THE ACQUISITION OF RELATIVE CLAUSES IN CYPRIOT GREEK: PRODUCTION AND COMPREHENSION

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This paper investigates the development of relative clauses in Cypriot Greek (CG) – in particular, young children's comprehension and production of subject relatives (SRs) and object relatives (ORs). A total of thirty-three monolingual children aged between 5 and 9 years acquiring CG as their native language (variety) participated in this study. Two different tasks were used to examine the acquisition of restrictive relative clauses: (i) a Picture Pointing Task, modified from Friedmann and Novogrodsky (2004), was used to investigate the auditory comprehension of SRs and ORs, and (ii) a Preference Task, modified from Novogrodsky and Friedmann (2006), was employed to examine the production of SRs and ORs. Crosslinguistic research provides evidence that children experience difficulties in the acquisition of ORs, whereas this does not seem to be the case for SRs (McKee and McDaniel, 2001; Stathopoulou, 2007). The on-going study on the acquisition of SRs and ORs in CG, the first in the literature for this language variety, so far appears to confirm the difficulty attested for other languages that children display in the acquisition of ORs.

1. Introduction

The acquisition of relative clauses has been studied extensively in the field of linguistics over the past forty years (syntax, semantics, processing, etc.). The bulk of research is concerned with children's comprehension and production both in experimental settings (e.g., Goodluck and Tavakolian, 1982; McKee et al., 1998; Håkansson and Hansson, 2000; Friedmann and Novogrodsky, 2004) and in spontaneous language samples (e.g., Menyuk,

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1969; Limber, 1976; Diessel and Tomasello, 2000; Matthews and Yip, 2003). Relative clauses display universal characteristics of language learning as well as characteristics that can be attributed to specific language features. The lively debate of the last four decades gives rise to a number of questions regarding the onset of the acquisition of these structures as well as the syntactic clause-formation mechanisms underlying them. Therefore, the study of language acquisition of relative clauses may provide essential insights into the language process in general.

The current study investigates the acquisition of relative clauses in an experimental situation for Cypriot Greek (CG), and it represents the first study on relative clauses in Greek Cypriot children. Although there are several studies that examined the acquisition of relative clauses in Standard Modern Greek (SMG), carrying out the present study was guided by the necessity to treat CG as a different variety (given its substantial differences from SMG). CG, the variety of interest in the current project, is a southeastern dialect of Modern Greek which is used in oral form only for daily communication. CG is an under-described dialect. The "formal" form of the language is the only written form and it is used in media communication, in schools, in public meetings, in parliament, and in speeches; officially, this is *dimotiki* or, as referred to by linguists, SMG. Greek Cypriot children are not exposed to SMG before school entry, at least not within typical everyday life (other than cartoons on television, for example). CG differs from SMG in substantial ways.

Among the better understood differences are lexical, morphological, phonological, and phonetic properties of the language (Newton, 1972; Arvaniti, 2001; Theodorou, 2007; Okalidou et al., 2010). Differences are identified at the morpho-syntactic level (e.g., for clitic placement, *wh*-question formation, focusing strategies, use and interpretation of perfective aspect), and consequently more recent research turned to morpho-syntactic descriptions of the language, aiming to fill the research gap (among others Terzi, 1999; Grohmann et al., 2006; Fotiou, 2009; Agouraki, 2010; Grohmann and Papadopoulou, 2011). Given the diglossic language situation in Cyprus, with CG the sociolinguistically "low" variety spoken natively by the majority of the 8050,000 inhabitants, and *dimotiki* or SMG the "high" variety, adults and school-aged children might be considered bidialectal or even bilingual because of their early exposure to both varieties. Within our own research group, we recently termed this "bi-*x*" as an umbrella term (Grohmann, 2011; Grohmann and Leivada, forthcoming), possibly to be narrowed down to and identified as "bilectal" (Rowe and Grohmann, under

review, who also provide a critical discussion of the terminological problems raised by either bidialectism or bilingualism in the context of Cyprus). Concurrent work within the Cyprus Acquisition Team pursues this issue from a developmental perspective (e.g., Kambanaros et al., in press).

Thus the linguistic situation and potential cultural differences (Oetting and McDonald, 2002; Washington and Craig, 2004) create an urgent need to explore the grammar, but also acquisition and subsequent language development, of the underdescribed, native variety — in the present case, CG as spoken in Cyprus. This paper, extending Grohmann et al. (to appear), tackles the development of both comprehension and production of restrictive relative clauses in CG by young children for subject relatives (SRs) as well as object relatives (ORs).

In what follows, sections 2 and 3 provide the necessary background for the paper on relative clauses in CG and some issues for language development. The methodology of the study is presented in section 4 and the results in section 5. The research questions that arose in the current study are discussed in section 6, where the importance and the implications of the findings are put in perspective and where several issues that came up during the experimental procedures are also addressed. Section 7 briefly concludes our contribution.

2. Relative Clauses in (Cypriot) Greek

Relative clauses can be found in all the world's languages (Downing, 1978; Lehmann, 1984). A relative clause is a subordinated structure, "connected to surrounding material by a pivot constituent" (de Vries, 2002: 14), typically a noun phrase (hence, the head noun). Two major properties characterize the structure of an externally headed restrictive relative clause of the sort found in English or Greek (both CG and SMG): the syntactic role of the head noun (outside the relative clause) and the syntactic role of the relativized expression (inside it).

Relative clauses in CG follow the head noun and, in the absence of an overt relative pronoun, are obligatorily introduced by the relative complementizer *pu* 'that'. The relative pronoun (*o opios/i opia/to opio* 'who-MASC/FEM/NEUT') is used rarely in CG, as opposed to SMG, and restricted to "formal" contexts. In this study, then, only *pu*-relatives were tested. The main properties of CG relative clauses are three-fold (shared by SMG). First, despite the fact that CG is a language with relatively free word order,

the subject of the relative clause obligatorily occupies a post-verbal position both in SRs (in 1, by assumption since the direct object sits typically in its base position) and in ORs (in 2).

(1) SUBJECT RELATIVE (SR)
i γiaγia pu fila ton pappu
the grandma [that kiss.3SG the grandpa.ACC]
'the grandma that is kissing the grandpa'

(2) OBJECT RELATIVE (OR)
i γiaγia pu fila o pappus
the grandma [that kiss.3SG the grandpa.NOM]
'the grandma that the grandpa is kissing'

Second, CG allows a resumptive pronoun in ORs in the form of a clitic which is co-indexed with the head of the relative. Thus it allows the presence of a pronominal element in positions from which movement is assumed to occur (as in 3).

(3) OR WITH RESUMPTION BY A CLITIC (CL)
i γiaγia pu tin fila o pappus
the grandma.NOM [that CL.3SG.FEM.ACC kiss.3SG the grandpa.NOM]
'the grandma that the grandpa is kissing'

Third, the distinction between SRs and ORs is plausibly facilitated by verbal agreement morphology. The distinction in meaning between the two comes about from the properties of the embedded verb. In the former, the embedded verb and the head of the relative clause share the same number features (as in 1). In the latter, embedded verb and embedded NP share the number feature (as in 2). Case also provides information to achieve the correct interpretation of relative clauses. Again, the two clauses share the same word order but they cannot be interpreted in the same way. Hence, on the basis of accusative (ACC) versus nominative (NOM) on the embedded NP, 1 is a SR, while 2 is an OR.

In this context, we assume that, while *pu* unambiguously sits in C0 with, in the absence of a relative pronoun, an empty operator (Op) in its specifier which is coindexed with the head noun, the inflected verb moves to T0, and the subject stays in situ. In SRs, Op either moves from or is related through other mechanisms of chain formation with the subject (SUBJ), while in

ORs this relation exists between Op and object (OBJ). Simplified, the internal structure of Greek relatives looks roughly as follows:

(4) $[_{CP}$ Op C^0 $[_{TP}$ __ V–T^0 $[_{vP}$ SUBJ … $[_{VP}$ OBJ …]]]]

In relation to the syntactic derivation, Varlokosta (1998, 1999) argued for Greek, based on early language acquisition data, that *pu*-relative clause formation involves movement. In addition, Alexiadou (1997) suggested a raising analysis for the syntactic derivation of Greek relative clauses. With respect to 4, this concerns the derivational history of Op, whether it has moved from its thematic base-generated position (i.e. [Spec,*v*P] in SRs and complement of V in ORs) or whether it is inserted into C and linked by coindexation to the relevant thematic position (empty *pro* or filled with a clitic RP). We assume here, although the details have little bearing on the data discussion and vice versa (see Theodorou, in progress, for details, also on CG). The two analyses are sketched in 5 for an OR such as 2 (without an RP) and 3 (with RP), ignoring verb traces/copies and the technical introduction of the clitic RP. The structures are roughly based on Hornstein's (2001) implementation of a promotion analysis (Vergnaud, 1974) who generates the operator derivationally (with the object starting out as "*wh*-NP"); angled brackets signal copies of movement and the arrow spelling out (cf. Grohmann, 2003).

(5) a. RAISING ANALYSIS (RELATIVE CLAUSE-EXTERNAL)
$[_{DP}$ i $[_{NP/NP\,[NP}$ γιαγια] $[_{CP}$ *wh*-<γιαγια> → Op pu (tin) fila o pappus]]]

b. MOVEMENT ANALYSIS (RELATIVE CLAUSE-INTERNAL)
$[_{CP}$ *wh*-γιαγια → Op pu-C^0 $[_{TP}$ (tin-)fila-T^0 $[_{vP}$ o pappus v^0 <*wh*-γιαγια>]]]

3. Relative Clauses in Language Development

On the basis of the occurrence of such structures as early as age 2, Diessel and Tomasello (2000) suggest that the earliest attempts for relative clause production involve simple, single proposition sentences. Nevertheless, crosslinguistic findings of typically developing language learners for relative clauses reveal that children modify the noun of a main clause already at around age 3 (e.g., Pérez-Leroux, 1995; Varlokosta and Armon-Lotem, 1998).

This said, Sheldon (1974) and Roth (1984) observed that relative clauses are difficult to process for children even at 6 years of age, an observation confirmed by findings which indicate that Hebrew- and Swedish-speaking children comprehend right-branching ORs only at around age 6 (see Friedmann and Novogrodsky, 2004, and Håkansson and Hansson, 2000, respectively). A unique feature that was unearthed in the numerous investigations of relative clauses across languages is that children master comprehension only two to three years after their first productions (for English, see among others Leonard, 1998).

In order to test children's performance on relative clauses, researchers used a variety of different tasks. The errors that children produced in those experimental settings suggest that children employ particular strategies in their efforts to interpret relative clauses. According to Varlokosta and Armon-Lotem (1998), a major argument in the literature revolves around the discussion whether children's relative clause-formation involves operator movement or not, which they classify as the *non-movement approach* (e.g., Labelle, 1990; Guasti and Shlonsky, 1995; Goodluck and Stojanovic, 1996) versus the *movement approach* (e.g., Crain et al., 1990; Pérez-Leroux, 1995; Bernstein et al., 1998). In order to support one over the other, researchers investigated in particular children's use of resumptive pronouns, the appearance of pied-piping relatives, and the use of complementizer versus *wh*-operator. Even though a more in-depth discussion of the two major approaches is not within the scope of this paper, some of the arguments developed to support the two directions are mentioned below in order to highlight cross-linguistic evidence in language acquisition.

Labelle (1988), as cited by McKee and McDaniel (2001), investigated the use of resumptive pronouns in children's relative clauses aiming to support the view that these early productions lack movement. She investigated unambiguous resumptives in non-subject relative utterances with complementizers produced by French-speaking children. She found that half of these relatives contained resumptive elements, that is, pronouns and full NPs. She interpreted this as an avoidance strategy of French-speaking children compared to productions of relative clauses that involve movement. Later, Pérez-Leroux (1995), replicating Labelle's task, elicited relative clauses from 11 English-speaking children aged between 3 and 5 years and 26 Spanish learners aged 3 to 6. Her findings were inconsistent with Labelle's study in terms of resumptive use. She found not only that the three groups used resumptives but also that the proportion of resumptives, cross-linguistically, does not differ significantly. In Serbo-Croatian the same test was adopted.

Goodluck and Stojanovic (1996) confirmed that children use resumptive pronouns in early relative clauses; they interpreted it as children's strategies, at young ages, to rescue constructions which they consider ungrammatical. Varlokosta and Armon-Lotem (1998) explored the acquisition use of resumptives in the acquisition of SMG and Hebrew. Hebrew-speaking children produced relative clauses containing resumptive pronouns even in places where it requires gap, while SMG-speaking children produced relative clauses that contained gaps where the adult grammar requires a clitic. In contrast, McKee and McDaniel (2001), investigating English speakers from young to old, found that children's and adults' production of resumptives were similar, leading them to suggest that the child grammar is adult-like with respect to the use of resumptives.

Therefore, these findings cannot fully support the non-movement approach, since young children's early use of *wh*-questions suggests that operator movement is available from early on. As for the use of resumptive pronouns, different researchers argue that this strategy does necessarily entail non-movement due to its complex typology (e.g., Pérez-Leroux, 1995; Goodluck and Stojanovic, 1996; Varlokosta and Armon-Lotem, 1998; Chatsiou, 2006).

Furthermore, it was found that early relative clauses are formed with complementizers rather than relative operators. This is the case for French-speaking children (Guasti, 2004), who relativize objects with the complementizer *que* rather than the relative pronoun *qui*. In SMG, a language where relative clauses can be formed with an overt relative operator or the complementizer *pu,* children were found to produce 100% relatives with the complementizer (Varlokosta and Armon-Lotem, 1998). Goodluck and Stojanovic (1996) showed that Serbo-Croatian children, at 4 years of age, use more relative clauses formed with complementizer *sto* (39%) compared to adult controls (9%). The authors interpreted these findings as an indication in favor of the absence of movement at these young ages. However, Varlokosta (1998) argued for SMG that the use of a complementizer does not indicate lack of movement.

Another issue that was discussed within the debate of movement approaches is the absence of pied-piping in relatives in instances in which pied-piping is obligatory in the adult language, such as oblique relatives in French. McKee et al. (1998) showed that English-speaking children of 3 to 6 years of age avoided relatives displaying pied-piping in production and rejected them also in comprehension tasks. Guasti (2004) summarized research that children speaking Romance languages avoid using preposi-

tional pied-piping until at least 7 years of age. In contrast, Greek-speaking children were found to use 66% relative clauses with PPs, which involve pied-piping, containing gaps, where adult clauses require resumptive (clitic) pronouns. Serbo-Croatian children also avoided pied-piping constructions in such places as oblique relative clauses which is obligatory in adult grammar. However, Goodluck and Stojanovic (1996) claim that the absence of pied-piping does not imply lack of movement but may be due to the limited positions from which relativization may take place.

On a different note, an issue that attracted a number of studies on the acquisition of relative clauses is the asymmetry found between SRs and ORs, in production (e.g., McDaniel et al., 1998) as well as comprehension (e.g., Novogrodsky and Friedmann, 2006; Stavrakaki, 2001). This concerns the observation that children exhibit higher scores for SRs than for ORs. Indeed, this is not related only to child language, since studies on processing have established that SRs are easier to process than ORs for adults as well (Traxler et al., 2002). Generative accounts of relative clause syntax (Vergnaud, 1974; Chomsky, 1977; Kayne, 1994; Hornstein, 2001) link the head noun to the relative pronoun, whether overt (e.g. English *which* or *who*) or covert (viz. a null operator Op, as in *that*-relatives or complementizerless SRs in English). SRs are assumed "easier" or "less complex" because the *wh*-movement step is "shorter" than in ORs, not having to cross the object along the way. The relevant structures are sketched in 6 and 7, with Op derived by "*wh*-movement" (in line with Chomsky 1973) or derivationally introduced through "sideward movement" inform a structure like 5a above (Hornstein, 2011):

(6) a. ROUGH STRUCTURE OF RELATIVE CLAUSE (RC)
$[_{DP}$ D [[NP] $[_{CP}$ RC]] (e.g. *the boy who/that/Ø…* in English)

b. EMPTY OPERATOR IN RC
[[NP]$_i$ $[_{CP}$ Op$_i$ C^0 $[_{TP}$ Spec T^0 $[_{vP}$ … <Op$_i$> …]]]]

(7) a. "LONGER" OP-MOVEMENT IN OR
$[_{CP}$ Op$_i$ C^0 $[_{TP}$ SUBJECT T^0 $[_{vP}$ <SUBJECT> V <Op$_i$>]]]]

b. "SHORTER" OP-MOVEMENT IN SR
$[_{CP}$ Op$_i$ C $[_{TP}$ (<Op$_i$>) T $[_{vP}$ <Op$_i$> V OBJECT]]]]

We will not engage in issues within the rich literature here but proceed with an overview of the acquisition literature. The subject–object asym-

metry for relative clauses was found in many languages, such as English (McKee and McDaniel, 2001), (Standard Modern) Greek (Stathopoulou, 2007), Hebrew (Novogrodsky and Friedmann, 2006), Italian (Arosio et al., 2006), and Turkish (Özge et al., 2010). For example, in Turkish, a language with rich verbal morphology, children at 5 to 8 years of age were found to use fewer object than subject relative clauses. The canonical word order of Turkish is SOV. In relative clauses the modified head always appears in the rightmost head position where two distinct participle suffixes relativize object and subject. Analyzing the avoidance strategies children applied (in conjoined and prepositional phrases) and the errors they produced (thematic role-reversal, non-pragmatic responses, and ungrammatical strategies in ORs but not in SRs) in relation to language-specific characteristics, Özge et al. (2010) suggested that the factors contribute to the asymmetry are: the frequency of the structure in child speech, the word order in SRs which preserves the canonical order in terms of OV, and the genitive case that appears in ORs which has an ambiguous function. Thus, Turkish-speaking children used more avoidance strategies in ORs than in SRs resorting mostly to less complex structures.

Turning now to Italian-speaking children, Adani (2009) found a comprehension of 90% correct for SRs as opposed to 53% for ORs. Despite her findings, she did not argue in favor of real knowledge of relative clause function, since SRs retain the canonical word order. On the other hand, the (minimally) above-chance performance in OR comprehension could be held as evidence that relativization is available from at least 3 years of age but is not yet sufficiently mature. Interestingly, young Italian-speaking children, aged 4 to 6 years, performed below chance (36%) in ORs where the subject appears in post-verbal position, confirming previous findings from Arosio et al. (2006). This led her to propose that the interpretation of such clauses, which require a null *pro* to be interpreted, is more difficult than interpretation of a full DP that appears in ORs with the subject in pre-verbal position. Earlier, Arosio et al. investigated the comprehension of ORs in Italian where the comprehension of ORs depends on the correct interpretation of number morphology. They found that children comprehend less successfully when the OR is disambiguated by morphology than by position.

To further highlight the importance of word order, we now turn to evidence taken from investigations of bilinguals. Matthews and Yip (2003) investigated relative clauses in English produced longitudinally by two bilingual children exposed to Cantonese and English from birth for whom Can-

tonese was considered the dominant language. Cantonese relative clauses are pre-nominal in contrast to post-nominal English relative clauses. The authors postulated that pre-nominal relatives in Cantonese are transferable to English at the initial stage. These pre-nominal relative clauses are ORs, where the word order facilitates the processing either for comprehension or for production, since prenominal ORs preserve the canonical word order of the main clause.

This further suggests that canonical word order proves to be a powerful strategy that underlines the difficulty presented by ORs in SVO languages. CG may be considered one such language, although there is still a debate about the underlying word order in Greek with respect to SVO versus VSO (cf. Roussou and Tsimpli, 2006, for a recent perspective on SMG).

4. The current study

The present study investigates the acquisition of relative clauses in an experimental situation by Greek Cypriot children with typical language development for both modalities, auditory comprehension and verbal production. Based on our findings, a number of questions can be raised which will be addressed in the following. These include:

A. When do CG-speaking children comprehend and produce relative clauses?
B. What types of errors do they make?
C. Is the subject–object asymmetry attested?
D. What are the theoretical and educational implications?

The relevance of questions A–C follows straightforwardly from the literature overview presented in the previous section; this will be discussed mainly in section 5 (expanding on Theodorou et al., to appear). Question D connects to our introductory remarks concerning CG as well as the role and relevance of the variety in the (linguistic) development of young children growing up in Cyprus. However, the findings of our study presented in this section, and the suggestions provided in section 6 below, might be taken as a starting point for future investigations in bi-*x* contexts (i.e. at least for bilectal, bidialectal, and bilingual children). Over and beyond that, an interesting line of implications concerns atypical or even impaired language development, in bi-*x* contexts and elsewhere, which will be only touched upon here (for a full discussion, see Theodorou, in progress).

4.1 Participants

Thirty-three children, ranging in age from 5 to 9 years old, participated in this study. All were native, "monolingual" speakers of CG, that is, both parents are Greek Cypriot, CG is the home language, and other than the bi-*x* context no additional language is spoken, acquired, or learned in the children's environment. They were split into four groups according to their age as reported in Table 1. In addition, seven adults participated in the production task as controls.

Table 1, Participant details

Age Group	Number	Mean Age	Std. Dev.	Gender
5;0–5;11	7	5;5	0;4	3M, 4F
6;0–6;11	8	6;7	0;4	5M, 3F
7;0–7;11	9	7;7	0;3	5M, 4F
8;0–8;11	9	8;6	0;3	3M, 6F
Adults	7	39;2	12;4	4M, 3F

Key: age = years;months; F = female; M = male; Std. Dev. = standard deviation

All children were recruited from kindergartens and primary schools in Limassol and surrounding areas after approval from the Ministry of Education and Culture. All children participated, as did the controls, in a large-scale investigation that aims to identify clinical markers for specific language impairment in CG (Theodorou, in progress). They participated in this study classified as typically developing children, and none had received any speech and language therapy or special education services during or prior to the time of testing. Parental consent forms were distributed and only those children whose parents approved in writing took part in the study.

4.2 Materials and methodology

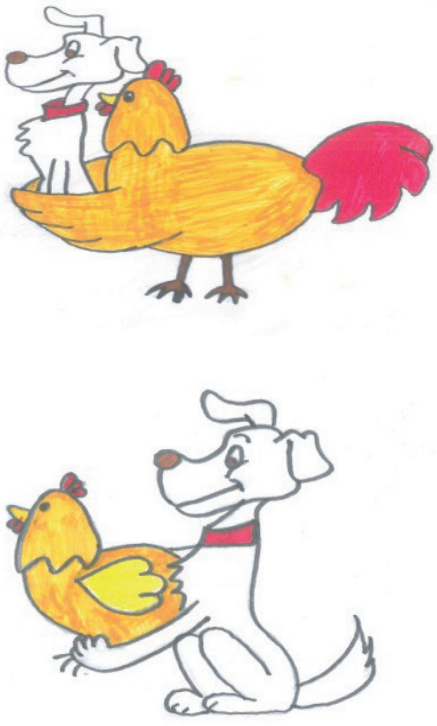
For the purposes of our study, two different tasks were used to examine children's performance on comprehension and production of restrictive relative clauses, an auditory comprehension task and a verbal production task. These were modeled on existing methods used in the literature and

specially adapted to CG. All testing took place in a quiet room in the children's homes or schools, and both tasks were administered within a single session.

Auditory Comprehension

The comprehension of subject and object relative clauses was tested with a task developed from the picture selection task used by Friedmann and Novogrodsky (2004), taking into account the modification Arnon (2005) suggested, who argued that "asking children to choose a picture rather than a referent might have hindered detection of the full performance range for the following reason: when a child points to the correct picture, we do not whether he or she is indeed pointing to the correct or incorrect referent" (p. 38).

Looking at a pair of two pictures, children were asked to listen to a sentence and put a sticker on the referent described by the sentence in one of the two pictures. Children heard SRs or ORs preceded by the request "Put a sticker on…", while looking at two pictures that featured the relevant NPs in both thematic roles, i.e. as agent or as patient/theme. For example, for the command "Put the sticker on the hen that the dog is holding", one



SR
"Put the sticker on the hen that is holding the dog."

OR
"Put the sticker on the hen that the dog is holding."

Figure 1, Example from the comprehension task (SR and OR)

picture depicted a dog holding a hen and the other showed a hen holding a dog (figure 1). (The entire task was carried out in CG, but for readability is provided here in English only.)

The experiment consisted of 32 items — 16 SRs and 16 ORs. Each picture set was presented twice, preceded once by a SR and once by an OR. All verbs were transitive, taking a direct object as a complement, used in present tense. In all sentences both NPs had identical number features so as to avoid inflectional cues provided by number agreement on the verb. In addition, all sentences were semantically reversible, enabling logical assignment of either thematic role to both NPs in the sentence. Therefore, hens and dogs can hold (agent) or be held (patient).

Answers were coded according to the position of the sticker. In the present example, four possible answers were enabled: "correct" (the held hen), "reversal error" (the holding hen), "agent error" (the holding dog), and "other" (the held dog). A pre-test was run before the actual experiment in order to ensure that children could recognize the animals depicted on the pictures and properly understand the instructions. During the testing no feedback was provided other than general encouragement like head shakes and "Let's look at the next one". When the children asked for repetitions, the experimenter complied. There was no time limit and scoring was online. The first author was the experimenter for all participants.

Verbal Production

Restricted relative clauses were elicited from each participant using a task developed from the preference task used by Novogrodsky and Friedmann (2006). The experimenter presented two options to the participant who was then asked to choose one of the options. Because of the construction of the task, the answer would have to be formed as a relative clause such as the phrase "I would like to be the child that…". The two situations were presented visually and orally at the same time in order to create the appropriate context and to eliminate memory load. The visual presentation of the stimulus was the novelty of the experiment design in relation to the original in an attempt to eliminate other factors which could affect the results such as memory load and attention.

The experiment consisted of 20 items, with 10 eliciting SRs and 10 ORs. The prompt that elicited ORs described two children performing two different actions (figure 2), which was then followed by the preference ques-

tion in 8. The prompt that elicited ORs described two children who are the themes of an action performed by two different figures (figure 3), followed by the preference question in 9.

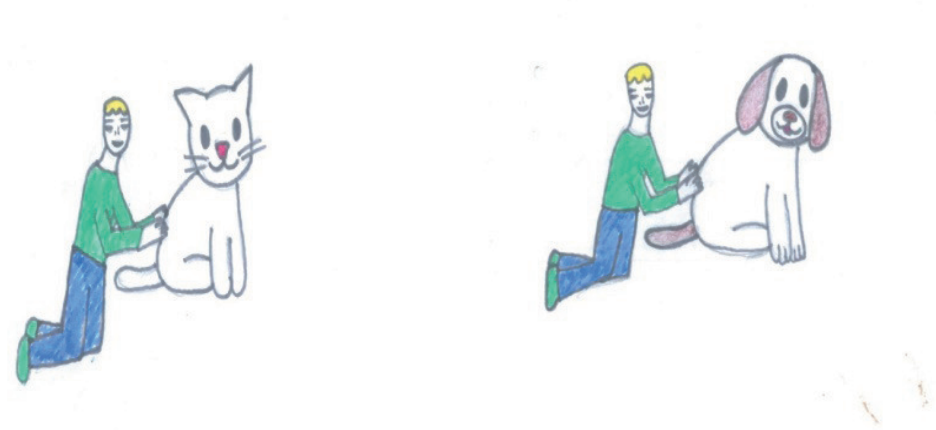


Figure 2, Example from the production task (SR)

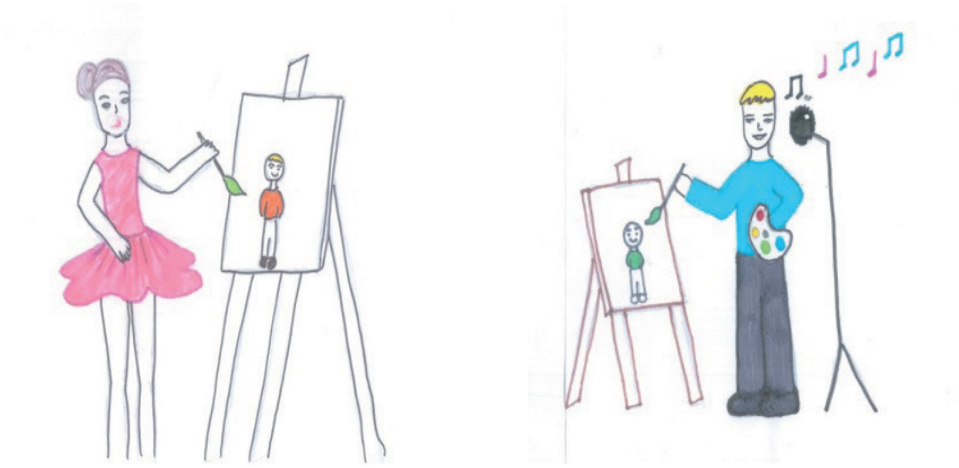


Figure 3, Example from the production task (OR)

(8) EXAMPLE OF A SUBJECT RELATIVE (SR)
/δame eʃi θcio peδaca. to ena peδaci kuⁿda ti γata tʃe to al:o pedaci kuⁿda to ʃilo. pco peδaci en:a θeles na sun? ksecina me "en:a θela na mun…"/
Target: */en:a θela na mun… to peδaci pu kuⁿda to ʃilo/*

'There are two children. One child is pushing the cat and the other child is pushing the dog. Which child would you rather be? Start with "I'd rather be…".
Target: 'I'd rather be the child that is pushing the dog.'

(9) EXAMPLE OF AN OBJECT RELATIVE (OR)
/δame eʃi θco peδaca. i xoreftria zoγrafizi to ena to peδaci tʃe o traguδistis zografizi to al:o peδaci. pco peδaci en:a θeles na sun? ksecina me "en:a θela na mun…"/
Target: */en:a θela na mun… to peδaci pu zografizi i xoreftria/*

'There are two children. The singer is drawing one child and the dancer is drawing the other. Which child would you rather be? Start with "I'd rather be…"
Target: 'I'd rather be the child that the singer is drawing.'

Each participant was tested in a quiet room, in either their school or the experimenter's office (first author, a certified and practicing speech and language therapist/pathologist). No time limit was imposed during the testing and no feedback was provided other than general encouragement. All children's and adults' responses were digitally audio-recorded and then transcribed by the first author.

We conducted a detailed response analysis in order to examine the response patterns of participating children. The responses were classified into nine categories: "target" response (10), use of "RP" (11), non-adult-like change in "word order" (12), "case error" (13), "filled gap" error (14), infelicitous "elliptical response" (15), "head error" (16), "agr(eement) error" (17), and "other error" composed either of errors not listed here or a combination of those just mentioned (18). Examples from each are shown below for a task that required the target response in 10, with the markers for each category indicated in boldface:

(10) TARGET RESPONSE ("TARGET")
to pedaci pu fila i γiaγia
the child.NOM that kiss.3SG the grandma.NOM
'the child that the grandma is kissing'

(11) USE OF RESUMPTIVE ("RP")
to pedaci pu **to** fila i γiaγia
the child.NOM that CL.3SG.MASC.ACC kiss.3SG the grandma.NOM

(12) CHANGE IN WORD ORDER ("WORD ORDER")
to pedaci pu **i γiaγia** fila
the child.NOM that the grandma.NOM kiss.3SG

(13) CHANGE IN CASE ("CASE ERROR")
to pedaci pu fila **tin γiaγia**
the child.NOM that kiss.3SG the grandma.ACC

(14) a. "FILLED GAP" WITH POST-VERBAL SUBJECT
to pedaci pu fila i γiaγia **to pedaci**
the child.NOM that kiss.3SG the grandma.NOM the child.ACC
b. "filled gap" with pre-verbal subject
to pedaci pu i γiaγia fila **to pedaci**
the child.NOM that the grandma.NOM kiss.3SG the child.ACC

(15) "ELLIPTICAL RESPONSE"
to pedaci
the child.NOM/ACC

(16) CHANGE IN HEAD ("HEAD ERROR")
i γiaγia pu fila to pedaci
the grandma.NOM that kiss.3SG the child.ACC

(17) "AGREEMENT ERROR"
to pedaci pu **me** fila i γiaγia
the child.NOM that CL.1SG.MASC.ACC kiss.3SG the grandma.NOM

(18) "OTHER ERROR"
to pedaci pu **to** fila i γiaγia **to pedaci**
the child.NOM that CL.3SG.MASC.ACC kiss.3SG the grandma.NOM the child.ACC

Note that while 10 and 11 are perfectly well-formed in adult CG (as well as SMG, but that is not our present concern), 12 is not; however, it remains to be see whether this might constitute a difference between CG and SMG (see also section 7). Concerning resumptives, we will not engage here in the wider debate concerning the status of the RP as the same as or different from the gap (see Chatsiou, 2006, for some discussion and references). We simply entertain the possibility in line with research within Chomsky's

(1995) minimalist program (Boeckx, 2003; Grohmann, 2003). All responses from 13 to 18 are completely unacceptable, if not even nonsensical. For 15 we indicate the case on the elliptical response as nominative or accusative (homophones in the Greek neuter declension). Most likely it is nominative, since Stathopoulou (2007: 116) also noted such elliptical responses in her study on the production of relative clauses in SMG by participants with Down syndrome, namely where the head noun is not neuter, for masculine (*o scilos* 'the dog') and feminine (*afti* 'this (one)'). We chose to restrict our productions to the neuter *to pedaci* 'the child' for methodological reasons so as not to provide the participant with additional cues (similar to our number restriction in the comprehension task; we will also readdress this issue in section 7).

5. Results

Children's overall performance split into the four age groups in relation to relative clause type and modality is presented in figure 4. It can easily be seen that children perform nearly ceiling in SRs, with production slightly better than comprehension. The overall accuracy in ORs was lower in all age groups for both modalities, and the asymmetry between comprehension and production noted for other languages is found here too (see section 3 above).

Focusing on the performance of the four groups in the comprehension experiment, we can see that the documented asymmetry between subject and object relative clauses can thus also be observed in CG. In addition, we note that SRs come with at-ceiling performance already at age 5, while ORs are not yet fully acquired as late as 9 years of age.

Moving on to the comparison between comprehension and production, we notice that OR production is mastered earlier than comprehension by children acquiring CG, as expected from the related literature. However, the gap is less than the existing literature suggests and this might be because the correct answers included responses that use resumptive pronouns.

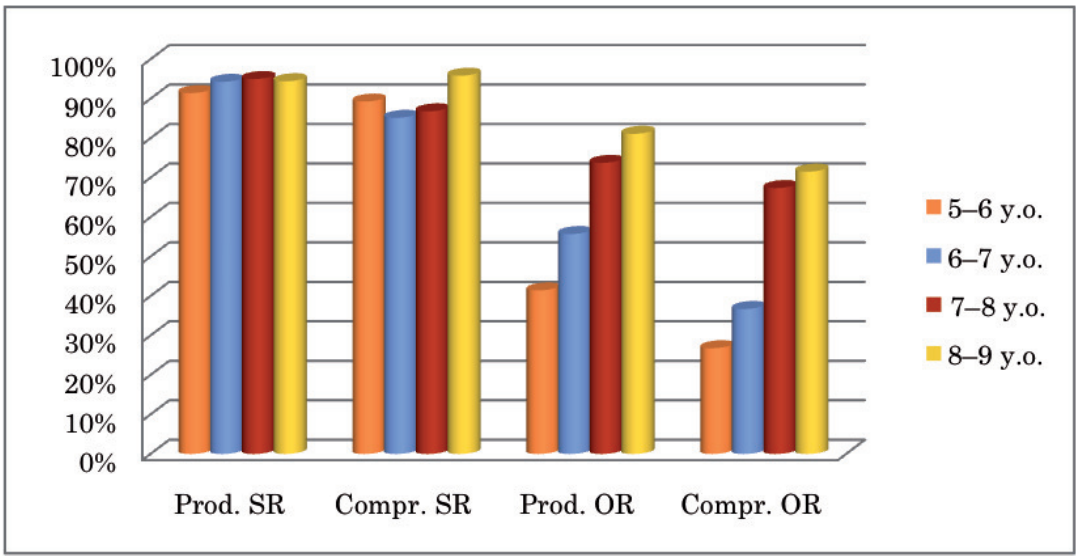


Figure 4, Results for all ages across relative clause types and modalities.

Seeing that performance on SRs was almost at ceiling, only the results of ORs will be discussed further. Figure 5 illustrates the errors children made on the OR comprehension task. Interestingly, children did not only perform thematic reversal errors (presumably due to case misinterpretation), but they also produced what Arnon (2005) dubbed "agent errors": children erroneously chose the agent of the relative clause instead of the clausal head (i.e. right picture, wrong actor) as often as they chose thematic role reversal (i.e. wrong picture, right actor).

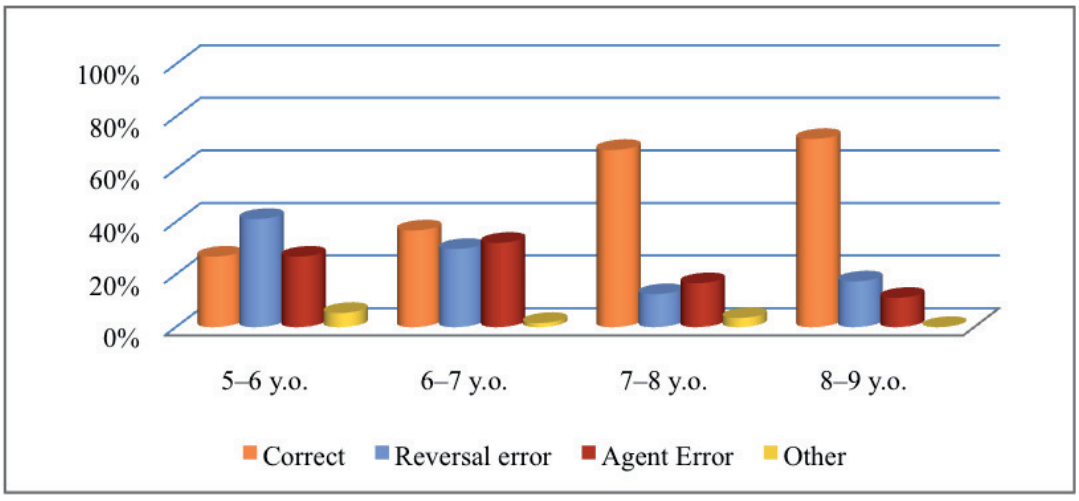


Figure 5, Results of the major error types in OR comprehension.

As for the production experiment, an asymmetry between subject and object relative clauses could also be observed once again, as is shown in figure 6. SRs clock in at ceiling already at age 5, while ORs are not yet fully acquired even at age 9. The percentage of correct answers includes responses where resumptive pronouns were used, as this is an acceptable option in the grammar of CG. Adults performed fully correct in SRs, whereas they faced some difficulty with ORs.

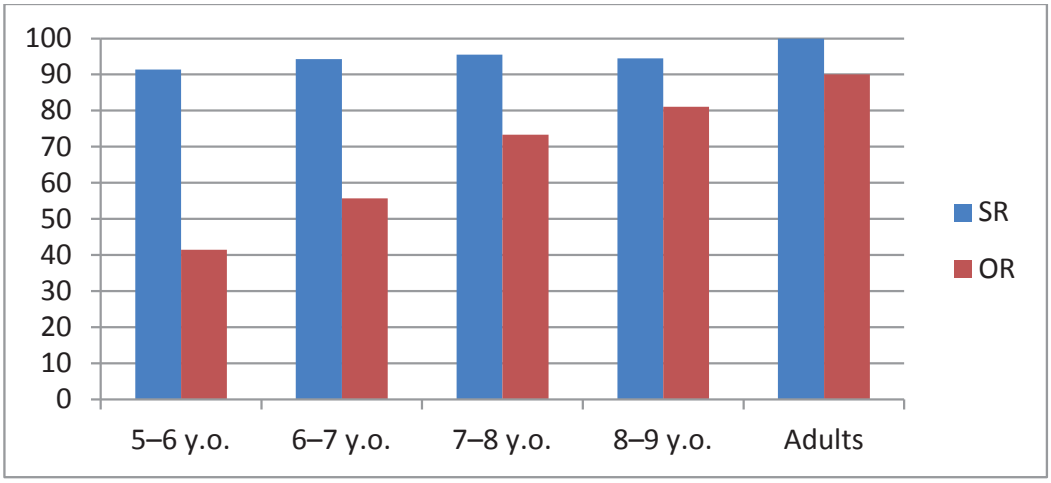


Figure 6, Results of the production experiment.

We now focus our attention on the analysis of responses that we got for ORs. In particular, a detailed error analysis has been conducted in order to examine the response patterns of each age group. The responses are shown in Table 2 (see examples 10–18 above).

Table 2, Results of the production task for all participants.

Age	Target	RP	Word Order	Case Error	Filled Gap	Elliptical Response	Head Error	Agr. Error	Other Error	*Total*
5–6	15	14	1	9	4	6	3	2	16	*70*
6–7	21	18	8	14	—	3	2	—	4	*70*
7–8	47	19	2	7	2	2	3	—	8	*90*
8–9	51	22	—	5	1	1	4	4	2	*90*
adults	59	4	—	—	—	—	5	1	1	*70*

Interestingly, a diversity of different types of errors is attested across the age groups. A noticeable percentage of child productions contained resumptive pronouns (20–25%: 14 and 18 out of 70 for the younger and 19 and 22 out of 90 for the older children). Moreover, 20% of the younger children (28 out of 140) versus just over 10% of the older children (19 out of 180) changed the case or head, generating SRs this way instead of target ORs. Regarding the category "other", we note that the majority of responses comprises a combination of the other response groups. Adults performed well overall but did produce some head errors.

6. Discussion

In the study reported here, the acquisition (onset) and development (over time) of restrictive relative clauses by Greek Cypriot children was examined. The main result of the current study is that young children encounter difficulties in the comprehension and production of ORs in CG, whereas the production and comprehension of SRs is nearly at ceiling already at age 5. Moreover, in accord with other studies, these data also demonstrate an asymmetry between production and comprehension, with children performing considerably better in the former.

Focusing on ORs, especially in the experimental comprehension task, we observed that not only did children perform thematic role reversal errors that were expected based on a non-movement account, but they also made agent errors. This result agrees with Arnon's (2005) results and shows that children do not select between two potential agents but between at least three. Our decision to adopt the particular modification was thus justified. Arnon suggested that children misunderstand the modifying nature of the clause, meaning that they do not conceptualize that the relative clause provides further information about the head noun, thus leading them to choose the wrong agent.

Turning our attention to the production of ORs, we first wish to highlight that responses with resumptive pronouns were counted as correct, given that such structures are grammatical in CG. However, further research is needed that would investigate resumptive pronoun use by adults and the effect of employing pictures as a point of reference with regard to the use of resumptive pronouns. The limited number of adults tested here for control purposes is not very revealing. Response analysis indicates that typically developing children adopt different avoidance strategies by pro-

ducing responses such as ORs with resumptive pronouns instead of the target response and SRs with changing the case or the head instead of target ORs. The variety of responses does not reflect any systematicity concerning particular errors. Following Rizzi (2005), one might say that they rather suggest a difficulty with the particular structure due to immature grammatical development.

The errors children made failing to produce the target ORs may constitute evidence that the attested difficulty in the acquisition of ORs derives from difficulties with the movement operations involved (see section 3). Children may thus fail to perform the relevant movement steps (*wh*-movement of Op, verb raising, etc.), modify any of these operations in non-standard ways (spelling out traces, targeting a different position, etc.), and/or cannot properly link the relevant dependencies (such as "Form Chain" for Op and relativized base position). Let us, for concreteness, then assume a simplified derivation such as the one sketched in 19, with the angled brackets indicating a copy left behind by movement and coindexation some sort of chain formation (leaving the specific aside; for a comprehensive discussion in the minimalist context bearing on a range of additional issues we cannot deal with, see Hornstein, 2001).

(19) to pedaci$_i$ [$_{CP}$ Op$_i$ pu-C^0 [$_{TP}$ __ fila-T^0 [$_{vP}$ i γiaγia <fila> <Opi>]]]

Filled gap errors such as in 14a could be interpreted with an analytical suggestion along the following lines: the thematic position of the null operator is spelled out, regardless of whether Op subsequently moves to [Spec,CP] or whether it is base-generated up there related to the thematic object position by some other means. This might then possibly reflect an underlying problem of children with (the appropriate realization of) empty categories:

(20) [$_{CP}$ Op pu fila i γiaγia **to pedaci**]
that kiss.3SG the grandma.NOM the child.ACC

The use of a resumptive pronoun as in 11, though no error, seems to be an instance of a similar spell-out of the variable left behind by Op-movement, followed by cliticization. That is, in one case, the thematic position gets spelled out by a full DP and in the other by a clitic.

(21) [$_{CP}$ Op pu **to$_i$** fila i γiaγia **<to>$_i$**]
that CL kiss.3SG the grandma.NOM

Moving on to word order errors such as 12, one plausible suggestion would involve the assumption that children do not perform verb movement in these structures; hence, they fail to raise the verb to T0, thereby generating ungrammatical structures. Alternatively, one could say that not only the verb but also the subject moves in such productions, namely from the base-generated [Spec,*v*P] to either [Spec,TP] or some higher topic, still with V-in-T. Since children do not show any problems with verb movement elsewhere, 22b is arguably more plausible.

(22) a. [$_{CP}$ Op$_i$ pu [$_{TP}$ Ø [$_{vP}$ **i γiaγia** fila <Op$_i$>]]]
b. [$_{CP}$ Op$_i$ pu [$_{TP}$ **i γiaγia** fila-T^0 [$_{vP}$ **<i γiaγia>** <fila> <Op$_i$>]]]
that the grandma.NOM kiss.3SG

Other errors such as change in case or head, where children produce an SR instead of a target OR, for example, further reinforce the idea that children have difficulties in performing ORs, whereas this does not hold to the same extent for SRs. These might be due to base-generation of Op in [Spec,*v*P] or the generation of a wrong relative head. Needless to say, a number of different analytical approaches come to mind, of course, which we do not want to exclude a priori. However, on the basis of the limited data collected at the present time, we would rather not speculate too much on the derivation of ungrammatical structures and possible underlying problems in the child acquiring CG at different (st)ages. Therefore, we postpone a more comprehensive treatment of the syntactic mechanisms that derive target and erroneous relative clauses in CG by young children for the time being. Some suggestions can be seen right above; once more data are collected (see also the brief discussion below), we might be in a safer position to choose one over the other.

7. Conclusion

In this paper, we presented a cross-sectional study of the acquisition and development of restrictive subject and object relative clauses in children acquiring the Cypriot variety of Modern Greek aged five to nine years. We could confirm for CG the cross-linguistic finding concerning children's difficulties in acquiring ORs compared to SRs. Furthermore, the well attested asymmetry between comprehension and production, where developmentally the latter precedes the former, also applies to CG, the linguistic variety under investigation.

As a morphologically rich subject in-situ language with canonical verb raising and the option of resuming the relativized element with a clitic, research on the acquisition of relative clauses in CG may potentially carry with it several theoretical implications. The frequent word order errors may suggest a lack of verb movement at the relevant developmental stage or indicate difficulties with subject displacement. That is to say, the child may not yet have acquired the obligatory raising of V (through *v*) to T — or wrongly raise the subject from [Spec,*v*P] to [Spec,TP] (as in English) or some higher slot (possibly a topic position).

Since it is well known that children are quite adept at placing the verb correctly from very early on (for recent literature review see Meisel, 2011), and since a topic position has been suggested for preverbal subjects in null subject languages (e.g., Alexiadou and Anagnostopoulou, 1998, for Greek), the outcome of this potential discussion may already be determined, though see Roussou and Tsimpli (2006: 339ff.) for additional discussion on the latter. There may be a need for a different perspective, and it might even come from CG, possibly in comparison with SMG. One such alternative take may involve an explanation in terms of intervention of the post-verbal subject (whatever its position in the structure), as has been argued for relative clauses and coordinate structures in Hebrew, Italian, and European Portuguese (e.g., Friedmann, Belletti, and Rizzi, 2009; Friedmann and Costa, 2010). Here, however, it would need to be explained why the subject counts as an intervener even when it is post-verbal. As an anonymous reviewer suggests, the relative weight of the different cues for processing may indeed play a role (such as case, word order, and verbal morphology).

Likewise, future research from CG child language may shed some light on the optional production of resumptive pronouns in relative clauses — in test scenarios with or without pictures — and it may well be informative regarding other contexts of spelling out variables. The latter issue is perhaps slightly more debatable and would involve a closer examination of the derivational introduction of the clitic as well as the suggested spell-out analysis of the empty operator (for some ideas in this context see Grohmann, 2003). However, since adults produce RPs as well, it would be interesting to carry out a more structured comparison between child and adult productions of ORs in both Greek varieties, CG and SMG. Perhaps a clue is to be found there.

In addition, a number of pedagogical lessons can be learned from studying the development of relative clauses and applied for the classroom. This issue is particularly relevant in the Cypriot context of diglossia, but

ties in to the points just raised. If it turns out that CG and SMG differ in finer details concerning the structure and derivation of relative clauses (beyond the presence or absence of relative pronouns), local educational curricula might want to be extended to include targeted instruction of relative clauses in school. This also depends on frequency numbers for CG, of course, which do not yet exist (be it for relative clauses or be it for a long list of other morphosyntactic and lexical aspects of the variety). The relevance of SMG might also bear on teachers' expectations of comprehension of relative clauses (as well as a number of other dialect-related aspects; see e.g. Leivada et al., 2012).

Lastly, there are also clinical implications to be gained from developmental research on relative clauses. These are currently explored for CG by Theodorou (in progress) and involve the integration of restrictive relative clauses into screening measures for language impairment assessments, the use of OR comprehension and production, in particular, for assessment purposes, and the incorporation of relative clauses into therapy and intervention programs. Once more, this is a highly relevant aspect of the present research agenda for the bilectal speech community of diglossia, as it exists in Cyprus.

While more research is clearly needed, our preliminary findings can certainly guide future studies. As for such future research, additional data are needed along several lines. For one, the full spectrum of relative structures should be employed in experimental data gathering, including the head noun in object function. We only tested subject head relative clauses for SRs and ORs, but not object gap structures for either. The full spectrum would thus contain tokens of the c- and d-structures in 23 as well (taken from Stathopoulou 2007: 112 for SMG, but easily adaptable to CG):

(23) a. SUBJECT HEAD–SUBJECT GAP
I katsika pu filai tin agelada htipai ton pithiko.
the goat.NOM that kiss.3SG the cow.ACC hit.3SG the monkey.ACC
'The goat that is kissing the cow is hitting the monkey.'

b. SUBJECT HEAD–SUBJECT GAP
O elefantas pu kinigai i tigris filai ti gata.
the elephant.NOM that chase.3SG the tiger.NOM kiss.3SG the cat.ACC
'The elephant that the tiger is chasing is kissing the cat.'

c. SUBJECT HEAD–SUBJECT GAP
O rinokeros sprohni to skilo pu htipai tin kamilopardali.
the rhino.NOM push.3SG the dog.ACC that hit.3SG the giraffe.ACC
'The rhino is pushing the dog that is hitting the giraffe.'

d. SUBJECT HEAD–SUBJECT GAP
I zevra filai tin katsika pu kinigai o pithikos.
the zebra.NOM kiss.3SG the goat.ACC that chase.3SG the monkey.NOM
'The zebra is kissing the goat that the monkey is chasing.'

We thus acknowledge that on a practical level, more children need to be tested — and at different ages, possibly allowing for further developmental milestones. Just as important, however, is the collection of additional and more stable control data from adults, since CG as a whole is rather understudied on the (morpho)syntactic level. These data could then be used to carry out comparisons between CG and SMG, both for adults and for children, in order to ascertain any qualitative differences. Additional data may also be collected from employing different elicitation techniques and even investigating spontaneous speech recordings or semi-structured elicitations. In the context of Cyprus, testing must be expanded to other populations and include bi(dia)lectal, bilingual, and impaired children, for example, to trace competence in relative clauses in CG in contrast to SMG, English, and typical language development.

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