Object clitic pronouns, definite articles and genitive possessive clitics in Greek preschool children with Specific Language Impairment (SLI): implications for domain-general and domain-specific accounts of SLI

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1. Introduction

Specific Language Impairment (SLI) is a developmental language disorder in which affected individuals fail to acquire language according to age-expected levels, in spite of typical development in other areas; they have normal non-verbal intelligence and socio-emotional development, no presence of motor speech disorders and no hearing difficulty or evident neurological damage. SLI is present from the earliest stages of development, in preschool children, and may continue on into adolescence and adult life.

Current investigations focus on pinpointing the clinical features of SLI across languages and on exploring its underlying nature and causes. A central theoretical debate on SLI concerns what type of account can best explain the morphsyntactic deficits observed; on one hand, researchers in favour of *domain-specific accounts* argue that SLI is the result of a selective limitation in the language system (e.g. van der Lely 2003). In contrast, the proponents of *domain-general* accounts argue that the language deficits in SLI are caused by deficits in general cognitive processing mechanisms, affecting other areas of cognition as well as language (Leonard 1998). Crosslinguistic investigations in languages with different morphosyntactic properties are crucial in putting the predictions of these frameworks to the test.

With regards to the clinical characteristics of SLI, there is converging evidence that children with SLI have significant limitations with the acquisition of morphosyntax (Bishop 1997; Leonard 1998). These difficulties are critically dependent on the language studied. Thus, in English and German, deficits in verbal morphology have been highlighted as a core feature, specifically consisting of omissions of the past tense morpheme (-ed) for English, and subject-verb agreement inflections (e.g. third person inflection –s, auxiliary and copula *be*) for English and German (Clahsen 1989; Rice, Wexler & Cleave 1995). In Romance languages such as Italian and French, third person object clitic pronouns are highly omitted by children with SLI (Bortolini, Caselli, Deevy & Leonard 2002; Jakubowicz, Nash, Rigaut & Gerard 1998; Paradis, Crago & Genesee 2005). Definite articles have also been pointed out as an area of difficulty for Italian-speaking children with SLI (Bottari, Cipriani, Chilosi & Pfanner 1998). In Greek, similarly to Romance languages, there is evidence that third person object clitic pronouns (in accusative case) and definite articles pose significant difficulties for preschool children with SLI (Tsimpli & Stavrakaki 1999; Tsimpli 2001).

In this paper we aim to contribute to the ongoing investigation on the characteristics and etiology of SLI by (a) identifying certain morphosyntactic structures that are particularly difficult for Greek-speaking preschool children with SLI, with emphasis on object clitic pronouns, definite articles and genitive possessive clitics and, (b) by exploring the theoretical implications of the findings for accounts of SLI. In the next section we will outline the properties of the target structures in Greek, and will review findings from Greek studies of SLI. We will then highlight accounts that could explain the pattern of deficits and will present the current study.

2. Background to the study

2.1 Object clitics, definite articles and genitive possessives in Greek. Properties, findings from SLI and theoretical explanations

In Greek, third person clitic pronouns are unstressed forms derived from strong pronouns ('afton' → 'ton'), they are marked for case, number and gender, and they are used frequently as direct (1a) or indirect (1b) objects. They may also be used as genitive possessives on a noun phrase (2):

(1a) **ton** pleni
him,*acc.masc.sg.* washes
(he/she) washes him
(1b) **tu** dini ena potiri
him, *gen.masc.sg.* gives a glass
(he/she) gives him a glass
(2) to vivlio **tu**
the book his,*gen.masc.sg.*
his book

Definite articles precede nouns and are licensed under specific discourse conditions, for example when the entity in the noun phrase has already been mentioned or is easily accessible in the common ground (Holton, Mackridge & Philippaki-Warburton 1997). In Greek, definite articles and accusative object clitics are considered to share many common characteristics. The main ones are the following:

i. They are are prosodically unstressed elements and morphophonologically identical in the accusative case (3):

(3) **ton** elefanda **ton** pleni
the,*acc.masc.sg. elephant* him,*acc.masc.sg* washes

ii. Both realise features of case, gender and number (in syntactic-minimalist terms these are uninterpretable phi-features; Chomsky 1995)
iii. They can both have a purely grammatical function, void of semantic information. For example, they can both be used expletively (4,5):

(4) **To** vlepo na fevgo
It (I) see,*1sg.* to go,*1sg.*
I see myself leaving
(5) **To** oti den exei erthi me anisixi
The,*neut.sg*. that he hasn't come worries me
The fact that he hasn't come worries me

In (4) the object clitic refers to a whole phrase, and in (5) the definite article does not contribute to the definiteness of a noun but again introduces a whole phrase. These and other properties have led researchers to attribute a determiner status to object clitics and definite articles in Greek (Tsimpli & Stavrakaki 1999). Similar claims have been made for clitics and articles in Romance languages (Uriagereka 1995 i.a.). The implications of these properties for theoretical accounts of SLI are reviewed below.

Turning to findings from SLI in Greek, Tsimpli & Stavrakaki (1999) studied the spontaneous speech of a 5;5 year-old girl who had been diagnosed with SLI. The participant had significant difficulties with the use of third person accusative object clitic pronouns and the definite article, showing high rates of omission (95%) in obligatory contexts. On the contrary, a higher performance was noted on full pronouns, indefinite articles and other types of clitic pronouns such as genitive possessive clitics. The findings of impaired object clitics and definite articles were confirmed by several other single case-studies looking at spontaneous speech (Diamanti 2000; Varlokosta 2000), and a group study by Tsimpli (2001), who looked at seven children aged 3;5 to 7;0 years. Moreover, Mastropavlou (2006) compared 10 preschool children with SLI aged 4;2 to 5;9 years to typically-developing age and language-matched control groups on elicitation tasks and confirmed the dissociation between accusative object clitics and genitive possessive clitics. However, the errors on clitic pronouns here consisted of both omissions and substitutions, and the rate of omissions was not as high as that reported in Tsimpli & Stavrakaki's (1999) study (30% compared to 95%). Furthermore, Tsimpli (2001) found a dissociation between object clitics and definite articles, the latter being less impaired at a stage where object clitic pronouns still posed difficulties. Finally, Stavrakaki (2001) did not observe difficulties with either object clitics or definite articles in the spontaneous speech of eight older children with SLI (mean age 7;3 years), who reportedly had difficulties with these structures at a younger age.

The studies reviewed above point to deficits in third person object clitic pronouns and definite articles in contrast to genitive possessive clitics, but there is a large variation in the extent to which these deficits are found. Many of the studies are single case-studies and have not employed appropriate control groups of typically-developing children as a means for comparison. Instead, they have compared their participants' performance with data from corpora of typically-developing children involving only four children (e.g. the CHILDES corpus for Greek, Stephany 1997). Moreover, there is a need for the spontaneous data to be supplemented with elicitation data, which would allow for the examination of other forms of object clitics that do not occur as frequently in spontaneous speech (e.g. genitive object clitics).

It should be noted that omissions of clitics and articles are not found as frequently in typically-developing children. Unlike what has been reported for typically-developing children acquiring other languages such as Italian and French, omissions of clitics in Greek-speaking children have only been reported in very early stages of development, before the age of 2;0 years (Stephany 1997). After 2;0 years, object clitics appear to be produced at normal rates by typically-developing children (Tsakali & Wexler 2003). Similarly, definite articles are reported to be omitted even more frequently than clitics before 2;0 years but are subsequently produced at high rates by 2;10 years (Stephany 1997; Marinis 2000). In addition, genitive possessives are argued to be acquired earlier than other clitic forms (Stephany 1997).

The reported deficits, if confirmed, can be explained by both domain-specific and domain-general proposals. Tsimpli & Stavrakaki (1999) put forth the Interpretability Hypothesis (IH), a syntactic account couched in the Minimalist framework (Chomsky 1995). The IH proposes a homogenous pattern of impairment of Greek-speaking children with SLI on object clitics and definite articles, on the assumption that they both share uninterpretable determiner (D)-features. Such features are considered to be inaccessible and heavily omitted in early stages of development of children with SLI. On the contrary, genitive possessive clitics are considered to carry semantic information, that of the possessor (interpretable features), and so are not predicted to be impaired. Conversely, a domain-general account such as the Surface Hypothesis (SH), put forth by Leonard (1989; 1998), would predict a similar impairment on object clitic pronouns and definite articles but for different reasons. According to this account, children with SLI, similarly to younger typically-developing children, have difficulties perceiving and processing unstressed, non-salient morphemes which, additionally, have a grammatical function. Both third person object clitic pronouns and definite articles in Greek satisfy these criteria. Moreover, they are even morphophonologically identical in certain cases. Genitive possessive clitics are also unstressed but they are found in a post-stress position, which is considered to be subject to lengthening and thus to an increase in salience. Various researchers have argued in favour of earlier acquisition in typically-developing children of post-stress clitics compared to pre-stress clitics (e.g. Tzakosta 2004). Thus, genitive possessives should be less impaired than object clitics and definite articles.

Differences between object clitics and definite articles would be predicted by another domain-specific account, the Representational Deficit for Dependent Relations (RDDR, van der Lely 1998; 2003). This account posits that the limitations of children with SLI with grammatical-type difficulties (termed SLI sub-group) are due to a deficit in the computational system, and specifically in the operation of movement involved in syntactic dependencies. According to this proposal, structures that involve long-distance movement pose difficulties and may be omitted, substituted or sometimes used correctly by children with SLI, due to the optional use of movement in the underlying grammar. If a movement-based syntactic account is posited for the generation of clitic pronouns (Kayne 1975; Philippaki-Warburton, Varlokosta, Georgiafentis, Kotzoglou 2004, see 6), then the RDDR account would predict that object clitic pronouns should be more impaired than definite articles and genitive possessive clitics in constructions such as those in the examples (2,3), which do not move[1] (Alexiadou & Stavrou 1998; 2000):

(6) ton_i pleni (ton_i) (him washes)

[Spec, TP [AGRP [VP [DP (Philippaki-Warburton et al. 2004)

2.2 Specific aims of paper

The specific aims of this paper are to investigate (a) whether accusative-case (direct) object clitic pronouns, genitive-case (direct /indirect) object clitic pronouns, definite articles and genitive possessive clitics are difficult for Greek-speaking preschool children with SLI, and, (b) to explore the implications of the findings on which of the domain-general or domain-specific accounts of SLI reviewed above (SH, RDDR, IH) would be more suitable to explain the pattern of deficits observed[2]. The predictions of the accounts are summarised as follows:
IH, SH: object clitics = definite articles < genitive possessive clitics
RDDR: object clitics < definite articles = genitive possessive clitics

3. Method
3.1 Participants

SLI group

Nine children aged 4;9 to 6;9 years (57 to 81 months) with a diagnosis of SLI, were selected out of a total of 15 children, from public and private centres for speech and language therapy in Greece. All participants were

[1] There are other syntactic accounts arguing that definite articles and genitive possessives may involve movement in certain constructions (see Marinis 2003; Alexiadou & Stavrou 2000) but not the ones that are examined here.

[2] The results presented here are part of a larger study which also assessed verbal morphology (S-V agreement, past tense), and phonological short–term memory (nonword repetition). The findings from this larger study are presented in detail and discussed in the light of other theoretical accounts in Smith, Edwards, Stojanovik & Varlokosta (to appear) and Smith (in preparation).

monolingual speakers of Greek, had been receiving speech and language support for a period of eight months to three years, and were attending kindergarten. The participants had received a diagnosis of SLI through multidisciplinary assessment, which excluded neurological impairment, motor speech impairment, autistic-spectrum difficulties and hearing impairment, and low non-verbal IQ (the participants' IQ scores fell within the normal range: > 80). Moreover, they were selected on the basis of language skills that fell below that of their peers by one-and-a-half to three years, with specific difficulties in the production of grammar. In addition, the children selected had a composite raw total of ≤ 1.5 standard deviations below the mean of age-matched peers on the morphosyntactic subtests of a Greek language test, the preschool version of the Diagnostic Test of Verbal Intelligence (DVIQ, Stavrakaki & Tsimpli 2000)[3].

Control groups

The participants in the SLI group were matched one to one to nine typically-developing children, aged 4;11 to 5;11 years (CA group), according to chronological age, and to nine children according to language / morphosyntactic ability (LA group), aged 2;10 to 4;3 years. All of the typically-developing children had undergone language and non-verbal screening and were found to have age-appropriate verbal and non-verbal skills. The CA group did not differ significantly in chronological age from the SLI group, whereas they had language scores significantly above those of the SLI group, as measured through independent samples t-tests (Mean Age SLI: 71 months ≈ Mean Age CA: 70.2 months, $t(8)= -0.1$, $p>0.05$, Mean DVIQ SLI: 47.4 < Mean DVIQ CA: 88.2, $t(8)= 5.1$, $p<0.001$). The children in the LA group were matched with the SLI group on the basis of raw scores on the DVIQ morphosyntactic subtests[4]. The mean morphosyntactic raw scores of the SLI group did not differ significantly from those of the LA group (Mean DVIQmorph SLI: 47.4 ≈ Mean DVIQ LA: 51.1, $t(8) = -0.2$, $p > 0.05$ table 1).

Table 1. Mean age and raw scores on DVIQ morphosyntactic subtests of SLI and control groups

Group (N=9)	Mean Age	Mean DVIQmorph. score
SLI	71 months (5.11 years)	47.4 (*SD: 23.5*)
CA	70.2 months (5.10 years)	88.2 (*SD: 4.9*)
LA	42.3 months (3.6 years)	51.1 (*SD: 23.9*)

The children in all groups were also matched for gender and socioeconomic level. In addition, their non-verbal skills were assessed on the Ravens Coloured Progressive Matrices (Raven 1997) and were found to fall within appropriate levels (≥ 25th percentile).

The three-way group design was employed to see whether the children with SLI showed a particular difficulty with the structures in question. A difference from the CA group would show whether the SLI group presented with a difficulty with the structures in the first place. On a next level, a difference from the LA group shows a difficulty beyond what would be expected given the children's overall morphosyntactic level, and thus points to areas of exceptional difficulty.

3.2 Materials and Procedure

All the structures (accusative object clitics, genitive object clitics, definite articles and genitive possessive clitics) were tested through picture-based elicitation tasks.

Object clitics

Procedure: The task aiming to elicit accusative and genitive object clitics was based on a procedure used widely for the elicitation of object clitics (Shaeffer 1997). The participants were shown pictures of animal characters engaging in transitive actions and were asked a question of the type "what is X doing to Y"? The target answer was: (he/she) Xs **him/her**. In this context, the use of the clitic is required by discourse and is preferred over a strong pronoun (7):

(7) Accusative object clitic
Question: Ti kani o likos sti helona? (What is the wolf doing to the turtle?)

[3] The DVIQ test is in the process of standardisation and has already been trialled on approximately 400 preschool children in Greece. Preliminary norms exist for ages 3;5 to 6;5 years. The test comprises five subtests, three of which (production and comprehension of morphosyntax and sentence repetition) were used in the present study for matching purposes and for further assessment of the children's skills.

[4] Strict matching criteria were employed: the participants were each matched closely with their LA control on two of the subtests. The raw totals on these had to not differ by more than two points.

Target answer: **Tin** pleni
her,*acc.fem.sg* washes, (He) washes her

Items: Both accusative and genitive-case object clitics were assessed, in feminine and masculine gender and singular and plural number. Each type of clitic was tested using five different verbs, transitive and di-transitive (for assessing both direct and indirect object clitics) with a total of 5x4=20 items/pictures per structure. The verbs were selected on the basis of imageability and familiarity. These factors were checked by showing the pictures to seven typically-developing children aged 5;0 to 10;0 years and seven adults, and asking them to name the actions they saw. Any verbs that were not correctly identified by the majority of the individuals were changed. Moreover, the items in all tasks were also tried out in a pilot study – see below.

Definite Article
Procedure: For the elicitation of the definite article, a similar method to that of Jakubowicz et al. (1998) was followed. Pictures similar to the object clitics ones were used again but a different question was asked, aimed at eliciting nominative and accusative-case articles: 'Who is Xing Y?'(8) or for accusative-case articles: 'Whom is Y Xing'? (9)

(8) Question: Pios pleni ti helona? (Who is washing the turtle?)
Target answer: **O** likos
The**,** *nom.masc.sg* wolf
(9) Question*:* Pion pleni i helona? (Whom is the turtle washing?)
Target answer: **To** liko
The,*acc.masc.sg* wolf

The elicitation of a definite article instead of an indefinite article in this task was ensured by retaining the same characters throughout the clitics and article task. This created an obligatory context by discourse for the presence of the definite article, as the characters were known and given.
Items: 10 accusative-case and 10 genitive-case articles were assessed, in feminine and masculine gender, and singular and plural number with a total of 20 items for definite articles. A different number of items per form was used in order to elicit a representative sample of definite article forms while maintaining the number of total items the same as that for object clitics. The definite article and object clitics items were all tested in the same test, so that each structure acted as a distracter for the other.
Pre-tests and training items for clitics/article task: Before starting the task, the animal characters were introduced to the participants. The participants were then shown pictures of the verbs that they were going to see and were asked to name them. This would show whether they had particular difficulties with any verbs. Six training items were then carried out, two for each of the structures assessed (accusative object clitics, genitive object clitics and definite articles).

Genitive possessive clitics
Procedure: The task assessing genitive possessive clitics was also picture-based. The procedure was similar to the other tasks: the child saw a picture and was asked a question of the type 'What is X pointing to?', targeting the elicitation of a genitive possessive clitic (10).

(10) Question: Ti dihni o likos? What is the wolf pointing to?
Target answer: To podi **tu**
The foot his,*gen.masc.sg* – his foot

The referents for the genitive possessive clitics were body parts, because these express inalienable possession and thus require the use of the genitive possessive clitic.
Items: As the genitive possessive clitics have been found to be unimpaired in previous studies, it was decided to only use 9 items in this task. No training items were used.

General Procedure
All children were tested in a quiet room, at their home, kindergarten or clinic, in four or five sessions in total. The activities included other elicitation tasks (see section 2.2), grammaticality judgment tasks and spontaneous speech samples which are not presented here. The elicitation tasks were first tried out in a pilot study on five typically-developing children and three children with SLI. Some methodological pitfalls (like problems with a particular verb) were pinpointed and addressed before the main study.

4. Results

The participants responded well to all the tasks and there were no instances of unscorable responses. The performance of all groups on each measure will first be presented and then, in section 4.2, within-groups comparisons will be outlined, showing the comparative performance on each measure within the groups. Statistical analyses were conducted using non-parametric procedures, due to the small sample sizes and the non-normal distribution of some of the data.

4.1 Between-groups comparisons

4.1.1 Object clitic pronouns

It was important to check both total production / omission of clitics, as well as correct performance. Correct answers involved ones with the correct clitic form. Incorrect responses consisted of a) ones where the *clitic had been produced* but incorrectly: grammatical substitutions of the clitic form (*tin* pleni - washes her: *ton* pleni-washes him), b) ones where the clitic *had not been produced*: omissions of the clitic (*ton* pleni – washes him: ***ø*** pleni - washes), verb omissions (ton pleni-washes him: banio - bath), use of other structures not involving a clitic form (for example the use of a noun phrase, pleni to liko – washes the wolf), or no answers. The rates of these are further analysed below. Table 2 shows the rates of total clitics produced or omitted and the correct answers for each clitic type.

Table 2. Total clitic production, omission and correct forms (sums (N), standard deviations SD, ranges, and mean percentages (M% =n/180 (20x 9) total items per measure or n/360 (180x2) for both measures.

	Total clitics (/360)				Correct							
	Produced		Omitted*		Accusative object clitics (/180)				Genitive object Clitics (/180)			
Group (N=9)	*N*	*M%*	*N*	*M%*	*N*	*SD*	*Range*	*M (%)*	*N*	*SD*	*Range*	*M%*
SLI	232	*64*	85	*24*	77	6.8	0-20	*42.7*	57	6.1	0-15	*31.6*
LA	340	*94*	14	*4*	142	3.9	8-19	*78.8*	120	2.8	10-19	*66.6*
CA	346	*96*	14	*4*	168	1.6	15-20	*95.5*	154	2.4	14-20	*85.5*

*This category only refers to clitic omissions, not verb omissions, use of other structures or no answers.

As it can be seen in the above table, the SLI group produced fewer object clitics than either control group. The structures without clitics were mainly clitic omissions (the rest of the categories are shown below). The SLI group also produced fewer correct object clitics than the control groups. The statistical significance of these findings was explored. Starting from total productivity, a Kruskall-Wallis test, followed by Mann-Whitney U comparisons showed a significant difference between the SLI group and both groups for total clitic production and clitic omission (using a Bonferroni adjustment for the number of comparisons, significance level 0.05/4=0.012) ***Total Production***: *H(2)= 9.5,* ***p < 0.01,*** *SLI < CA, U=9,* ***p < 0.01****, SLI < LA, U=15,* ***p < 0.012****,* ***Total Omission****: H(2)=9.1,* ***p < 0.01,*** *SLI < CA, LA, U=11.5,* ***p < 0.01***

Significant differences were also found in the correct performance of accusative and genitive object clitics (significance level0.05/4=0.012):

Accusative clitics**:** *H(2)=13.3,* ***p=0.001****, SLI < CA: U=7.5,* ***p < 0.01,*** *SLI < LA, U=13,* ***p < 0.01***

Genitive clitics: *H (2) =14.5,* ***p= 0.001****, SLI < CA: U= 3.7,* ***p < 0.001,*** *SLI < LA, U=15,* ***p < 0.012***

The types and rates of incorrect responses produced on accusative and genitive object clitics is shown in tables 3 and 4.

Table 3. Types and rates of incorrect responses on accusative clitics (n, % out of 180 total items)

Group (n=9)		Substitutions	Clitic omissions	Verb omissions	Other structure	No answer
SLI	n	52	33	11	3	4
	%	*28.8*	*18.3*	*6.1*	*1.6*	*2.2*
LA	n	34	2	1	1	0
	%	*18.8*	*1.1*	*0.5*	*0.5*	*0*
CA	n	12	1	0	0	0
	%	*6.6*	*0.5*	*0*	*0*	*0*

Table 4. Types and rates of incorrect responses on genitive object clitics (n, % out of 180 total items)

Group (n=9)		Substitutions	Clitic omissions	Verb omissions	Other structure	No answer
SLI	n	45	52	9	10	7
	%	*25.5*	*28.8*	*5*	*5.5*	*3.8*
LA	n	44	12	1	0	1
	%	*24.4*	*6.6*	*0.5*	*0*	*0.5*
CA	n	12	13	0	1	0
	%	*6.6*	*7.2*	*0*	*0.5*	*0*

These tables show that most of the incorrect responses involved substitutions and clitic omissions rather than use of other structures, verb omissions or no answers. It should also be noted that the SLI group differed from the LA group on clitic omissions, not substitutions, which was also obtained in the statistical analyses of total omissions presented above. Substitutions of object clitics in the SLI and LA groups involved grammatical substitutions, namely gender substitutions (e.g. ton–him: tin-her).

4.1.2 Definite articles

The total productions, correct forms and omissions/substitutions of definite articles are shown in table 5.

Table 5. Total productions, correct responses, omissions and substitutions in definite articles

Group (N=9)	Total produced (/180)		Correct				Omissions		Substitutions	
	N	*M (%)*	*N*	*SD*	*Range*	*M (%)*	*N*	*M (%)*	*N*	*M (%)*
SLI	159	*88.3*	126	6.1	4-20	*70*	17	*9.4*	33	*18.3*
LA	179	*99.4*	166	2.6	13-20	*92.2*	0	*0*	13	*7.2*
CA	180	*200*	180	0	0	*100*	0	*0*	0	*0*

Table 5 shows that the SLI group produced fewer correct definite articles than the control groups but their overall rates of total and correct production were higher than those on clitics. Incorrect responses involved omissions but mostly substitutions as well as a very low rate of no answers not shown in the table (only 2.2%). The control groups did not omit articles at all. The rate of total productions, omissions and correct performance was explored for significance. Kruskall-Wallis tests followed by Mann-Whitney U comparisons (with a significance level adjusted at 0.05/4=0.012) showed that the SLI group differed significantly from the CA group on correct productions, but did not differ significantly from the LA group on any of the measures (exact p-values are reported for these):

Total production: *H(2)=6.5,* ***p <0.05****, SLI - CA: U=22.5, p=0.04, SLI-LA: U=25.5, p=0.093*
Omission: *H(2)= 8.9,* ***p <0.05,*** *SLI – CA: U=22.5, p=0.04, SLI-LA: U=22.5, p=0.029*
Correct production: *H(2)=9.3,* ***p < 0.01,*** *SLI < CA: U=13.5,* ***p <0.01,*** *SLI – LA: U=23.5, p=1.15*

4.1.3 Genitive possessive clitics

The total productions, omissions and correct responses on genitive possessive clitics are shown in table 6.

Table 6. Total productions, omissions and correct performance in genitive possessives

Group (N=9)	Total produced (/81)		Omitted		Correct			
	N	*M (%)*	*N*	*M (%)*	*N*	*SD*	*Range*	*M (%)*
SLI	65	80.2	14	17.2	65	2.6	0-9	80.2
LA	80	98.3	1	1.2	77	0.7	7-9	95.6
CA	78	96.3	3	3.7	78	0.5	8-9	96.2

From table 6 it can be seen that the SLI group scored lower than the control groups on the genitive possessives but this difference was not big. There were some omissions but these were mainly made by one participant. The other incorrect responses consisted of only one substitution in the LA group and are thus not shown in the table. A Kruskall-Wallis test showed no significant differences between the groups (*H(2)=2.4, p >0.05*), so no further analyses were carried out.

4.1.4 Individual performance

The wide range of scores seen in the object clitics and definite articles task prompted an examination of individual performance. The scores of each participant with SLI were converted into z-scores based on a) the CA group's mean b) the LA group's mean. If the scores were found to be below 1 standard deviation from the mean of both control groups then the participant was considered to have a significant difficulty with a structure. The results showed that for object clitics, six out of the nine participants had significant differences from both control groups, two differed from the CA group and one scored within the normal range. In contrast, in the definite articles, five participants differed from both groups, but had higher scores than on the object clitics, whereas the rest had scores within the normal range. Finally, as seen, only one participant had significant difficulties with genitive possessives, while the other eight produced them at high rates. Thus, individual performance confirmed the difficulties experienced at a group level.

4.2 Within-groups comparisons

As it was seen in the previous sections, all groups showed a higher performance on definite articles and on genitive possessive clitics than on object clitics. These differences were explored for significance through non-parametric pairwise comparisons (Wilcoxon signed ranks) within the groups.

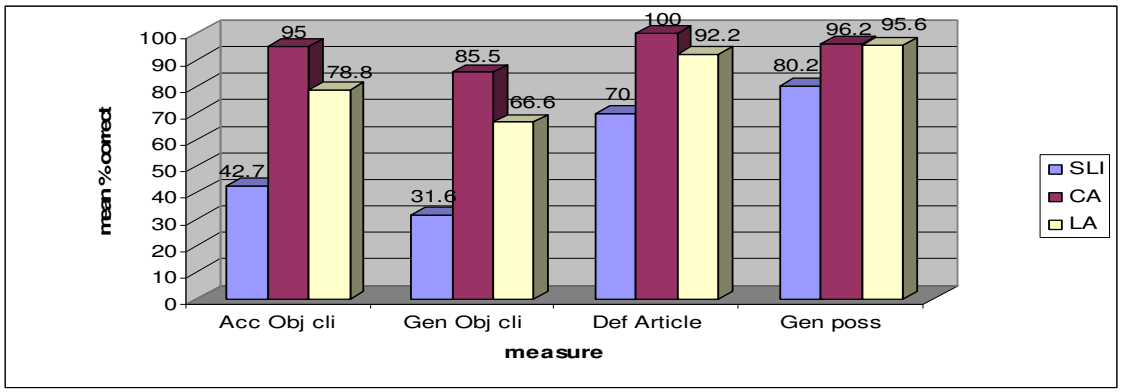
Object clitics - definite articles

The categories examined were total production, correct production and omission of clitics and articles. Differences (at a significance level of 0.05/3=0.016) were found in these measures, which were more pronounced in the SLI group. Specifically, there were significant differences in all groups between the total production of genitive object clitics and definite articles (*SLI: Z = -2.7,* ***p < 0.01,*** *CA: Z= -2.2,* ***p < 0.016,*** *LA: Z= -2.7,* ***p < 0.01*****).** The SLI group additionally differed in the rate of omissions of genitive clitics compared to definite articles (*Z=-2.5,* ***p <0.01***), and in the rate of correct productions of both types of clitics compared to correct definite articles (AccClitics < Def Articles*, Z= -2.5,* ***p < 0.01*****,** GenCli < Def. Art**,** *Z= -2.6,* ***p < 0.01***). The LA group also different on the correct productions of these measures (*Z=-2.4,* ***p <0.016*****).**

Genitive possessive clitics - object clitics

Next, the correct performance on genitive object clitics was compared to that on genitive possessive clitics in all groups. Statistically significant differences were found showing lower performance on genitive object clitics than on genitive possessives in the SLI and LA groups (Wilcoxon signed ranks: SLI group: *Z=-2.5,* ***p < 0.05****,* LA group: *Z= -2.6,* ***p < 0.05*****).** Definite articles were not compared to the genitive possessives, as it was evident from the mean scores that they did not differ significantly. The correct performance of the groups on all measures is shown in figure 1:

Figure 1. Correct responses (M %) on accusative /genitive object clitics, definite articles and genitive possessive clitics in all groups



*Acc Obj cli=Accusative object clitics, Gen Obj cli= Genitive object clitics, Def Article= Definite article, Gen poss =genitive possessive clitics

5. Discussion

The aims of this paper were first to investigate whether accusative and genitive-case object clitic pronouns, definite articles and genitive possessive clitics are difficult for Greek-speaking preschool children with SLI, and second, to examine whether any of the accounts of SLI reviewed here predicted the pattern of deficits observed. The findings presented in section 4 showed that the SLI group had the most difficulties with accusative and genitive object clitics; the participants produced significantly fewer clitics overall and fewer correct forms than both control groups, and they had fewer difficulties with definite articles, on which they differed significantly from only the CA group. They did not differ from any of the control groups on genitive possessives. Moreover, a significantly higher performance was noted on definite articles and on genitive possessives than on accusative and genitive object clitics.

The findings on impaired performance of object clitics and the dissociation with the genitive possessive clitics agree with previous findings in Greek SLI (Tsimpli & Stavrakaki 1999; Tsimpli 2001; Mastropavlou 2006). Genitive object clitics have not been studied before but the relatively lower performance on these which was observed in all groups can be attributed to the later acquisition of genitive case compared to accusative case (Stephany 1997).

Moreover, although the rate of clitic omissions distinguished the SLI group from the control groups, it was not as high as that reported in Tsimpli & Stavrakaki (1999) and Tsimpli's (2001) studies (only 24% compared to 96%). This could be due to differences in methodology (spontaneous speech versus elicitation procedures with matched control groups) or the different stage of development of most of the participants in the present study. A certain degree of variance could also be due to the heterogeneity inherent in the populations of SLI. Furthermore, the dissociation between object clitics and definite articles has been noted in the study of Tsimpli (2001) but is in contrast with the theoretical claims put forth by Tsimpli & Stavrakaki (1999) and Tsimpli (2001).

In the next sections, these findings will be discussed in relation to the domain-general and domain-specific theoretical accounts presented in section 2.1. We will then propose an alternative account combining features of existing proposals, and will further identify another factor that could be implicated in the pattern of impairment observed.

We begin the evaluation of the accounts from the domain-general account, the Surface Hypothesis; the main prediction of the SH (Leonard 1998) is that all object clitic forms and definite articles should be equally impaired and particularly difficult for children with SLI, due to the fact that they are unstressed morphemes that carry grammatical information. On the contrary, genitive possessive clitics may be expected to be easier, as they are found in a lengthened, more salient position. Although better performance on genitive possessives was indeed found in the present study, the predictions of a homogenous impairment on all unstressed, non-salient morphemes was not upheld because all participants had a higher performance on definite articles than on object clitics. Furthermore, individual performance showed that even the children who had difficulties with both object clitics and definite articles performed better on the latter. A similar pattern of performance was noted in the control groups, especially the younger LA group. Moreover, this pattern was observed despite the fact that some of the forms of definite articles and object clitics are morphophologically identical (e.g. section 2.1, example 4).

Moving onto the domain-specific accounts, the same argument holds for the Interpretability Hypothesis (Tsimpli & Stavrakaki 1999; Tsimpli 2001). According to this proposal, a similarly impaired performance on object clitics and definite articles would be predicted on the grounds of the common morphosyntactic features that these elements are proposed to share ([+D, -interpretable]). On the contrary, a lack of difficulty is predicted with genitive possessive clitics, which are assumed to carry interpretable features. The difficulty with object clitics and a certain degree of difficulty with definite articles compared to genitive possessive clitics was thus upheld by the present findings. However, what cannot be easily explained is the observed dissociation between the object clitics and definite articles, present in even the youngest participants. Moreover, the pattern of errors (omissions / substitutions) does not agree with the claim that the structures are inaccessible to SLI children.

The Representational Deficit for Dependent Relations hypothesis (van der Lely 1998) predicts that grammatical elements involving movement should be more difficult than ones that do not. In this sense, if a movement-based approach is adopted for the generation of object clitics, the RDDR may explain the observed dissociation between object clitics and definite articles. The pattern of errors observed here is consistent with the claims of the RDDR; the children produced a range of omissions, substitutions, but also correct productions of the forms, which can be explained by the assumption of optionality in the use of movement (van der Lely 1998). However, the RDDR does not explain a certain extent of difficulty observed with definite articles, and the trend for a difference between definite articles and genitive possessives. In other words, if only moved elements are problematic for children with SLI, then it is not directly explicable why definite articles are not at age-appropriate levels, while genitive possessives are better than the other measures in children with SLI.

An alternative explanation which has not been explored would involve a combination of the IH and RDDR hypothesis; it is possible that the common morphosyntactic properties ([+D, -interpretable]) of object clitics and definite articles in Greek result in a certain extent of difficulty with these structures for children with SLI.

However, object clitics may additionally have other characteristics that may render them more difficult. Thus, the additive effect of movement combined with uninterpretability / morphosyntactic deficiency may result in object clitics being even more difficult to acquire in SLI than definite articles, which involve uninterpretable features but no movement. Moreover, elements such as the genitive possessive, which do not involve either of these factors, may be easier. In this sense, it would be possible to think of movement and uninterpretability as difficulty factors. This would result in the following hierarchy:

High difficulty	[+movement, + morphosyntactic deficiency]	object clitics
	[-movement, + morphosyntactic deficiency]	definite articles
↓ Low difficulty	[-movement, -morphosyntactic deficiency]	genitive possessive clitics

The above hierarchy agrees with the pattern noted in the SLI group. It may also account for the profile of the control groups to a large extent, although further research would be required to confirm whether the tendency noted in section 3.2, for definite articles instead of genitive possessives to be the highest measure in the control groups reflects an actual profile difference between the control groups and the SLI group.

Finally, we conclude with a further factor that could be implicated in the impairment in object clitics, the interface status of clitics. Specifically, clitics appear to constitute interface structures; on one hand, they may involve the syntax - morphology interface; Mavrogiorgos (2007) proposes that object clitics in Greek start off as syntactic elements but later on end up as morphological affixes at the syntax - morphology interface. Object clitics also involve the discourse - syntax interface, as they need to be bound either in syntax or discourse. Sorace (2004) has proposed that structures at interfaces are particularly vulnerable and problematic for second language learners. Avrutin (1999) has also argued that elements at the syntax - discourse interface require more processing resources than syntax-only structures and are thus more difficult for typically-developing children and adults with aphasia. A similar assumption may hold for children with SLI; specifically, limitations at the discourse - syntax interface level may manifest as object/clitic drop resulting from limitations in the process of argument pronominalisation, similarly to typical and second language development (e.g. see Tsimpli 1992; Marinis 2000). This could explain clitic omissions in SLI children. Moreover, the reason why the accusative-case definite articles were not dropped as frequently could be attributed to the difference in the instructions for the elicitation of each structure; in the definite articles instruction, the wh-pronoun clues the child into producing a DP (11), whereas in the object clitics instruction (12) there is no clue as to what structure should be produced (Theodora Alexopoulou, personal communication).

(11) Q: **Pion** pleni i xelona? A: **to liko** (Q: Whom is the turtle washing? A: the wolf)
(12) Q: Ti kani o likos sti helona? A: **Tin** pleni (Q: What is the wolf doing to the turtle? A: He is washing her

The above proposal is purely speculative and preliminary. Further research would be needed to establish whether the difficulties experienced with clitics involve mainly morphosyntax or disourse, or both.

6. Conclusion

This paper looked at object clitics, definite articles and genitive possessive clitics to examine whether they were problematic for children with SLI, and by doing this to also test certain theoretical proposals of SLI. It was found that object clitics were the structure with the poorest performance for all groups but especially the SLI group, clitic omissions distinguishing the SLI group from both control groups. On the other hand, definite articles were not as difficult, and genitive possessive clitics yielded an even higher performance. It was examined whether this pattern could be explained by processing or morphosyntactic factors. Although none of the accounts reviewed here appeared to fully explain the deficits observed, a domain-specific proposal providing a linguistic explanation such as the RDDR hypothesis was closer to predicting the deficits observed than a domain-general account attributing the children's linguistic deficits to processing deficits. Moreover, a combinatory model was proposed whereby movement and interpretability / morphosyntactic deficiency may act as difficulty factors, rendering object clitics more problematic than definite articles and genitive possessives. Other factors that may be implicated in clitic omission involve constraints of the discourse - syntax interface, which should be explored through further research.

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