old group for one item (in VPP). The difference disappears as children's success improves with age.

This calls for an examination of the odd items. In each item, which in this case was a picture, there were two identical characters. One of them receives the action by a third non-identical character and the second performs the action to that same character, as illustrated in (10) below. In both cases the two identical charcters had different gender which could have been regarded as the source of the difference, but this

the adults (p<0.05). For the comprehension of VPP RCs, a significant difference is found both for the 3-4 and for the 5-6 year olds when compared with the 8-9 year olds and adults (p<0.01). Nevertheless, no difference is found between the two youngest groups in comprehension of any of DO, IO, or VPP RCs. Last, no difference between the 8-9 year olds and the adults is found in their comprehension of DO or IO RCs.

These findings show that not all groups are at ceiling with comprehension of SRs. While the 8-9 year olds and adults performed at ceiling, and the 5-6 year olds performed close to ceiling level, the youngest group performed much worse in their comprehension of SRCs. Furthermore, the level of accuracy in non-Subject relative clause comprehension increases exponentially with age (e.g., from 50% in the youngest group, to 75% in the older group, to 98% in the 8-9 year olds and to 100% in the group of adults in comprehension of IO RCs).

To further understand the nature of the responses among the youngest groups who did not score at ceiling, their level of accuracy was re-evaluated to confirm whether the results reflect individual chance level or preference for a specific response. The child could select one of three options by selecting one of three referents, each of which represents a different answer or option: correct answer, Reversal error or Agent error. Because of this, the chance level in this task is 33% rather than 50%, so children scoring over 42% success are already above chance (see Arnon, 2005). A Binom test shows that even the youngest group performed above chance level in the comprehension of all RCs [4].

To address the lack of balance between the number of items per relative clause type, and the small number of test items per category which gives more weight to each test item, a further analysis checked whether the response level for each category was representative of the different items used, or whether particular items contributed to the low or high performance in a specific category. An item analysis of SRs (using Friedmann's ANOVA) in the 3-4 year-old group shows that more than 13 children are correct on all eight items with no significant difference between each item. Both items are similarly difficult in the IO condition: on one item, 9 children gave a correct response, and on the other,

---

[4]   *Had chance level been 50%, the youngest group would have been above chance for DO RCs (63% success), but for both IO RCs and VPP RCs, the youngest group (3-4 year olds) would seem to perform at chance level (50% and 49% respectively). In this case, the 5-6 year olds would perform above chance level on IO relatives (75% accuracy) but at chance level on the VPP relative clause type (58%).*

In the VPP relative condition, the exceptional picture (in 11) is facilitated by general world knowledge: one cat is touching the dog and the other is being touched by the same dog.
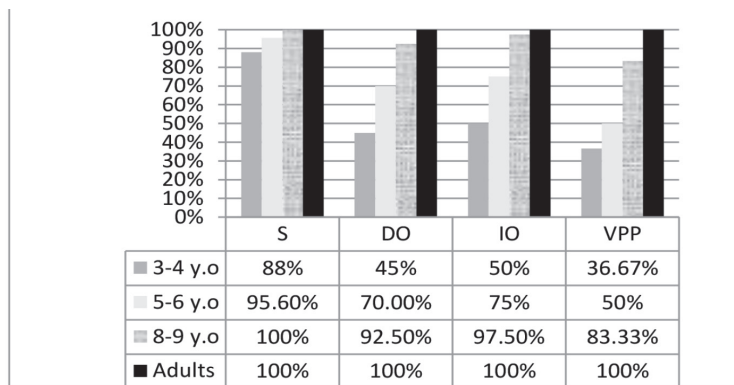
(11)
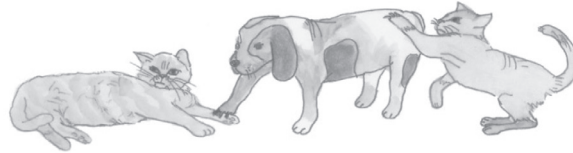
The child was asked to "point to the cat that the dog is playing with." The cat that is touching the dog seems to be scratching it, which would most likely not have been interpreted as playing. General world knowledge about cats scratching others could interefere here and influence the interpretation of the picture. As a result, there was not a real competing option for the child. In all other cases the children had to choose between two distinctly competing characters involved in the same action, and thus had to rely only on their linguistic knowledge to select the correct response.

 Excluding these two items yielded no differences in the between-group comparison. Figure 5 presents the level of accuracy per relative clause category (S, DO, IO and VPP) for the four age groups after excluding the two items that were deemed misleading.

Figure 5

Level of accuracy per relative clause category in the four age groups after excluding the two irrelevant items

	S	DO	IO	VPP
■ 3-4 y.o	88%	45%	50%	36.67%
5-6 y.o	95.60%	70.00%	75%	50%
8-9 y.o	100%	92.50%	97.50%	83.33%
■ Adults	100%	100%	100%	100%

was also true for four more pictures in the non-subject condition which posed a problem for the children (DO1, DO2, IO1 and IO2 in Figure 4), and thus could not be the only explanation. Checking the exact instances that triggered ceiling responses in these conditions reveals that these specific test items are easier to comprehend since the pictures give away the correct response, not being as symmetrical as the others. This is influenced either by general world knowledge, or by slight differences between the supposedly identical characters. Notably, no such difference is found in items other than this particular picture.

In the odd DO item (in 10) the child was asked to "point to the girl that the man hugged."
(10)

The identical girls in the picture are distinguished from one another since one is sitting in the man's arms while the target character is standing behind the man and hugging him. The action of hugging being received by the sitting girl is more salient and was more obvious to the participant of the study than the same action done by the standing girl at the background who is rather leaning towards the man. It might further have been facilitated by the agreement between the verb and the subject since in this picture the gender of the agent, subject, and the object are different (see Gunzberg-Kerbel et.al 2008).

relative clause comprehension. The rest were below chance. However, more children of the 5-6 year-old group were above chance (9 children), though the difference is not statistically significant when χ^2 --Test is used. This suggests that some of the youngest children probably have some ability to process VPP RCs but have not yet fully mastered it, and that the 5-6 year olds are closer than the youngest group to mastery. The performance of the 8-9 year olds was significantly different from the two younger groups (χ^2=17.28, p<0.0001 compared with the 3-4 year olds and χ^2=9.23, p=0.002 compared with the 5-6 year olds) indicating that they are at the threshold of the stage in which comprehension of VPP RCs is mastered.

After the exclusion of the irrelevant items (one in DO and one in VPP), the analysis of DO and IO focuses only on the number of children who succeeded in the two remaining items. Table 3 presents the number of children who displayed full success in both items of DO and IO RCs.

Table 3

Number of children who displayed full success in both items for DO and IO RCs

Group/RC	No. of children with full success on both DO items	No. of children with full success on both IO items
y.o 3-4	3	7
y.o 5-6	12	10
y.o 8-9	17	19

For DO, a χ^2 -Test shows a significant difference between the two younger groups in the number of children who were able to answer correctly on both items (χ^2=8.64, p=0.003). For IO, a significant difference was found between the two older groups (χ^2=10.16, p=0.0014). Numerically, Table 17 shows that for DO, only 3 children in the youngest group were able to respond correctly on both items. In the rest of the group, 12 children gave one correct response (50% success[5]) and 3 chil-

---

[5]   *50 % success is not interpreted as chance performance in this study, as previously discussed. In the present study chance level is 33%.*

A between-group comparison per category using a one way ANOVA shows that after excluding these two items from DO and VPP items, a difference is still found between the different age groups in comprehension of these RCs ($F(66)=11.68$, $p<0.0001$ for DO and $F(66)=17.73$, $p<0.0001$ for VPP). Similar to the previous comparison (which included the two items), this comparison reflects a difference found in a DO that emerges from the gap between each of the youngest groups and the adults as well as between the 3-4 year olds and the 8-9 year olds (with no change in p-value). In addition to this, as in the previous comparison, in comprehension of VPP RCs, the significance emerges from the gap in comprehention between each of the youngest groups of children and the older groups (with no changes in p-values). That is, excluding the two items maintains the relationship between the level of accuracy and the subjects' age, but enlarges the gap between the two youngest groups in comprehension of DO and VPP RCs, with the 3-4 year olds scoring lower. Furthermore, excluding these two items results in a chance performance of the 3-4 year olds on VPP RCs. This calls for a further analysis to find out whether this group's performance reflects the individual performance, and whether all 3-4 year olds performed at chance.

Table 2 presents the number of children within each age group who performed above chance, at chance, or below chance in comprehension of VPP RCs.

Table 2

Number of children who performed above chance, at chance, or below chance in comprehension of VPP RCs

Group/Level	Above chance	At chance	Below chance
y.o 3-4	5	10	5
y.o 5-6	9	8	3
y.o 8-9	18	2	0

As shown in table 2, in the youngest group only 5 children performed above chance while 10 children were at chance level in VPP

A within-group analysis shows a significant difference in each of the child groups in their comprehension of each relative clause type ($F(66)$= 11.39, $p<0.0001$, in the 3-4 year old group, $F(66)=10.25$, $p<0.0001$, in the 5-6 year old group and $F(66)$= 2.88, p= 0.043, in the 8-9 year old group). Post-hoc Tukey HSD tests show that the significance in the youngest group of children (3-4 year olds) is caused by the gap between S RCs and each of the non-subject relative clause types ($p<0.01$). However, no significant difference is found between the different types of non-subject relatives themselves (DO, IO, and VPP) in this group. In the 5-6 year old group, post-hoc Tukey HSD tests show a significant difference between the comprehension of S RCs and both DO ($p<0.05$) and IO ($p<0.01$) RCs as well as between the comprehension of DO and VPP RCs. No difference is found between the comprehension of S and each of the IO, DO, and VPP clauses or between IO and VPP RCs. Moreover, in the 8-9 year-old group, the only difference found is between S and VPP RCs ($p< 0.05$). No difference is found between IO and each of the S, DO and VPP RCs or between the DO clauses and S and VPP RCs.

Figure 6 shows overall that the accuracy level of the youngest group in subject RCs is much higher than in the non-subject categories. The accuracy level on IO and VPP is almost the same (50% and 49% respectively). However, with DO this group of children scored higher than both IO and VPP. No chance level is found. The 5-6 year olds scored the highest of all age groups on S RCs. The accuracy level with DO and IO is almost the same while with VPP it is lower than in both categories in this group. Even though the figure shows that the 8-9 year olds are at ceiling with S RCs, accuracy level on VPP is the lowest like in the younger groups. On DO and IO, the accuracy level is almost the same (96% and 98% respectively). Overall, S RCs are best comprehended in all child age groups while VPP RCs are the least comprehended, even for the 8-9 year olds. DO and IO RCs do not differ in the different child groups. In the 8-9 year old group, DO and IO RCs are comprehended at ceiling level.

After excluding the two misleading items as discussed, a few changes are apparent in the results of the within-group comparison. A reanalysis using a one-way ANOVA shows, similarly to the previous comparison,
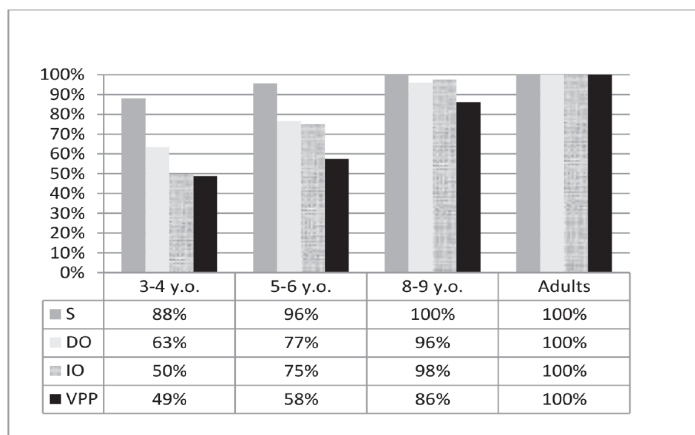
dren did not succeed with either item (0% success). For IO, however, Table 17 shows that 7 children in the youngest group succeeded with both items. Of the other children, 6 had 50% success and 7 children did not succeed at all. In contrast, in the 8-9 year old age group, 17 children gave a correct response on both of the DO items, and 19 children did so on both of the IO items. Only 3 children in this group gave one correct response (50% success) on DO and one child on IO. None of the 8-9 year olds failed on both items. The number of children with full success rates increased with their age as did the number of children with one correct answer.

To conclude, the major finding of the between-group analysis is that children and adults are significantly different in comprehension of all RCs, S RCs as well as the other types of RCs (DO, IO, and VPP). In comprehension of S RCs, a difference was found between the youngest group of children (3-4 year olds) and each of the other groups. In comprehension of DO, IO, and VPP RCs, a difference was found between the two younger groups (the 3-4 year olds and 5-6 year olds) and the two older groups (the 8-9 year olds and adults), with the 8-9 year olds showing adultlike comprehension.

Moving to the within-group analysis, Figure 6 presents the level of accuracy for the different relative clause categories (S, DO, IO, and VPP) in the three child groups.

Figure 6

Level of accuracy per relative clause category versus age child group

	3-4 y.o.	5-6 y.o.	8-9 y.o.	Adults
S	88%	96%	100%	100%
DO	63%	77%	96%	100%
IO	50%	75%	98%	100%
VPP	49%	58%	86%	100%

Discussion

In this study, which is a preliminary exploration of the comprehension of subject and non-subject RCs by the 3-4 and 5-6 year old age groups in comparison with the 8-9 year olds and adults, the structural and developmental factors that affect the comprehension of different RCs in PA and the difference between the comprehension of these RCs in each age group were examined.

The study found that the children's performance on SRs were significantly better than on non-SRs as one category in all child groups, with a wider gap in level of success in the younger groups (88% vs. 44% and 95.6% vs. 65% in the 3-4 and 5-6 year olds, respectively). This gap was also found when the different types of non-subject relatives were compared separately. It also found that the 3-4 year olds' performance was significantly lower than that of the older groups of children and the adults in the comprehension of SRs. The two youngest groups (the 3-4 year olds and 5-6 year olds) performed significantly lower than the 8-9 year olds and the adults in the comprehension of the non-SRs.

In comparing the different relative clause types within each of the child groups, It was found that the comprehension of SRs was significantly better than that of each of the non-SRs within all child groups. Also, a difference was found in the 5-6 and 8-9 year old groups when comparing the non-SRs to each other. In this comparison, the comprehension of VPP RCs was most rarely accurately comprehended in all child groups, with a performance close to chance level in the youngest group (36.6 %).

Previous studies have also shown a subject-object discrepancy in the comprehension of RCs. Even at a stage when they are able to produce both types of RCs, children are able to comprehend SRs, but have difficulty in DO relative clause comprehension. This discrepancy was also found in the early stages of PA acquisition in this study. Such a discrepancy was not found in the older children (8-9 year olds) or the adults, who all scored at ceiling or near ceiling in comprehension of S and DO RCs. This finding assumes that age plays an important role in how well DO RCs are processed. It is especially important to note that the level of accuracy in the different age groups increased with the age

a within-group difference in comprehension of the different RCs in all of the three child groups (F(66)= 10.96, p<0.0001, in the 3-4 year old group, F(66)=10.05, p<0.0001, in the 5-6 year old group and F(66)= 4.3, p= 0.0084, in the 8-9 year old group). However, in this comparison, post-hoc Tukey HSD tests show different results for the 5-6 year olds and the 8-9 year olds, but not for the youngest group. In the 5-6 year-old group, VPP RCs are significantly difficult to comprehend than each of S and IO RCs. The children's performance on DO is not significantly different from their performance on VPP RCs in this group. In the 8-9 year old group, a post-hoc Tukey HSD test shows a significant differ-ence between IO and VPP RCs. Specifically, IO are comprehended bet-ter than VPP RCs in this group (in addition to the difference between S and VPP RCs).

In sum, the major finding of the within-group analysis is that in all three child groups a significant difference is found in comprehension of the various relative clause types. In every type there is a difference be-tween the comprehension of S RCs and at least one other type of relative clause. However, while a significant difference in success rate amongst the non-subject relative clause types themselves is found neither in the 3-4 year old group nor in the 8-9 year olds, a significant difference is found between DO and VPP RCs in the 5-6 year old group. The perfor-mance of the adults in the comprehension of all relative clause types is at ceiling

To summarize, the data analysis showed that children performed best on SRs. In both comparisons (i.e., treating each non SR as distinct as opposed to one category), a significant difference was found between the S RCs and the non-subject RCs. That is, in both cases an assymetry was revealed, and not in DO RCs only. Moreover, when each non-SRs was approached as a distinct type, all child groups had the lowest suc-cess rate with VPP RCs. Also, at least one significant difference was found between the different non-SR categories, suggesting a ranking difficulty. The analysis of the comprehension data also showed that children in the youngest group performed at chance level on VPP RCs.

between the head and the gap in the clause in order to make correct thematic assignment.

An additional explanation for the children's difficulty in comprehending DO RCs was suggested by Gunzberg et al. (2008) who investigated the comprehension of RCs in children ranging in age from 3;9 to 5;5. They attributed such a difficulty to the children's non-mastry of Binding Condition B, which is responsible for coreffering the resumptive pronoun with the correct NP and in certain languages is acquired after the age of 6. Since in this study the children in the younger groups, the 3-4 and 5-6 year olds, but not the older ones, had a similar difficulty with DO RCs, possible difficulties with Condition B could offer an alternative explanation. This, however needs to be checked for other instances of Condition B in the language of PA-speaking children.

Two further recent theories were proposed to explain the subject-object discrepancy in children: the Externalization theory by Botwinik (2008) and The Intervention Theory by Friedmann et al. (2009). Both theories can be adopted to explain the PA-speaking children's difficulty with comprehending RCs, such as, `il-mara `illi ra:mi ghaṭṭa-ha 'the-woman that Rami covered-her' in the present study. According to The Externalization Theory , the random choice of the children between two options (e.g., either the woman covered rami or rami covered the woman) is because both possibilites are the outcome of two equally satisfying parsing analyses. In one parsing option, θ1, the Agent of 'covered' is externalized (x) to generate modification, θ2, the Theme of 'covered' is assigned to 'Rami'. This results in interpreting θ1, the Agent of 'covered', as 'the woman', which is known as the "Reversal error". The other option leads to correct parsing: θ1, the Agent of 'covered', is assigned to 'Rami', θ2, the Theme of 'covered', is externalized (x). Alternatively, according to The Intervention Theory, suggested by Friedmann et al. (2009), the cause of PA-speaking children's difficulty with DO relative clause might be the intervention effect created by the fact that the target and the intervener (i.e., the relative head and the subject) are both lexical NPs.

As mentioned earlier, the present study found that subject-object discrepancy exists in Arabic as well. It was further noted that the discrepancy is not limited to DO RCs and that there is a ranking of dif-

of the participants (45% for the 3-4 year olds, 70% for the 5-6 year olds, 92.5% for the 8-9 year olds and 100% for the adults).

As regard to the source of the children's difficulty with non-SRs, asking the child to point to one referent out of three in the tested items can trigger the child to err in two different ways in non-SRs. The first way is to confuse the thematic role of the moved element with the thematic role of the Agent of the clause (the Reversal error), resulting in the child pointing to the performer of the action instead of the receiver of the action. The second way is point to a third different character, the Agent of the relative clause, instead of the relative head. The responses of the participants were recorded in this study only as 'correct' or 'incorrect'. Unfortunately, the specific type of error in an incorrect response was not recorded in the present study, so there was no record of the exact referent to which the participant pointed when it was not the target. However, children of similar ages as those in our study were tested on their comprehension of DO RCs (with and without a resumptive pronoun) in Arnon (2005). The children were tested in a similar manner and made what Arnon (2005) calls the 'Agent error' (i.e. pointing to the Agent of the relative clause rather than to the relative head) among other types of errors. Therefore, even with the lack of data in this study, it can be assumed here that the three options for responses to the items in the comprehension experiment were available in the testing.

The difficulty with non-subject (DO) RCs in the present study was also reported by Gunzberg et al. (2008), Friedmann & Novogrodsky (2004) and Van der Lely (1994). Most explanations were concerned with the source of the reversal errors. The above studies suggested that in DO RCs the canonical order of the constituents is changed which can be interpreted correctly only if the child is able to process movement. In syntactic terms, the relation between the relative head at the beginning of the clause, which is the 'Agent' canonical position, and its thematic role within the clause is not fully processed by the child at this age. Hence, the results of the comprehension experiment (45% and 70% accuracy in DO for the 3-4 year olds and the 5-6 year olds respectively) suggest that the youngest group of children have not yet mastered the syntactic abilities by which they can understand the structural relations

References

Adams, C. (1990). Syntactic comprehension in children with expressive language impairment. British Journal of Disorders of Communication 25. 149-171.

Aoun, J. & Choueiri, L. (1996). Resumption and Last Resort. Ms., University of Southern California, Los Angeles.

Aoun, J., Choueiri, L.and Hornstein, N. (2001). Resumption, movement and derivational economy. Linguistic Inquiry 120 (3). 371-403.

Armon-Lotem, Sh. Botwinik-Rotem, I. & Birka, S. (2006). The acquisition of relative clauses in Hebrew: prepositions and resumptive pronouns. In Proceedings of the Generative Assembly on Language Acquisition, University of Siena, Italy, 1-14.

Armon-Lotem, Sh., Danon, G. & Walters, J. (2008). The use of prepositions by bilingual SLI children: The relative contribution of representation and processing. Proceedings of the Generative Assembly on Language Acquisition, pp. 41-46.

Arnon, I. (2005). Relative clause acquisition in Hebrew: Toward a processing-oriented account. In: Brugos, A., Micciulla, L. & Smith, C. A. (Eds.), Proceedings of the Twenty-ninth Boston University Conference on Language Development. Somerville, MA: Cascadilla Press.

Berman, R. (1997). Early acquisition of syntax and discourse in Hebrew. In: Shimron Y. (Ed.), Psycholinguistic studies in Israel: language acquisition, reading and writing, pp. 57-100. Jerusalem: Magnes Press. (in Hebrew).

Botwinik-Rotem, I. 2007. Null prepositions in L2 English and L2 Hebrew. In Belletti (ed.), Language Acquisition and Development. Cambridge Scholars Press/CSP.

Botwinik, I. (2008). Accounting for the comprehension of Hebrew object relatives. In: Gavarró Algueró & João Freitas, Maria. (Eds.), Language Acquisition and Development. Cambridge Scholars Press: CSP.

Botwinik, I., Bshara, R.. and Armon-Lotem, Sh. 2014. Children's productions of relative clauses in Palestinian Arabic: Unique errors and their movement account. Lingua 156. 40-56. DOI information: 10.1016/j.lingua.2014.10.007

Brown, D. (1972). Children's comprehension of relativized English

ficulty. We assume that the above explanations are true for DO RCs as well as for IO and VPP RCs. However, the VPP RCs proved to be the most difficult of all, as was evident in the 3-4 year olds' comprehension accuracy being around chance performance (36.6%). This finding calls for further analysis.

In DO and IO RCs, the verb assigns both case and theta role to its complement. The resumptive pronoun is cliticized to the verb. In VPP RCs, the verb assigns theta role to the noun which complements the preposition. Case is assigned by the preposition itself and the resumptive pronoun is cliticized to the preposition instead of the verb. Thus, the children more easily identify the reference of the resumptive pronoun in DO and IO, when compared with their ability to do so with VPP. Note that in production of RCs in PA (Botwinik, et, al. 2014) , VPP RCs were also found most difficult. Due to the nature of the errors, there it was argued that they were derived by A'-movement, which indicated a possible reanalysis of the prepositional phrase. And as in Armon-Lotem et al. (2006), the reanalysis is conducted when the content of the preposition is recoverable from the verb, which triggers Op/PRO movement. The kind of prepositions used in VPP RCs in the present study, but not in LPP RCs, were restricted prepositions (Armon-Lotem et al. 2006, 2008). Because these prepositions are recoverable from the verb, movement was assumed to be available in producing VPP relative clause by the children. The availability of movement in these types of RCs led the children to err much more than when producing other types of RCs.

Conclusion

Depending on both movement-based and non-movement-based factors, the study concludes that the subject-non-subjectt comprehension discrepancy and the graded difficulty in processing the non-subject RCs in PA can be explained both by universal properties of RCs comprehension (thematic-assignment) and Semitic languages' specific properties of RC derivation (the availability of A'-movement).

Gunzberg-Kerbel, N., Shvimer, L. & Friedmann, N. (2008). "Take the hen that the cow kissed the hen". The acquisition of comprehension and production of various relative clauses in Hebrew. Language and Brain, 7. 23-43.

Hakes, B., Evans, J. & Brannon, L. (1976). Understanding sentences with relative clauses. Memory and Cognition, 4, 313-333.

Kidd, E. & Bavin, E. L. (2002). English-speaking children's comprehension of relative clauses: Evidence for general-cognitive and language-specific constraints on development. Unpublished manuscript, La Trobe University, Bundoora, Australia.

Labelle, M. (1990). Predication, Wh-movement, and the development of relative clauses. Language Acquisition, 1, 95-119.

Labelle, M. (1996). The acquisition of relative clauses: Movement or no movement? Language Acquisition, 5, 65-82.

McKee, C, McDaniel, D., & Snedeker, J. (1998). Relative children say. Journal of Psycholinguistic Research, 27, 573-596.

Reinhart, Tanya and Tal Siloni. (2003a). Against an Unaccusative Analysis of Reflexives, in The Unaccusativity Puzzle: Explorations of the Syntax-Lexicon Interface, ed. by A. Alexiadou, E. Anagnostopoulou and M. Everaert, Oxford University Press, 159-180.

Reinhart, Tanya and Tal Siloni. (2003b). Thematic Arity Operations and Parametric Variations, OTS Working Papers in Linguistics.

Rizzi, L. (1990). Relativized Minimality. Cambridge, MA: MIT Press.

Roth, P. F. (1984). Accelerating language learning in young children. Journal of Child Language, 11, 89-107.

Saiegh-Haddad, E. (2003a). Linguistic distance and initial reading Acquisition: The case of Arabic diglossia. Applied Psycholinguistics, 24, 431-451.

Somekh, s. (1980). The question of language in modern Arab literature. Tel-Aviv: the Ministry of Education and Culture and Tel-Aviv University. (in Hebrew)

Seidl, A. Hllich, G. & Jusczyk, P. (2003). Early understanding of subject and object WH-questions. Infancy, 4, 423-436.

Sheldon, A. (1974). The role of parallel function in the acquisition of relative clauses in English. Journal of Verbal Learning and Verbal

sentences. Child Development 42. 1923-1936.

Cook, V. J. (1975). Strategies in the comprehension of relative clauses. Language and Speech 18. 204-212.

Correa, L. M. (1982). Strategies in the acquisition of relative clauses. In: Aitchison, J. & Harvey, N. (Eds.), Working Papers of the London Psycholinguistic Research Group, 4, 37-49.

Correa, L. M. (1995). An Alternative assessment of Children's comprehension of relative clauses. Journal of Psycholinguistic research, 24, 183-203.

Crain, S., McKee, C. & Emiliani, M. (1990). Visiting relatives in Italy. In: Frazier, L. & de Villiers, J. (Eds.), Language processing and language acquisition, pp. 335-356. New York, NY: Kluwer.

de Villiers, J .G, de Villiers, P. A. & Hoban, E. (1994). The central problems of functional categories in the English syntax of oral deaf children. In: Tager-Flusberg, H. (Ed.), Constrains on language acquisition: Studies of atypical children, pp. 9-47. Hillsdale, NJ: Erlbuam.

Diessel, H., & Tomassello, M. (2000). The development of relative clauses in spontaneous child speech. Cognitive Linguistics, 11, 131-151.

Ford, M. (1983). A method for obtaining measures of local parsing complexity throughout sentences. Journal of Verbal Learning and Verbal Behavior, 22, 203-218.

Frauenfelder, U. H, Segui, J. & Mehler, J. (1980). Monitoring around the relative clause. Journal of Verbal Learning and Verbal Behavior, 19, 328-337.

Friedmann, N. & Novogrodsky, R. (2004). The acquisition of relative clause comprehension in Hebrew: A study of SLI and normal development. Journal of Child Language, 31, 661-681.

Friedmann, Naama., Belletti, A. & Rizzi, L. (2009). Relativized relatives: Types of intervention in the acquisition of A-bar dependencies. Lingua, 119, 67-88.

Goodluck, H., .2010. Object extraction is not subject to child gelatinization minimality. Lingua, 120. 1516-1521.

Grodzinsky, Y. 2003. Imaging the Grammatical Brain. M. Arbib, ed., Handbook of Brain Theory and Neural Networks, 2nd edn. Cambridge, MA: MIT Press.

DO RCs:
1) `il-mara –l-li –l-walad ghaṭṭa:-ha
   the woman that the boy covered

2) `il-binit –l-li –z-zalami qaṣṣil-ha shaʿar-ha
   the girl that the man cut her hair

IO RCs:
1) <u>`il-walad –l-li –l-binit `aʿṭaṭ-u shorabi</u>
   the boy that the girl gave him soup
2) `il-walad –l-li –z-zalami <u>`aʿ</u> ṭa:-a ḥalayi
   the boy that the man gave him candy

VPP RCs:
1) `iz-zalami –l-li –l-walad rash ʿale-h mayyi
   the man that the boy threw water on

2) `-z-zalami –l-li –l-walad -ṭ-ṭallaʿ `ʿal<u>e-h</u>
   the man that the boy looked at

Appendix B: The transcription conventions that were used in tran-scribing the PA examples.

Consonants

Letter Name	Letter	Symbol
hamza	أ	`
ba	ب	b
ta	ت	t
tha	ث	th
jeem	ج	j
ḥa	ح	ḥ
xa	خ	x
dal	د	d
thal	ذ	dh
ra	ر	r
zen	ز	z

Behavior, 13, 272-281.

Shlonsky, U. (1992). Resumptive Pronouns As a Last Resort. Linguistic Inquiry, 23, 443-368.

Tavakolian, S. L. (1981). The conjoined-clause analysis of relative clauses. In: Tavakolian, S. L. (Ed.), Language acquisition and language theory, pp. 167-187. MIT Press, Cambridge, MA.

Traxler, M. J., Morris, R. K. & Seely, R. E. (2002). Processing subject and object relative clauses: Evidence from eye movements. Journal of Memory and Language, 47, 69-90.

Van der Lely, H. (1994). Canonical linking rules: forward versus reversed linking in normally developing and specifically language impaired children. Cognition, 51, 29-72.

Varlokosta S. & Armon-Lotem, Sharon. (1998). Resumptives and WH-movement in the acquisition of relative clauses in Modern Greek and Hebrew. DUCLD, 22, 737-746. Somerville, MA: Cascadilla Press.

Wexler, K. (1992). Some issues in the growth of control. In: Larson, R. R., Iatridou, S., Lahiri, U. & Higginbotham ((Eds.), Control and Grammar. Dortretch: Kulwer.

Appendix A: The relative clauses that were tested in the comprehension study (the participant had to point to the correct referent after hearing the relative clause). They are first transcribed and then translated into English.

<u>Subject RCs:</u>

1)   `iz-zalami –li ḥassas ʾal-walad
        the man that tapped (on) the boy

2)   `il-binit –l-li qaṣṣat shaʾr -z-zalami
        the girl that cut the man's hair

3)   `iz-zalami –l-li rash mayyi ʾal walad
        the man that threw water on the boy

4)   `il-mara –l-li ghaṭṭat –l-walad
        the woman that covered the boy

sheen	س	sh
seen	ش	s
ṣad	ص	ṣ
ḍaḍ	ض	ḍ
ṭa	ط	ṭ
ẓa	ظ	ẓ
enʾ	ع	ʾ
ghen	غ	gh
fa	ف	f
qaf	ق	q
kaf	ك	k
lam	ل	l
meem	م	m
noon	ن	n
ha	ه	h
waw	و	w
ya	ي	y

Vowels

fat ḥa		a
ḍamma	ʿ	u
kasra		i
alef	ا	:a
waw	و	:u
ya	ي	:i
(Ya (daʾden	ي	e
(Waw (banṭalon	و	o