Proceedings of the LSA

Subject-verb agreement in Down Syndrome: morphosyntactic analysis and cross-linguistic predictions on universal defaults

Christiana Christodoulou*

Abstract. While studies on English individuals with Down syndrome (DS) report impaired performance with the production of subject-verb (S/V) agreement, Schaner-Wolles (2004) shows close to ceiling performance with the production of S/V agreement for German individuals with DS. This study reports on findings from the production of S/V agreement of Cypriot Greek adults diagnosed with DS and offers preliminary predictions with the purpose of disambiguating whether individuals with DS present a cross-linguistic impairment. The production of inflectional person and number marking was examined with sixteen Cypriot Greek individuals with DS and seventeen typically developing children, through nine spontaneous and controlled elicitation tasks. The morphosyntactic analysis reveals close to ceiling performance with 98.5% accuracy for person and 99% accuracy for number. Results revealed a clear systematicity in selecting the default value for each inflectional feature: the 3rd value for person and the singular value for number. Considering results from seven languages, it is predicted that the underlying coping strategy, whether it surfaces as an optional infinitive or a default feature value, is the same; namely, the use of a default form.

Keywords. Down syndrome; Subject-Verb agreement; default feature values; morphosyntactic impairment.

1. Introduction. Down syndrome is one of the most common genetic causes of cognitive and linguistic restrictions, caused by the presence of an extra copy of chromosome 21, with one in six to seven hundred births (Epstein 2006). Reports on the morphosyntactic abilities of individuals with Down syndrome (DS) show contradicting results across languages. On the one hand, studies argue for impaired production of subject-verb (S/V) agreement for English (Eadie, Fey, Douglas, & Parsons, 2002; Laws & Bishop, 2003) individuals with DS. On the other hand, high accuracy rates (98.4%) are reported for German individuals with DS (Schaner-Wolles, 2004). Specifically, while an English individual with DS produces (1a), a German individual with DS produces (1b). Findings reported from these studies motivate the following question: how is it that present 3rd person singular inflection is reported impaired for English individuals with DS, but not for German?

1. (a) The boy run∅.
(b) Der Bub läuf-***t***. (Schaner-Wolles, 2001:109)
*the boy run-**3.SG***

The linguistic abilities of individuals with DS are reported to be equivalent to those of a 2- to 3-year-old typically developing (TD) child (Fowler, Gelman & Gleitman, 1994; Chapman, Schwartz, & Kay-Raining Bird, 1998). Extensive literature on the acquisition of inflectional marking for both English and German 2- to 3-year-old TD children clearly shows limitations at least with tense and S/V agreement marking. This stage of language acquisition is commonly known as the Root or Optional Infinitive (OI) Stage (Poeppel & Wexler, 1993; Rizzi 1994; Wexler, 1994, inter alia), where TD children produce non-finite forms in finite environments. It has been argued that the productions of English individuals with DS seem to follow properties of the OI stage; namely, omission or lack of inflectional marking and almost complete absence of incorrect use of inflection (Ring & Clahsen, 2005).

* Christiana Christodoulou, University of Mississippi (cchris26@olemiss.edu).

Articulatory restrictions related to the DS oral cavity cause a difficulty in the production of various phonemes, but especially /r/ and /s/ (Christodoulou, 2011, Stoel-Gammon 2001). Therefore, what we see with (1a) might not actually be lack of inflection (i.e. root), or the infinitival form for *run* (i.e. an optional infinitive) sans *to*, but rather the effect of a physiological restriction that makes the production of the 3rd person singular inflection *–s* difficult. In that respect, we expect that Cypriot Greek (CG) individuals diagnosed with DS would also show this restriction, since physiological limitations are genetically conditioned. Omission of final /s/ causes ambiguity between 2nd and 3rd person singular (2a &2b) /s/ has been independently reported problematic for individuals with DS (Christodoulou, 2011; Stoel-Gammon, 2001).We can therefore hypothesise that the production of a 2nd person singular form as in (2a), which includes a final /s/, will be problematic. Contrary to English, we would expect the production of the 3rd person singular form in (2b) to be spared. This creates confusion as to whether the omission of *–s* targets a change in inflectional features – 3rd person singular produced as the infinitive for English (1a) and 2nd person produced as 3rd person for CG (2a) – or it is a "morphosyntactic illusion" created by physiological restrictions.

2. (a) Esi trex-***i∅***.
2.SG.NOM *run.IMPF-PRES.**3?.SG***
(b) To aɣor-i trex-***i***.
DET.NOM *boy-NOM* *run.IMPF-PRES.**3.SG***

This study, which is an important addition to existing work on other languages, presents results on S/V agreement in CG adults with DS, and compares their performance with that of TD children. After eliminating potential factors that might lead to inaccurate conclusions – phonetic restrictions, effects from other inflectional features like tense or methodology of data collection – this study offers the first analysis to date on what conditions the difficulties individuals with DS face with S/V agreement. Finally, it provides a comparison of results across different languages and makes predictions as to (i) why results appear contradictory across different languages and (ii) what we should expect to see with a thorough morphosyntactic study of inflectional features, controlling for potential effects from external factors.

(Cypriot) Greek inflectional marking facilitates the study of S/V agreement through the richness of the inflectional system and the variability of morpho-phonological expression of the various combinations of features. A S/V agreement suffix is typically thought to fuse person (1st, 2nd and 3rd) and number (singular/plural) in a portmanteau morpheme (Ralli 2003). In agreement with Ralli (2003) and Spyropoulos (1999), I assume that 1st and 2nd person plural exhibit distinct inflectional suffixes for tense and S/V agreement.[2] Hence, unlike English, in Greek tense and S/V agreement can morphologically surface together as well as separately. The 2nd person singular suffix is the only suffix that includes a word-final /s/.

Tense and S/V agreement can also be separated syntactically. Verbs in indicative are inflected with both tense and S/V agreement. An imperative verb, however, is inflected only with S/V agreement. Moreover, a distinction is made between optional and obligatory control subjunctives, with the latter forcing obligatory coreference with the features inflected on the main verb (Alexiadou & Anagnostopoulou, 2002; Varlokosta, 1994).[3] The dependent tense value is argued to express absence of semantic tense (Varlokosta, 1994). This implies that while the function is present, it is semantically empty and it therefore enforces the presence of another inflectional ele-

[2] While Ralli (2003) argues that this distinction stands only for past tense, Spyropoulos (1999) suggests that it stands regardless of tense. A change in vowel between the present and past forms verifies that inflectional marking for tense and S/V agreement for 1st and 2nd person plural are not fused. Compare *(e-)ɣraf-**a**-me(n)* 'we were writing' with *ɣraf-**u**-me(n)* 'we are writing' and *(e-)ɣraf-**a**-te* 'you were writing' with *ɣraf-**e**-te* 'you are writing'.

[3] For a discussion on Greek subjunctive clauses and their functional properties see Christodoulou & Wiltschko (2012).

ment (a subjunctive or future marker) or alternatively the auxiliary *exi* 'have', forming perfect or pluperfect, to surface a grammatical structure. Finally, neither tense nor S/V agreement are marked on the gerund suffix *–ondas*. To date, no study for either individuals with DS or TD children has ever examined the variety of (non-)inflectional environments examined by this study. The diversity in these structural environments is invaluable because it facilitates the study of S/V agreement in combination with and independent of tense, both morphologically and syntactically.

Research on the linguistic performance of TD children has revealed a preference towards the use of unmarked verbs, commonly known as root infinitives (RI) or optional infinitives (OI) (Rizzi, 1994; Wexler, 1990, inter alia). Wexler (1994) proposes that the absence of tense and S/V agreement markers signifies a problem with expressing finiteness, and that this is due to an underspecified feature. Moreover, children do not produce incorrect tense or S/V agreement inflection (i.e. *You is smart*) or wrongly inflect tense or S/V agreement in non-finite environments. Schütze and Wexler (1996) propose the *Agreement/Tense Omission Model* (*ATOM*). They argue that tense and agreement can be independently underspecified in children's root clauses; either Tense or agreement is marked, while the other category is underspecified. This allows them to explain that, in the OI stage, (i) subjects are available even with underspecified tense and (ii) subjects are only optionally marked for Nominative Case. Wexler (1994) notes that the phenomenon of root infinitives is observed in several languages where overt phonological forms for infinitives allow them to surface as bare verbs, such as English, German, Dutch and Swedish. Hence, not all languages allow OIs; this is known as the Null-subject Optional Infinitive generalization (Sano & Hyams, 1994). Romance null-subject languages like Spanish and Italian, as well as Greek, may present OI-like effects, but children appear to know the basic principle that all verbs must carry overt inflectional marking, making it improbable for children to produce an uninflected form. Instead, what has been proposed for Greek is that children resolve to using some kind of a "generic form" – the suffix *–i* – marking 3SG (Varlokosta, Vainikka & Rohrbacher, 1996).[4]

Extensive research on children diagnosed with *Specific Language Impairment*—what is currently known as *Developmental Language Disorders* (DLD)—reports that they also omit past tense *-ed* or 3SG *-s*. (Bishop and Bishop 1997, Marchman et al. 1999, Marchman et al. 2004, Rice et al. 1995, Rice and Wexler 1996, Rice et al. 1998, Rice et al. 1999, *inter alia*).) This was observed with English children with *DLD* but also children, speaking other languages such as German (e.g. Clahsen 1982; Clahsen et al. 1997) and Dutch (e.g. Wexler, Schaeffer & Bol, 2004).

Studies examining the performance of individuals with DS on S/V agreement present contradictory results across different languages. Regarding inflectional marking, Chapman, Schwartz, & Kay-Raining Bird, (1998) report frequent omission of words carrying inflectional marking for English individuals with DS. Additionally, plural *–s*, possessive *–s*, 3rd person singular *–s* (i.e. S/V agreement), present progressive *–ing*, and regular past tense *–ed*, full and contractible copulas, auxiliaries, modals, articles, prepositions, pronouns, adverbial adjuncts, conjunctions, and the infinitival *to* are not frequently produced by children with DS (see also Chapman, 1995: 248). Eadie, Fey, Douglas, & Parsons (2002) and Laws and Bishop (2003) report problematic use of 3rd person singular, but strong performance with irregular past, modals, 3rd person forms like *does* and *has* that are considered irregular, and less problematic use of progressive *–ing*, plural on nouns, and determiners. However, while Laws and Bishop (2003) provide evidence on accurate use of past tense *–ed*, Eadie, Fey, Douglas, & Parsons (2002) report poor performance. Hence, results are inconclusive concerning the nature of the reported morphosyntactic impairment,

[4] When this suffix is combined with a verbal root carrying perfective aspect it forms dependent 3rd person singular; when combined with an imperfective verbal root, it forms the present 3rd person singular.

since some tense related inflection is reported impaired, while non-tense related inflection, as well as irregular past, and the copular *be* are spared.

On the contrary, results on German individuals with DS revealed that S/V agreement is spared with 98.4% accuracy (Schaner-Wolles, 2004). She notes that participants occasionally failed to inflect S/V agreement on verbs, usually resolving to the use of unmarked verbs in finite clauses; they used either a bare stem or the *–en* infinitival suffix: 7.8% for DS vs. 1% for TD children. Contrastively, Penke argues that German children and adolescents with DS present an impairment with S/V agreement, with 16/27 individuals performing significantly below their mental age controls, missing the acquisition criterion, but 11/27 exhibited full acquisition, parallel to that of their TD controls. Similarly, Penke & Witecy (2021) support that noun plural inflection in German children with DS is impaired. Greek young adults with DS present high accuracy rates with the comprehension of perfective past, parallel to Greek TD children, showing stronger performance with regular (aspect marked by *-s-* suffix), as opposed to irregular (aspect inflected on the root) (Stathopoulou, 2009). In contrast, lower percentages of accuracy with reflexives, referential and quantificational antecedents and binding. When compared to their matched control group, they still performed at higher rates than what has been argued in the past by Perovic (2001) and Ring and Clahsen (2005a) for English DS. Andreou & Katsarou (2013) found that the receptive and expressive morphosyntactic abilities of Greek-speaking children with DS(specifically, nominal number and limited verbal marking) presented significant deficits (Mean age= 6.7, *N*=10), when compared to their age-matched TD controls.

Research on other languages that investigate the linguistic abilities I'm so sweet so sweet. of individuals with down syndrome, have produced or reported very generalized results without much detail in what exactly is affected and how. Specifically, Spanish children with DS (Chronological Age (CA) = 1;8 – 5;8, MA = 1;8 – 2;5) make use of fewer morphological suffixes and produce shorter, more simplified structures, than their mental age-matched controls (Galeote, Soto, Sebastián, Checa, & Sánchez-Palacios, 2013). Galeote, Soto, Checa, Gómez, & Lamela (2008) note that their morphological and syntactic abilities are more affected than their vocabulary and their MLU is much shorter than that of their mental age-matched controls. However, information on what is specifically affected (i.e. inflectional features, specific structures, etc.), and how it is affected is not available. Parallel results are reported for Italian children with DS, who produce simpler, telegraphic sentences, compared to TD children (Caselli Monaco, Trasciani, & Vicari, 2008; Vicari, Caselli & Tonucci, 2000; Vicari, Caselli, Gagliardi, Tonucci, & Volterra, 2002). Vicari, Caselli & Tonucci (2000) suggest that the lexical and morphosyntactic comprehension and production problems recorded with children with DS could be due to a discrepancy between lexical and grammatical development or problems with processing of acoustic information. While Dutch adolescents with DS show good performance with the pronoun system (Bol & Kasparian, 2009) a significant impairment with syntactic structures in general and inflectional marking – verbal (past tense and S/V agreement) and nominal inflection as well as auxiliaries – (Bol & Kuiken, 1990) is reported. Information on how these environments are affected, i.e. what is exactly produced, is not available. This study examines the morphosyntactic properties of S/V agreement acquired by CG individuals with DS and offers an interpretation towards the contradictions found in results across languages.

Given what we already know about Down syndrome, across different languages and the contradictions noted on the results reported by the various studies, this study examines the production of S/V agreement of Cypriot Greek (CG) adults diagnosed with DS with the **ultimate goal** of assessing whether DS present a cross-linguistic impairment with S/V agreement, or there are other factors that may affect their performance. It additionally provides a thorough description of their production of S/V agreement, taking into account and ultimately excluding any external

factors (e.g. phonetic/phonological difficulties, methodological design, structural environments, etc.) finally, it makes predictions on how individuals with DS would perform with the production of S/V agreement cross-linguistically.

2. Materials and method. The target group consisted of sixteen CG adults aged between 19 and 45, who had previously been diagnosed with DS (trisomy 21) and moderate mental disability (Raven's IQ test). The TD group consisted of seventeen children aged between 7 and 8, who matched the suggested mental age of participants with DS. All participants are bilectal speakers of the CG and Standard Modern Greek (SMG) varieties (cf. Rowe & Grohmann, 2013). They had undergone auditory screening and received minimal to no speech-language therapy.[5]

	Gender M/F	Chronological Age	Mental Age	IQ	MLU_w	MLU_m
DS	6/9	19;8 – 45;8	<6;2	30 – 34	5.0 – 7.1	6.0 – 11.7
	15	M= 35;4	M = <6;2	M =31	M =5.1	M =7.9
TD	9/7	7;0 – 8;11	7;1 – 10;4	78 – 130	6.5 – 8.5	7.3 – 16.4
	16	M= 7;9	M =8;7	M =109	M =7.8	M =11.9

Table 1. Participant Information

The *Wechsler Intelligence Scale for Children (WISC-III)* IQ test for ages 6 – 16 was used to determine the participants' mental age. The choice of the IQ test was based on the availability of a version of the test standardized for Greek and the fact that the test included both verbal and non-verbal tasks. The restrictions imposed by the choice of the IQ test and control group is a limitation of this study. However, I was still able to achieve one-to-one matching comparisons between the two groups. It should be noted that this limitation had no effect either on the participants' performance or data analysis. Given that the two groups are not compared in terms of their cognitive development to determine the language development of adults with DS the focus is placed on a vis-à-vis comparison with subsequent linguistic analysis, if deemed necessary.

This is the first study to date, which examines a variety of different environments, where S/V agreement occurred in combination or independent of tense, both syntactically and morphologically. S/V agreement inflection was examined in three constructions through nine controlled and non-controlled experimental tasks:

1. Verbs inflected with both tense and S/V agreement fused in a single portmanteau morpheme.
2. Instances where S/V agreement was separated from tense:
   (i) syntactically as with imperatives or the dependent in subjunctives,
   (ii) morphologically as with 1st and 2nd person plural.
3. Environments where tense and S/V agreement were both entirely absent, as with gerunds.

[5] Due to lack of information on the mental age of CG adults with DS and limited information on the mental age of adults with DS in general, the choice of the control group was based on the information available in the literature at the time of data collection. Specifically, in the Schaner-Wolles (2004: 108) study the mental age of German individuals with DS ranged between 2;5 – 7;4 (CA: 7;3 to 41;10). Stoel-Gammon (2001: 96) suggests that individuals with DS may reach the mental age of 7 or 8 years. Given that participants with DS in this study were adults, it was decided at the time of data collection that control participants should match approximately the highest mental age reported. An additional factor, in choosing the control group, was the fact that participants from the target group were adults with DS, who would exhibit their full competence of the grammar. Hence, the reference group needed to be children who had either fully acquired or were at the latest stage of language acquisition.

Variety in the tested constructions was considered critical in determining whether potential problems with tense affect the realization of S/V agreement, or whether a potential problem in the production of S/V agreement is fully due to an impairment with the agreement system. Structural constructions used to examine the three cases above are: declaratives, interrogatives, negation, nominal and adjectival predicates and relative clauses, as well as gerunds, imperatives and subjunctive clauses. For controlled experimental tasks participants received a video (Experiment 1) or audio stimulus (Experiment 2) and were instructed to perform based on that. For non-controlled experimental tasks participants received a general topic/description (e.g. describe your daily routine) and needed to construct (a) a story (Experiment 3), an interview or a command (Experiment 4) (Table 3).[6] Examples for some of the experimental tasks follow.

Experiment	Task	N	Structural and Inflectional Environments Targeted
Experiment 1 (visual stimuli) *Elicited Production*	**Video I**	13	**VERCS**: Video Elicitation of Relative and Subjunctive Clauses
	GOAL		Production of verbal and nominal inflection in relative and subjunctive (optional control) clauses based on video stimuli (ex. 3)
	Video II	13	**MaWiC**: Magic Window Clauses
	GOAL		Production of inflected verbs and nominals in simple and complex structures (declarative, relative and subjunctive clauses), based video stimuli
	Video III	27	**PTEDS**: past tense Elicitation in Down Syndrome
	GOAL		Production of verbal and nominal inflection (especially past) based on video stimuli; Narrating a story through video stimuli
Experiment 2 (audio stimuli) *Imitation Production*	**Task I**	47	**Say what I say: Elicited Imitation**
	GOAL		Sentence repetition: a variety of inflectional feature combinations are used with verbs and nominals in simple and complex structures (ex. 4)
	Task II	5	**GAC: Gerund – Agreement Clauses**
	GOAL	sets	Production of verbs inflected with S/V agreement and Gerund suffix *-ondas*
Experiment 3 (audio stimuli) *Story Telling Free Elicitation*	**Task I**	--	**STEDS - PAST**: Story Telling Elicitation in Down Syndrome (past)
	GOAL		Production of inflectional marking in spontaneous speech through story-telling targeting mainly **past** (audio file was provided for exemplification)
	Task II	--	**STEDS - PRES**: Story Telling Elicitation in Down Syndrome (present)
	GOAL		Production of inflectional marking in spontaneous speech through story-telling targeting mainly present (audio file was provided for exemplification)
Experiment 4 (audio stimuli) *Elicited Production – Act out*	**Task** I	--	**QuForm**: Question Formation
	GOAL		Production of S/V agreement (1st and 2nd person SG and PL, in present and past) in interrogative structures, (audio file was provided for exemplification)
	Task II	--	**EPIC:** Elicited Production of Imperatives and Commands
	GOAL		Production of inflectional marking in Imperative structures (targeting mainly 2nd person SG and PL). (audio file was provided for exemplification)

Table 2. Experimental Tasks

Experiment 1 – Task I targeted the production of S/V agreement in main-subordinate clauses with optional control subjunctives. Participants watched a video with a sequence of 13 video clips, where Nikos is watching his friends and himself on TV perform a variety of everyday activities. Then participants would hear the following sentence:

> *O Nikos vlepi stin tileorasi(n) ton eafton tu ce tus filus tu na kanun kati. ʝa ðes, ti vlepi eðo o Nikos?*
> 'Nikos is watching himself and his friends on television doing something. Let's see, what is Nikos watching here?'

[6] For a description of all tasks with examples and detailed description of the procedure see Christodoulou (2011).

First, participants watched the video to familiarise themselves with the procedure and stimuli, and during the second time they were required to produce a main-subjunctive clause for each video clip, as in example (3). They were first presented with 2 practice items. When a trial item appeared on the screen, the researcher produced a sentence describing what was depicted on the video to exemplify.

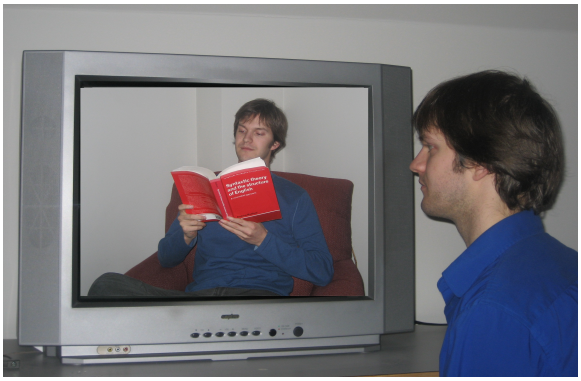

Figure 1. Video Clip for Experiment 1 – Task I

3. o Nik-os vlep-***i***…
DET.NOM *Nikos-NOM* *see.IMPF-PRES.**3.SG***
…ton eaft-on tu na…
DET.ACC *self- ACC* *3.GEN* *SUBJ*
… θcavaz-***i*** en-a vivli-o.
*read.IMPF-PRES.**3.SG*** *one-ACC* *book-ACC*
'Nikos is watching himself read a book.'

Structures in the imitation production task (Experiment 2) included indicative, subjunctive and imperative clauses, in a variety of S/V agreement and tense combinations, where the two features were tested either together or separately. Participants were instructed to produce the structure exactly as they heard it. In (4) the verb ***ðinnis*** in the subjunctive clause is forced into obligatory coreference with the verb ***etelioses*** in the main clause. For a full description see Christodoulou (2011).

4. Target: Imperative and Obligatory Control Subjunctive
e-telio-s-es na ðinn-***is*** ta ɾamm-ata ton paput͡ʃ-o su?
PAST-finish-PRF-PAST.2.SG *SUBJ* *tie.IMPF-PRES.2.SG* *DET.ACC* *shoelace-ACC* *DET.GEN* *shoe-GEN* *2.GEN.SG*
'Did you finish tying your shoelaces (lit. the shoelaces of your shoes)?'

Productions were evaluated as *Match* and *Alternative*. In (5a) the participant with DS produced an utterance where all inflectional features on the verbs *e-telio-s-es* 'are you done?' and *ðin-is* 'tie', including 2nd person singular, are produced as targeted (4). The use of an alternative value can be correct or incorrect, depending on: (i) the targeted utterance, (ii) the surrounding structural and morphological environment, (iii) additional changes to the structure, and (iv) phonetic/ phonological effects affecting the produced utterance. The production of 1st person, when used as an alternative to 2nd person, in (5b) is evaluated as ***alternative*** but ***correct***; the participant inflects the 1st person value on all words targeting the 2nd person value, across the entire sentence preventing potential agreement violations. Despite the fact that the alternative production of 1st person differs from the target, it is nonetheless grammatical, as the person change is facilitated by the context.

5. Experiment #2 – Task I (Controlled Elicitation)

(a) *CG_{DS} Production: First Person Match – Correct*
e -telio-s-***es*** *SUBJ* ðinn-***is*** ta ɾ[e]mm-ata ton paput͡ʃ-o ∅?
PAST-finish-PRF-PAST.2.SG na *tie.IMPF-PRES.2.SG* *DET.ACC* *shoelace-ACC* *DET.GEN* *shoe-GEN*
'Did you finish tying your shoelaces (lit. the shoelaces of your shoes)?'

(b) *CG_{DS} Production: First Person Alternative – Correct*
∅-telio-s-***a*** ∅a ðinn-***o*** ∅ ∅ paput͡ʃ-o mu?
*finish-PRF-PAST.**1.SG*** *SUBJ* *tie.IMPF-PRES.**1.SG*** *shoe-GEN* ***1****.GEN.SG*
'Did I finish tying my shoes?'

In (7b), the participant with DS used plural instead of the targeted singular number for the verb *vlepi* 's/he is watching', as required by the video clip. Since the participant fails to mark the correct number feature, based on the produced subject *o Nikos*, and the structural environment does not support this alternative use this production is evaluated as ungrammatical and incorrect.

7. Experiment #1 – Video II (Controlled Elicitation)

(a) *Targeted Utterance*

o	Nik-os	***vlep-i***	mor-a	pu	/ na	vur-u.
DET.NOM	*Nikos-NOM*	*see.IMPF-PRES.3.**SG***	*baby- ACC*	*that*	*SUBJ*	*run.IMPF-PRES.3.PL*

'Nikos is watching children that are running.'

(b) CG_{DS} *Production: Plural Alternative – Incorrect*

o	Nik-oł	***Ø lep-u***	mor-a	pu	[p]ur-u.
DET.NOM	*Nikos- NOM*	*see.IMPF-PRES.3.**PL***	*baby- ACC*	*that*	*run.IMPF-PRES.3.PL*

'Nikos are watching children that are running.'

Phonetic Error Analysis. The omission and substitution of /s/ with and without inflectional value was examined. Despite the considerably high means of word-final /s/ omission causing morphosyntactic effects, the comparison between the two environments did not reveal a statistically significant difference between omissions causing morphosyntactic effects, and those causing purely phonetic/phonological effects, results did not evidence a main effect of *effect type*, $F(1,186) = 2.03$, $p < .156$, or *group and effect type* $F(2,186) = 2.04$, p .155. These results, taken together with a large list of additional evidence, suggest that word-final /s/ omission is not a grammatical phenomenon triggered by impairment in the production of 2nd person singular or lack of grammatical knowledge.[7] See Christodoulou (2011) and Christodoulou & Wexler (2016) for a detailed the analysis. Results from the phonetic analysis were factored in the morphosyntactic analysis presented below.

3. Results. The participants' productions for person and number are summarized in Tables 3 and 4, respectively. There are two easily distinguishable results identified in these confusion matrices: (i) the majority of productions match the target, and (ii) the most favoured alternatives are the 3rd value for person and singular for number. However, participants use 3rd person and plural to substitute for forms where gerunds were targeted, to agree with the main clause subject *oli mazi* 'all*PL* together'. A preference for 1st person as an alternative to 2nd and 3rd person was observed.

	DS					TLD				
Production	1st	2nd	3rd	GER	Match %	1st	2nd	3rd	GER	Match%
1st Person	**1,031**	3	35	0	**96.4**	**999**	0	5	0	**99.5**
2nd Person	12	**390**	14	0	**93.8**	2	**681**	6	0	**98.8**
3rd Person	20	10	**2,268**	0	**98.7**	5	3	**2,416**	0	**99.7**
Gerund	19	0	42	**71**	**53.8**	2	0	38	**125**	**75.8**

Table 3. Confusion Matrix of Person Production on Verbs

[7] Additional evidence confirming this finding include: (i) an overall problem with /s/ omission in all word positions, (ii) the variety of (non-)inflectional environments /s/ omission occurs in, (iii) high percentages of accuracy with all inflectional features, including person and number, and (iv) the surrounding morphosyntactic environment (i.e. other words related to the verb are still inflected with 2nd person). These are analysed in detail in Christodoulou (2011).

	DS				TLD			
Production	SG	PL	GER	Match %	SG	PL	GER	Match %
Singular	**2,946**	11	0	99.6	**2,957**	7	0	99.8
Plural	48	**773**	0	94.2	23	**1,084**	0	97.9
Gerund	26	36	71	**53.4**	4	35	**125**	**76.2**

Table 4. Confusion Matrix of Number Production on Verbs

After eliminating potential effects caused by a phonetic or phonological impairment, overall performance across the six person-number combinations was at or near ceiling for both groups (Figure 2). Both person and number were rarely used incorrectly by both individuals with DS (*M*=0.26%, *N*=10/4,096) and TD children (*M*=0.10%, *N*=4/4,228). This result leaves little room for exploring any potential correlations across other potential variables affecting the participants' performance. Results confirm that both groups use person and number inflection with close to ceiling accuracy. Percentages of incorrect production for each person and number value were surprisingly low (Figure 2). However, if an alternative is used it is often used incorrectly, excluding instances where 3rd person and plural values are used as alternatives for gerunds. Adults with DS performed parallel to TD children with 1st person. On the contrary, results revealed that individuals with DS did not produce 2nd and 3rd person as accurately as TD children, though differences were so minuscule. A Univariate analysis with accuracy means as the dependent variable and Person values and Group as the independent variables showed no effects of *Person* $F(5,93) = .95$, $p = .513$ and *Group* $F(5,93) = 3.66$, $p = .196$, and no interaction between *Person and Group* $F(5,93) = 2.67$, $p = .074$. Along the same lines, a statistical analysis revealed no significant effects for *Number* $F(3,62) = 1.33$, $p = .454$ and *Group* $F(2,62) = 2.17p = .380$, and no interaction between *Number* and *Group* $F(3,62) = 0.76$, $p = .386$.

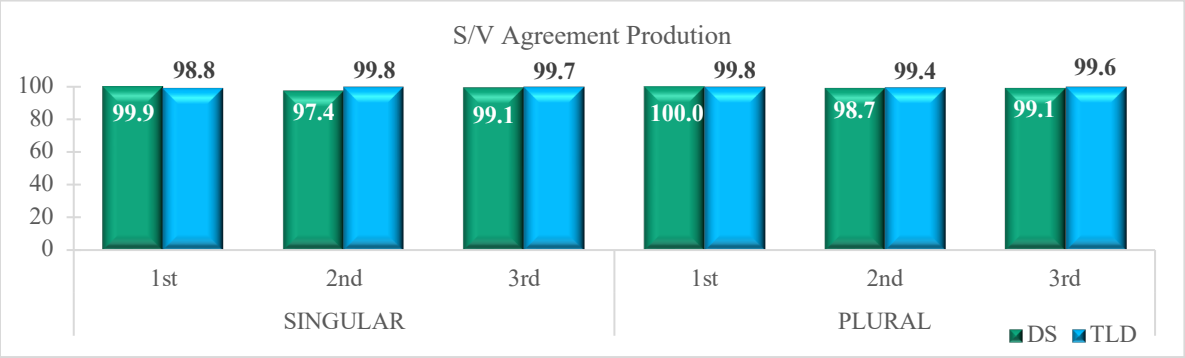

Figure 2. S/V Agreement Production

There was no correlation between incorrect productions and a particular syntactic structure or experimental task. Neither structural complexity nor specific structural environments conditioned the participants' incorrect productions, though some tendencies were recorded and are discussed below. In addition, no correlation between inaccurate S/V agreement and tense use was recorded; based on the overall number of verb productions, incorrect person and tense productions cooccurred at 0.26% (*N*=10/4,096) for adults with DS and 0.10% (*N*=4/4,228) for TD children. Incorrect instances of number and tense cooccurred at 0.13% (*N*=5/4,096) for adults with DS and 0.07% (*N*=3/ 4,228) for TD children. Overall, tense and S/V agreement (both person and number) were used incorrectly with the same verb at 0.03% (N=1) for adults with DS and 0.05% (N=2) for TD children. Results on the distribution of person and number below are evaluated based on (i) the value targeted or expected by an experimental task, and (ii) the surrounding structural environment.

Percentages of affix drop were negligible (DS: M=0.9, TD: M=0.6). Rates of full verb omission are small for both groups: DS: N=159/4,096, M=3.9; TD: N= 23/4,228, M=0.5. A univariate analysis surfaced no effects for *Person* $F(2,93) = 1.33$, $p = .429$ and *Group* $F(2,93) = 0.73$, $p = .483$, but there was an interaction between *Person and Group* $F(1,61) = 22.3$, $p = <.001$. A post-hoc Bonferroni Analysis revealed that second person production differs significantly from both 1st and 2nd person ($p = <.001$). Along the same lines, a Univariate analysis revealed no significant effects for *Number* $F(1,62) = 1.00$, $p = .501$ and *Group* $F(1,62) = 0.22$ $p = .907$, but there was a significant interaction across the two $F(1,62) = 5.96$, $p = .018$. The considerably low percentages of alternative production, affix drop and full verb omission suggest that both groups have acquired the morphosyntactic mechanisms pertaining to the assignment of person and number, as targeted in the appropriate environments but also in spontaneous and uncontrolled speech. Statistical significance surfacing due to ceiling effects is possible.

4. Discussion

After eliminating potential effects from phonetic limitations, results recorded with CG adults with DS and TD children reveal close to ceiling performance with both person and number. On occasions where participants do not produce a form as targeted, three strategies are employed:

1. an alternative value, instead of the targeted one, resulting to either a grammatical or ungrammatical production was produced,
2. the inflectional suffix for person and number was omitted,
3. the entire verb was omitted.

Overall percentages of incorrect use with alternative feature values are lower than 1.5% for person and 1% for number for adults with DS and lower than 0.5% for both person and number for TD children. Percentages of suffix omission do not surpass 0.9% for participants with DS and 0.5% for TD children. Regarding the third strategy, percentages of verb omission do not surpass 4% for both person and number for adults with DS and 0.5% for both features for TD children.

Coping strategies across the two groups included: substitution of 1st for 2nd person and vice versa, especially in the *Elicited Imitation* task. The preference for 1st person as an alternative can be explained in three ways. First, participants with DS perceive the experimenter's production of 1st person as actually referring to the experimenter and the production of 2nd person as referring to them. Therefore, participants changed the person reference to match their perception. Second, according to Harley and Ritter (2002), while 3rd person is the complete absence of person specification, between 1st (speaker) and 2nd (addressee) person, 1st person is the default form. Third, according to egocentrism (Piaget and Inhelder, 1969), children cannot shift perspective until "concrete operations", a phenomenon mainly observed around age 7. Given that the linguistic abilities of individuals with DS do not surpass those of a 7- year-old, they might be failing to shift perspective of the speaker/addressee reference. The latter analysis is unlikely since adults with DS assign the appropriate person value correctly at percentages over 97% for all person values.

Interestingly, participants from both groups, using the same coping strategy, show a clear preference in using an inflectional suffix marking tense, person and number, instead of the gerund suffix, the only verbal inflection that carries neither tense nor S/V agreement; this was recorded at approximately 46% for adults with DS and 24% for TD children. Their preference of present 3rd person plural suffix is dependent on the context of the structure, matching the person and number features of the subject in the main clause; this results in a grammatical alternative to the targeted gerund structure, and is more likely a frequency effect as CG adult speakers rarely use gerunds. When considering what conditions the preference of alternative forms, these forms should be sepa-

rated from the overall use of alternative productions; they depend on the structural environment and therefore context-dependent. The following tendencies set the foundation for an analysis on the performance of CG adults with DS as well as a preliminary cross-linguistic analysis on the production of S/V agreement in individuals with DS.

CYPRIOT GREEK INDIVIDUALS WITH DS. No correlation of incorrect production between S/V agreement and tense, or between person and number was found. After excluding the articulatory and structural restrictions summarised above, participants show a higher preference towards 3rd for person and singular for number as alternative values to the targeted inflectional ones. Results on correlations suggest that these are not treated as a bundle, as reported by Varlokosta, Vainikka & Rohrbacher (1996), as they are found to be altered separately and not as one fused morpheme. That is, in some cases we may have the change of a form from 1st to 3rd person plural, or from 1st person singular to 1st plural. Based on cross-linguistic evidence singular is considered the default value for number and 3rd is considered the overall default (absent, in fact) value for person (Harley & Ritter 2002).[8] Further analysis pursed by this study shows that the preference for a default value per inflectional feature is further supported by the fact that the lowest number of non-match instances were observed with the values that are used as alternatives the most (i.e. defaults) (for **Person**, DS: 1st= 4.1%., 2nd=5.8% , 3rd= 1.7% ; TD: 1st= 1.6%., 2nd=1.3% , 3rd= 0.7% for **Number** DS: SG= 1.2%., PL=6.4%; TD: SG= 0.8%., PL=2.5%).[9] Following Harley and Ritter (2002), I consider the preference towards these features as a preference towards the use of default forms. Their analysis is based on evidence from (i) the order these feature values are acquired by TD children cross-linguistically and (ii) frequency rates and inflectional patterns these values are used by TD adults cross-linguistically.

Based on these two tendencies and some cross-linguistic tendencies in the production of these features, below I provide cross-linguistic predictions on what may condition problems in the production of S/V agreement across individuals with DS speaking different languages: (Cypriot) Greek, English, German, Spanish, Italian and Dutch. However, given that the inflectional systems of these languages differ significantly, language-specific characteristics (morphosyntactic properties and morpho-phonological forms of inflectional paradigms) cause this phenomenon to surface in different ways. Surfacing effects make the coping strategy appear different precisely because the inflectional systems across languages are overtly expressed in different ways. I hypothesise that, although S/V agreement effects appear to be so diverse across languages, the underlying strategy of the participants' preferences for some forms over others is the same across languages. It is predicted that:

1. difficulties with inflectional marking might have a core underlying cause,
2. language-specific characteristics might surface differing effects on how this core difficulty is expressed and consequently,
3. different strategies in coping with linguistic difficulties might be recorded.

Note that these are merely predictions; some of these studies use as little as two participants with DS or an overgeneralised reference of "severe morphosyntactic impairment" without any specific information. Only a detailed morphosyntactic analysis on the development of S/V agreement in individuals with DS can validate these predictions.

[8] Even though Harley and Ritter (2002) discuss data on the pronoun system, results from this study show that this preference is also recorded with verbal person and number. This analysis is also supported by results on TD children. who show a preference for the two features, not just with nominal but also with verbal person and number.

[9] Findings on the production of case revealed that lower percentages of non-match feature values are not conditioned by frequency; accusative is used more frequently than nominative (the default for case in (Cypriot) Greek), and yet the lowest percentage of non-match instances is recorded with nominative Christodoulou (2011; 2016).

GREEK INDIVIDUALS WITH DS. Given that the **inflectional systems** of the CG and SMG varieties are virtually the same, with micro-variations in the surfacing of morpho-phonological forms, we would expect Greek and CG individuals with DS to perform in a parallel manner. Namely, exhibit new ceiling accuracy with S/V agreement production. For inflectional feature value substitutions, preference towards the default feature value for each feature is expected.

ENGLISH INDIVIDUALS WITH DS. Examining the use of past tense, noun plurals, and comparative adjectives, Ring and Clahsen (2005) concluded that participants with DS show a preference for unmarked forms. They propose that the OI hypothesis can "extend to other functional categories" like number and degree (comparative/superlative), which, like tense, can be underspecified. Two interpretations for the use of unmarked forms are possible:

(i) use of the default for S/V agreement is the OI (the infinitival form without *to*), or
(ii) use of the "universal" default values 3rd for person and singular for number, but physiological restrictions prevent the production of the final /s/.

Even though it is impossible with what is currently available to decide between the two, evidence for the second interpretation come from their performance with evidence for this comes from their performance with copulas and auxiliaries which are reported to be spared, where inflectional paradigms present variations in the morpho-phonological forms. This is parallel to that is reported for the Greek copula *ime* 'be' with at ceiling performance with inflectional values, despite the relatively high rates of omission (Christodoulou 2011; Christodoulou & Wexler, 2022). Additional evidence comes from the fact that neither by DS nor by TD children use the infinitival ***BE***.

GERMAN INDIVIDUALS WITH DS. Results for German adults with DS reported by Schaner-Wolles show almost at ceiling accuracy with S/V agreement and use of unmarked verbs in finite clauses (infinitival suffix *–en*[10] or bare stem). The performance of the DS participants in Penke's (2018) study, though split, appears to strongly support the default feature value hypothesis. The same two hypotheses are available for German as well; given that German does allow OIs, we may expect that their performance might surface more OIs, parallel to English and German TD children. The alternative of using the unmarked or default features, however, appears to be more plausible in this case, given that participants in the Penke study present a high proportion of substitutions, using the 3rd person singular *-t* to substitute for other S/V agreement forms, rather than the infinitival suffix. Therefore, I hypothesise that the performance of CG, German and English individuals with DS is in fact parallel; while German and CG individuals with DS appear to use the "default" values for person and number, in English, a language with restricted overt morphology, individuals with DS appear to use the infinitival form as the default. Results from Schaner-Wolles support the OI hypothesis, which seems to align more with what has been reported for English DS. The possibility, however, that these participants may be using the 3rd and SG values as the default, but we fail to see this due to potential articulatory restrictions begs further, careful investigation.

SPANISH INDIVIDUALS WITH DS. Despite lack of reference to specific phenomena, it is predicted that a number of potential problems with Spanish individuals with DS would be accidental: 3/6 person-number combinations across all three tenses and across indicative and subjunctive contain a word-final /s/. Based on findings from the current study and the Spanish S/V agreement inflectional paradigm, we expect to see either (i) the use of the infinitival form following English and German, or behaving more like CG, (ii) the use of a default value per feature. Given that Spanish is an inflectionally rich, pro-drop language that does not allow OIs, the second possibility is more likely.

[10] Note that from the inflectional paradigm, provided in Table 9 in the Appendix, many suffixes contain *–en*. As with English it is impossible to know, unless the surrounding structural environment offers additional clues, whether *–en* is actually the infinitival suffix, or one of the other *–en* suffixes carrying tense, person and number.

ITALIAN INDIVIDUALS WITH DS. Given that the Italian inflectional paradigms for S/V agreement do not include any phonemes that are challenging for individuals with DS, we anticipate that a detailed morphosyntactic assessment will surface minimal problems. Since Italian is an inflectionally rich language that requires overt inflectional marking, we would also not expect uninflected forms. Alternative feature values will either show a particular preference for (i) the infinitival form, or (ii) default forms. The second prediction is favoured due to the lack of OIs in TD children.

DUTCH INDIVIDUALS WITH DS. The inflectional system of Dutch does not present much variation in the inflectional suffixes across the 6 person-number combinations. Despite limited information on what is exactly produced or affected by Dutch individuals with DS, we can predict: (a) low percentages on incorrect use with S/V agreement, and (b) use of default forms. For the latter, we would either anticipate: (i) use of the infinitive, or (ii) use of default value: 3rd for person and singular for number. We would more likely observe the former, given (a) the performance of German individuals with DS (Dutch also being a non-pro-drop, Germanic language), and (b) the fact that Dutch allows IOs, just like English and German.

After a brief look at S/V agreement through seven pro-drop and non-pro-drop languages, it is predicted that the seemingly diverse performance of individuals with DS across languages, with inflectionally rich and poor morphology, from different language families (Greek, Germanic, Romance), actually has the exact same underlying origin; namely, (i) OI is how the default is realised in non pro-drop languages and (ii) the use of the default value per feature is how the default is realised in pro-drop languages. However, language-specific characteristics surface a differing and sometimes contradicting performance, causing overall performance and coping strategies to surface differently cross-linguistically. Nonetheless, the core limitation across these languages is the same within Universal Grammar; resolving to the least marked form. This could also potentially be true for young TD children, though a more extensive, cross-linguistic study is necessary to verify such prediction.[11] Based on this preliminary observation, a question on the nature of infinitives, as well as OIs and default forms arises. These are questions with a number of theoretical implications currently under investigation.

Results from the current study have major implications on how morphosyntactic difficulties could be addressed through intervention and rehabilitation for individuals with DS. Specifically, eliminating effects from external factors before designing a rehabilitation plan specialising on a particular morphosyntactic phenomenon is critical. For the latter, the suggestion of the core underlying nature of alternative productions attempts to give a unified explanation (work in progress) on the distinction between pro-drop and non-pro-drop languages in relation to the use of unmarked, infinitival or default forms. Naturally, only a cross-linguistic study on languages with different inflectional systems examining the performance of individuals with DS, using the same methodology, factoring in language specific characteristics and articulatory limitations, would be able to confirm the predictions presented above and give definitive answers to these questions.

References

Alexiadou, A., & Anagnostopoulou, E. (2002). Raising without Infinitives and the Role of Agreement. In A. Alexiadou, E. Anagnostopoulou, S. Barbiers, & H-M. Gaertener (Eds.), *Dimensions of Movement: From Features to Remnants*. (pp. 17-30). Amsterdam, The Netherlands: John Benjamins https://doi.org/10.1023/A:1006090432389

[11] Further analysis is necessary to determine whether the choice of default is conditioned by syntax or morphology. A preliminary analysis examining this is available (Christodoulou, 2011) as well as more recent work in preparation.

Bol, G., & Kuiken, F. 1990. Grammatical Analysis of Developmental Language Disorders - a Study of the Morphosyntax of Children with Specific Language Disorders, with Hearing Impairment and with Downs-Syndrome. *Clinical Linguistics & Phonetics 4*, 77-86.

Bol, G. & Kasparian, K. 2009) The Production of Pronouns in Dutch Children with Developmental Language Disorders: A Comparison Between Children with SLI, Hearing Impairment, and Down's Syndrome. *Clinical Phonetics and Linguistics 23 (9)*, 631-646. https://doi.org/10.3109/02699209008985472

Caselli, M. C., L. Monaco, M. Trasciani, & S. Vicari. 2008. Language in Italian Children with Down Syndrome and with Specific Language Impairment. *Neuropsychology, 22*, 27–35. https://doi.org/10.1037/0894-4105.22.1.27

Chapman, R. S. 1995. Language Development in Children and Adolescents with Down Syndrome. In P. Fletcher & B. MacWhinney (Eds.), *The Handbook of Child Language*, (pp. 664-689). Oxford, UK: Blackwell Publishers.

Chapman, R.S., Seung, H., Schwartz, S.E., & Kay-Raining Bird, E. 1998. Language Skills of Children and Adolescents with Down Syndrome: II. Production Deficits. *Journal of Speech, Language and Hearing Research, 41*, 861–873. https://doi.org/10.1044/jslhr.4104.861

Christodoulou, C. 2011. Cypriot Greek Down Syndrome: Their Grammar and Its Interfaces. PhD dissertation, University of British Columbia, Vancouver.

Christodoulou, C. & Grohmann, K. K. 2014. Morphosyntactic Issues in the Development of Cypriot Greek Individuals with Down Syndrome. *Proceedings of the 38th annual Boston University Conference on Language Development*, November1 – 3, Boston. http://www.bu.edu/bucld/files/2014/04/christodoulou.pdf

Christodoulou, C. & Wiltschko, M. 2012. Function without Content: Evidence from Greek Subjunctive na. In A.M. Di Sciullo (ed.) *Towards a Biolinguistic Understanding of Grammar: Essays on Interfaces*, pp. 117–140. Linguistik Aktuell. Amsterdam: John Benjamins.

Christodoulou, C. & Wexler, K. 2022. Copula Omission in Down Syndrome. *Journal of Language Learning and Development*. http://dx.doi.org/10.1080/15475441.2022.2047687

Christodoulou, C., & Wexler, K. 2016. The Morphosyntactic Development of Case in Down Syndrome. *Lingua 184*, pp.25 – 52. DOI.org/10.1016/j.lingua.2016.05.011

Galeote, M., Soto, P., Checa, E., Gómez, A., & Lamela, E. 2008. The Acquisition of Productive Vocabulary in Spanish Children with Down Syndrome. *Journal of Intellectual and Developmental Disability, 33*, 292-302. https://doi.org/10.1080/13668250802441870

Galeote, M., Soto, P., Sebastián, E., Checa, E., Sánchez-Palacios, C. 2013. Early Grammatical Development in Spanish Children with Down Syndrome. *Journal of Child Language, 41*, 111-131.

Eadie, P.A., Fey, M.E., Douglas, J.M., & Parsons, C.L. 2002. Profiles of Grammatical Morphology and Sentence Imitation in Children with Specific Language Impairment and Down Syndrome. *Journal of Speech, Language and Hearing Research, 45,* 720–732.

Epstein, C. J. 2006. Down's Syndrome - Critical Genes in a Critical Region. *Nature, 441*, 582-583.

Harley, H., & Ritter, E,. 2002. Person and Number in Pronouns: A Feature-Geometric Analysis. *Language, 78*, 482-526. https://doi.org/10.1353/lan.2002.0158

Kumin, L. 2006. Speech Intelligibility and Childhood Verbal Apraxia in Children with Down Syndrome. *Down Syndrome Research and Practice 10*:10-22.

Laws, G., & Bishop, D.V.M. 2003. A comparison of language abilities in adolescents with Down syndrome and children with specific language impairment. *Journal of Speech, Language and Hearing Research, 46*, 1324–1339.

Penke, M. (2018). Verbal agreement inflection in German children with Down syndrome. *Journal of Speech, Language, and Hearing Research 61*, 22117–2234. https://doi.org/10.1044/2018_JSLHR-L-17-0241

Poeppel, D., & Wexler, K. 1993. The Full Competence Hypothesis of Clause Structure in Early

German. *Language, 69*, 1-33.
Ralli, A. (2003). Morphology in Greek Linguistics: The State of the Art. *Journal of Greek Linguistics, 4*, 77–129.
Ring, M., & Clahsen, H. 2005. Morphosyntax in Down's Syndrome: Is the Extended Optional Infinitive Hypothesis an Option? *Stem-, Spraak-en Taalpathologie*, *13*, 3-13.
Rizzi, L. 1994. Early Null Subjects and Root Null Subjects. *Syntactic Theory and First Language Acquisition: Cross-linguistic Perspectives, Vol 2*, 249-272.
Rice, M., Wexler, K. & Cleave, P. 1995. Specific language impairment as a period of optional infinitive. *Journal of Speech, Language and Hearing Research 38*, 850–863.
Rowe, C., & Grohmann, K.K. 2013. Discrete Bilectalism: Towards Co-Overt Prestige and Di-glossic Shift in Cyprus. *International Journal of the Sociology of Language, 224*, 119–142.
Sano, T. & N. Hyams. 1994. Agreement, Finiteness, and the Development of Null Arguments. In Powers, S., & Hamann, C. (Eds.), *Acquisition of Scrambling and Cliticization*, Dordrecht: Kluwer, (pp.345–396). *Proceedings of NELS 24*, Gonzales, M. (Ed.), University of Massachusetts, Amherst: GLSA (pp. 543–548).
Stoel-Gammon, C. 2001. Down Syndrome Phonology: Developmental Patterns and Intervention Strategies. *Down Syndrome Research and Practice* 7:93-100. https://doi.org/10.3104/reviews.118
Schaeffer, J. 2012. Specific Language Impairment: evidence from the division of labor and the interaction between grammar and pragmatics. LAP Lambert Academic Publishing,
Schaner-Wolles, C. 2004. Spared Domain-Specific Cognitive Capacities? Syntax and Morphology in Williams Syndrome and Down Syndrome. In S. Bartke, & J. Siehmüller (Eds.), *Williams Syndrome across Languages* (pp. 93-122). Amsterdam, The Netherlands: John Benjamins.
Schütze, C. T., & Wexler, K. 1996. Subject Case Licensing and English root Infinitives. *Proceedings of the 20th Annual Boston University Conference on Language Development, Vols 1 & 2*, 670-681.
Spyropoulos, V. 1999. Agreement Relations in Greek. Doctoral dissertation, University of Reading. Reading, Berkshire.
Stathopoulou, N. 2009. *The Linguistic Profile of Greek Individuals with Down Syndrome: Evidence from Syntactic and Morphological Phenomena.* Doctoral dissertation, University of Essex. Colchester, Essex.
Varlokosta, S. 1994. *Issues on Modern Greek Sentential Complementation*. Doctoral dissertation, University of Maryland. College Park, Maryland.
Varlokosta, S., Vainikka, A., & Rohrbacher, B. 1996) Root Infinitives without Infinitives. *Proceedings of the 20th Annual Boston University Conference on Language Development, Vols 1 & 2*, 816-827.
Vicari, S., Caselli, M. C., & Tonucci, F. 2000. Asynchrony of Lexical and Morphosyntactic Development in Children with Down Syndrome. *Neuropsychologia, 38*, 634-644.
Wexler, K. 1990. Optional Infinitives, Head Movement and the Economy of Derivations in Child Grammar. *Paper Presented at the Annual Meeting of the Society of Cognitive Science*, MIT, Cambridge, Mass.
Wexler, K. 1994. Optional Infinitives, Head Movement and the Economy of Derivations. In *Verb Movement,* eds. Lightfoot, David, and Norbert Hornstein, 305-362. Cambridge, England: Cambridge University Press.
Wexler, K., Schaeffer, J. and Bol, G. 2004, Verbal Syntax and Morphology in Typically Developing Dutch Children and Children With SLI: How Developmental Data Can Play an Important Role In Morphological Theory. Syntax, 7: 148-198. https://doi.org/10.1111/j.1467-9612.2004.00006.x