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Eliseo Díez-Itza | Universidad de Oviedo

Manuela Miranda | Universidad de Oviedo

Vanesa Pérez | Escuelas Universitarias Gimbernat-Cantabria

Verónica Martínez | Universidad de Oviedo

 <https://doi.org/10.1075/z.223.13die>

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Pages 219–234 of

Atypical Language Development in Romance Languages

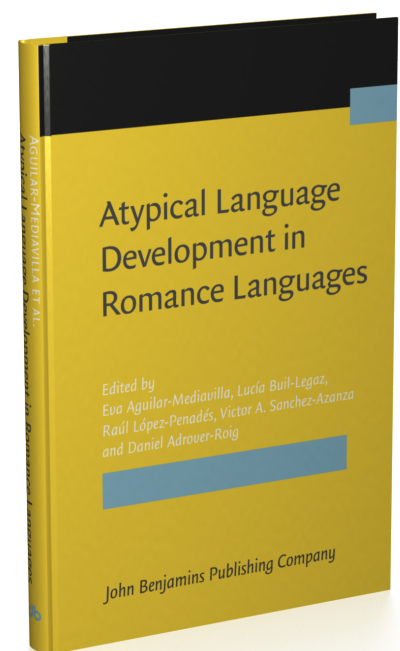
Edited by Eva Aguilar-Mediavilla, Lucía Buil-Legaz, Raúl López-Penadés, Victor A. Sanchez-Azanza and Daniel Adrover-Roig

2019. vi, 257 pp.

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Profiles of grammatical morphology in Spanish-speaking adolescents with Williams Syndrome and Down Syndrome

Eliseo Díez-Itza,¹ Manuela Miranda,¹ Vanesa Pérez² and Verónica Martínez¹

¹Universidad de Oviedo / ²Escuelas Universitarias Gimbernat-Cantabria

This chapter presents a comparative perspective on the morphological profiles of Williams Syndrome (WS) and Down Syndrome (DS). The initial research described these neurodevelopmental disorders as cases of specific preservation and delay of grammar, respectively, whereas later approaches have challenged such assumptions. The present study aimed to contribute to this discussion with data from 18 Spanish-speaking adolescents in three groups (WS, DS and typical development). Spontaneous speech was analysed with the tools of the CHILDES Project, transcribing and coding the parts of speech and morphological errors. While errors are less frequent in WS than in DS, their type and distribution remain atypical in both syndromes which points towards differential trajectories of language development.

Keywords: Williams Syndrome, Down Syndrome, morphology, grammatical profiles, atypical language trajectories

Introduction

Comparative studies have contributed significantly in the past three decades to a substantial revision in the definition of Intellectual Disability, within a new paradigm that is more centred on syndrome-specific neurodevelopmental profiles than on global deficits or delays (Schalock et al., 2010). During this period, a growing body of research has emerged on Williams Syndrome (WS), a rare genetic neurodevelopmental syndrome (hemideletion on chromosome 7q11.23) with a phenotype of distinctive facial features, intellectual disability and hypersociability. The studies comparing Williams Syndrome and Down Syndrome started in

the Salk Institute, within the research program on the neuropsychological profile of WS (Bellugi, Lichtenberger, Jones, Lai, & St. George, 2000) using Down Syndrome (DS) as the comparison group because it was considered the model of “mental retardation”, global and homogenous for all functions. The initial study by Salk Institute researchers (Bellugi, Marks, Bihrlé, & Sabo, 1988) presented the results of the cognitive and linguistic functioning of three adolescents with WS and concluded that their language, contrary to what had been described in DS, constituted “an island of sparing” in the face of severe cognitive deficits. Therefore, these authors presented WS as a particular or atypical case of “mental retardation”, with intact grammatical competence against impaired visuospatial skills, which was interpreted as a genetically based dissociation between language and nonverbal intelligence. Despite certain morphological errors, Bellugi, Bihrlé, Jernigan, Trauner, and Doherty (1990) also concluded that the language of six adolescents with WS was “preserved” in comparison with their DS controls matched for sex and chronological and mental age. At the same time, the WS profile was considered “atypical” due to its specific deficits and preservations within and across domains. From these preliminary data on WS and their comparison with those of children with Specific Language Impairment (SLI), Pinker (1991) suggested that they constituted a case of “double dissociation” that would prove the independence between language and general cognition.

However, studies in Romance languages such as Italian, Spanish and French, found atypical morphosyntactic errors, questioning the hypothesis of preserved language in WS (Diez-Itza, Antón, Fernández-Toral, & García, 1998; Karmiloff-Smith, Grant, Berthoud, Davies, Howlin, & Udwin 1997; Volterra, Capirci, Pezzini, Sabbadini, & Vicari, 1996). The debate over the typical or atypical nature of the morphosyntactic profile of WS has been maintained in a series of studies (Benítez-Burraco, Garayzábal, & Cuetos, 2017; Diez-Itza, Martínez, Fernández-Urquiza, & Antón, 2017; Mervis, 2006).

WS profile is interpreted differently from different approaches. From the preservation approach, WS profile is interpreted regarding a system with a typical functioning but in which some components are impaired (Clahsen & Almazan, 1998, 2001; Clahsen, Ring, & Temple, 2004; Krause & Penke, 2002; Zukowski, 2005). Nevertheless, from the neuroconstructivist approach, WS profile is interpreted as the result of an atypical developmental trajectory, arguing that the preservation approach disregards the complex dynamics of development (Karmiloff-Smith, 1998; Hsu & Karmiloff-Smith, 2008; Oliver, Johnson, Karmiloff-Smith, & Pennington, 2000; Thomas et al., 2001; Thomas & Karmiloff-Smith, 2003).

Research concerning the grammatical profile of individuals with DS is not exempt from controversy. While an important agreement exists about the marked difficulties in grammar observed in the individuals with DS, studies differ about

the nature and extent of their grammatical impairment (Chapman, Seung, Schwartz, & Kay-Raining Bird, 1998; Diez-Itza & Miranda, 2007; Eadie, Fey, Douglas, & Parson, 2002; Fabbretti, Pizzuto, Vicari, & Volterra, 1997; Finestack & Abbeduto, 2010; Galeote, Soto, Sebastián, Checa, & Sánchez-Palacios, 2014; Lázaro, Garayzabal, & Moraleda, 2013; Martin, Klusek, Estigarribia, & Roberts, 2009; Rutter & Buckley, 1994; Schaner-Wolles, 2004). The hypothesis of preservation of grammar in WS was based on the comparison with DS, but the view that DS presented a homogeneous profile of cognitive and linguistic delay did not correspond with research results that showed linguistic development as asynchronous related to mental age (Fowler, 1990; Miller, 1988). Similarly, later comparative studies suggested that WS did not demonstrate better linguistic abilities than expected for mental age and that the apparent preservation of language in WS was a resulting artefact from comparing it with DS, whose profile presented specific weaknesses in grammar (Vicari, Caselli, Gagliardi, Tonucci, & Volterra, 2002). In fact, even though the difficulties of morphosyntactic production were more prominent in DS, they also appeared to some extent in WS individuals when compared with TD children matched for mental age (Vicari et al., 2004), for verbal age (Diez-Itza et al., 2017), and for chronological age (Benítez-Burraco et al., 2017). Furthermore, the research of early language development showed that both syndromes presented an initial delay and that the later observed differences in the profiles of adolescents were the result of specific asynchronous trajectories of lexical and morphosyntactic development (Mervis & Robinson, 2000; Singer-Harris, Bellugi, Bates, Jones, & Rossen, 1997; Vicari, Caselli, & Tonucci, 2000).

In sum, although the comparative research has shown that DS presents a higher frequency of morphological errors than WS, it is still debated if the frequency of errors in WS is at the level expected for mental and verbal age. The nature of errors in both syndromes is also debated by those who consider that it reflects delays or selective deficits in a system that is comparable to that of the typical development; and those interpreting the morphological profiles as the result of atypical developmental trajectories.

In order to address some of these issues, the study presented in this chapter aimed to investigate the morphological profiles of WS and DS as part of a wider research program that compares the linguistic profiles of WS, DS and Fragile X Syndrome (FXS) with those of TD individuals (The Syndroling Project: Diez-Itza et al., 2014). The specific objectives are centred in the comparison of two groups of adolescents with WS and DS according to (i) the distribution of the part-of-speech categories (nouns, verbs, determiners, prepositions, conjunctions, pronouns, ...) in the samples; (ii) the frequency of morphological errors by parts of speech; and (iii) the frequency of each type of morphological errors. Based on prior research, it was predicted that the distribution of parts of speech would not be syndrome-specific.

It was also predicted that morphological errors would not be equally present in all part-of-speech categories. Finally, it was predicted that participants with DS would present a syndrome-specific profile characterised by a higher frequency of morphological errors affecting function words and by a higher frequency of omission errors, while participants with WS would present fewer errors but would also show atypical errors.

Methodology

Participants

The sample was composed of 18 Spanish-speaking adolescents in three groups (3 males and 3 females in each group): a WS group (Mean age 17.06/SD 2.31/range 14.36–20.64), a DS group (Mean age 16.83/SD 1.89/range 14.05–19.06) and a group of typically developing (TD) children (Mean age 5.42/SD 0.34/range 5.01–5.89). The TD children were paired by sex and verbal age (MLU) with the WS group (WS MLU 5.70/SD 2.07/range 3.56–9.17; TD MLU 5.77/SD 2.00/range 3.71–9.00). Given that the MLU of the adolescents in the DS group was significantly lower (DS MLU 2.52/SD 0.98/range 1.29–4.12), their verbal age-equivalent (VAE) was obtained from the *Peabody Picture Vocabulary Test* (PPVT) (DS VAE 5.53/SD 0.43/range 5.0–6.08) and was used as the paired variable with the other groups.

Procedure

The speech samples were obtained from spontaneous conversations with a researcher in natural settings, and they are part of larger corpora within The Syndroling Project (Diez-Itza et al., 2014). Each session, with an estimated duration of 40 minutes, was videotaped and transcribed using the tools of the CHILDES Project (MacWhinney, 2000). To control for length, one sample of 1,000 consecutive tokens from each participant was selected for analyses in the present study.

Morphological analysis was conducted with the MOR program, one of the CLAN programs for the analysis of transcripts in the CHAT format from CHILDES. MOR provides a complete part-of-speech tagging (POST) for every word indicated on the main line of the transcripts, along with the morphological analysis of inflectional and derivational affixes and clitics. For example, the program gives the following analysis for the utterance “*CHI: en el colegio” (in the school): %mor: prep|in det:art|el&MASC&SG = the n|school (prep: preposition; det: determiner; n: noun).

The parts of speech selected from the POST output to assess the profiles of grammatical morphology were: Articles, Nouns Adjectives, Personal Pronouns, Demonstratives, Possessives, Relative Pronouns, Quantifiers, Adverbs, Verbs, Prepositions and Conjunctions. Further, manual coding of errors included: (i) Errors by parts of speech; and (ii) Type of errors: Omission (OMI), Substitution (SST), and Addition (ADD). Substitution errors included gender, number and person agreement errors, as well as tense inflexion errors (see examples in Table 1). Measurements included absolute and relative frequencies expressed in means and percentages. According to the first objective, we calculated the distribution of the part-of-speech categories within the 1,000-word samples from each participant, using the *FREQ* program of CHILDES to count the number of words from each category. Then, we calculated the number and percentage of errors by category, which allowed us to assess whether all the categories were affected by morphological errors in the same proportion (%). Furthermore, with the aim of comparing the error profiles independently of the absolute frequency of error, we determined the percentage distribution of errors by parts of speech in each group. This relative distribution indicates the percentage out of the total number of errors corresponding to each part-of-speech category. Similarly, after calculating the total number of errors by types in each group, we determined the percentage out of the total number of errors corresponding to each type (Omission, Substitution and Addition). The Mann-Whitney U test was used to compare differences between groups in the mean frequency of errors by categories and by types.

Table 1. Examples of the type of errors

Type	Utterances	Part of speech
OMI	no <i>*(lo)</i> sabía hacer	Personal pronoun
	<i>I did not know to do *(it)</i>	
	me gusta <i>*(el)</i> sol	Article
	I like <i>*the</i> sun	
SST	<i>*apaguen (apaga)</i> la luz tú	Verb
	<i>*turn off</i> the light you	
	papi <i>*con</i> (y) mami	Conjunction
	daddy <i>*with</i> (and) mommy	
ADD	no <i>*lo</i> quiero decirlo	Personal pronoun
	<i>I do not want *it to say it</i>	
	Hay <i>*a</i> veces que acabo	Preposition
	<i>there are *to sometimes I end up</i>	

Results

The analyses of the frequencies of distribution of the part-of-speech categories (out of 1,000-word tokens) revealed some differences. Table 2 presents the percentage of words in the categories in which statistically significant differences between some of the groups existed. In the WS group, the nouns frequency (NOU) was less than in the DS group. Conversely, the adolescents of the DS group showed a lower use of personal pronouns (PPR), relative pronouns (RPR) and verbs (VRB) than the adolescents of the WS and TD groups. Differences did not exist regarding the distribution of parts of speech between the WS group and the TD group, except the case of articles (ART), whose frequency of use was lower in the WS group.

Table 2. Percentage of part-of-speech categories use

	DS	WS	TD	DS vs. WS	DS vs. TD	WS vs. TD
	Mean% (SD)	Mean% (SD)	Mean% (SD)	Mann-Whitney Test (Z) (p)		
ART	6.17% (10.206)	5.95% (7.791)	6.90% (2.529)	-.321 (.748)	-1.444 (.180)	-2.173 (.030)*
NOU	20.79% (29.224)	14.88% (21.235)	18.05% (29.303)	-2.402 (.016)*	-1.444 (.149)	-1.604 (.109)
PPR	4.70% (17.484)	7.88% (17.904)	7.62% (16.216)	-2.402 (.016)*	-2.882 (.004)**	-.401 (.688)
RPR	2.39% (5.835)	4.53% (13.441)	4.40% (13.038)	-2.882 (.004)**	-2.882 (.004)**	-.080 (.936)
VRB	15.14% (31.403)	20.32% (15.967)	20.47% (36.952)	-2.402 (.016)*	-2.082 (.037)*	-.320 (.749)

Note: ART Articles, NOU Nouns, PPR Personal Pronouns, RPR Relative Pronouns, VRB Verbs.

As for the absolute incidence of morphological errors, it was much greater in the DS group (Mean = 99.56/*SD* = 39.85) than in the WS group (Mean = 7.67/*SD* = 5.60) and the TD group (Mean = 2.67/*SD* = 2.25), while between these last two groups there were no statistically significant differences. Morphological errors did not affect in the same proportion (%) all part-of-speech categories. Table 3 shows the percentages of error by categories in each group. The DS group presented a significantly greater percentage of errors than the WS and TD groups in all categories, except in demonstratives (DEM) where none of the groups presented errors. The high percentage of errors in Articles (ART), Personal Pronouns (PPR) and Prepositions (PRE) was salient in the DS group. A similar pattern was observed in the WS group, even though the percentages of errors were much lower

in this group. Nevertheless, only the percentage of errors in articles (ART) showed significant differences between WS group and TD children.

Table 3. Percentage of errors by part-of-speech categories

	DS	WS	TD	DS vs. WS	DS vs. TD	WS vs. TD
	Mean% (SD)	Mean% (SD)	Mean% (SD)	Mann-Whitney Test (Z) (p)		
ART	41.30% (32.310)	2.01% (1.672)	.25% (.618)	-2.882 (.004)**	-2.989 (.003)**	-2.308 (.021)*
NOU	2.25% (2.191)	.12% (.309)	.10% (.268)	-2.823 (.005)**	-2.823 (.005)**	-.123 (.902)
ADJ	7.19% (3.878)	1.11% (2.721)	1.04% (2.551)	-2.308 (.021)*	-2.308 (.021)*	-.123 (.902)
PPR	32.38% (18.422)	1.76% (.620)	.78% (.897)	-2.882 (.004)**	-2.903 (.004)**	-1.613 (.107)
DEM	0% -	0% -	0% -	- -	- -	- -
POS	10.79% (16.139)	0% (0)	0% (0)	-2.286 (.022)*	-2.286 (.022)*	0 (1.000)
RPR	4.16% (5.733)	0% (0)	0% (0)	-2.286 (.022)*	-2.286 (.022)*	0 (1.000)
QNT	15.03% (11.456)	0% (0)	0% (0)	-3.077 (.002)**	-3.077 (.002)**	0 (1.000)
ADV	1.68% (.521)	0% (0)	.15% (.388)	-3.077 (.002)**	-2.989 (.003)**	-1.000 (.317)
VRB	11.15% (5.634)	1.18% (.899)	.49% (.637)	-2.882 (.004)**	-2.903 (.004)**	-1.129 (.259)
PRE	28.17% (16.780)	2.63% (3.311)	.35% (.558)	-2.882 (.004)**	-2.934 (.004)**	-1.826 (.068)
CON	7.95% (4.420)	.20% (.504)	0% (0)	-2.989 (.003)**	-3.077 (.002)**	-1.000 (.317)

Note: ART Articles, NOU Nouns, ADJ Adjectives, PPR Personal Pronouns, DEM Demonstratives, POS Possessives, RPR Relative Pronouns, QNT Quantifiers, ADV Adverbs, VRB Verbs, PRE Prepositions, CON Conjunctions.

We also compared the relative percentage of errors in each part-of-speech category over the total number of errors. Figure 1 presents the percentage distribution of errors by category out of the total number of errors. In relative terms, the three groups presented distinct profiles. The WS group and the DS group showed both a higher proportion of errors in articles (ART) and a lower proportion of errors in adjectives (ADJ) than TD group. However, their profiles differed in the proportion

of errors in personal pronouns (PPR) and verbs (VRB), which was much higher in the WS group, and in the proportion of errors in conjunctions (CON), which was higher in the DS group. The WS group and the TD group showed both a very high proportion of errors in personal pronouns (PPR) and a very low proportion of errors in conjunctions (CON), but they presented different profiles regarding the proportion of errors in the rest of the categories. The WS group showed a higher proportion of errors in articles (ART), verbs (VRB) and prepositions (PRE), and a lower proportion of errors in adjectives (ADJ). Finally, the DS group and the TD group showed both a similar proportion of errors in prepositions (PRE), but the DS group presented a higher proportion of errors in articles (ART) and conjunctions (CON), and a lower proportion of errors in adjectives (ADJ), personal pronouns (PPR) and verbs (VRB). It is necessary to point out that, in Figure 1, the specified categories account for 98.71% of the errors from the WS group and 95.03% of the errors from the TD group, but they account only for 80.71% of the errors from the DS group. This difference reflects the fact that the DS group presented more morphological errors than the other groups, and, as a result, other categories also presented a high number of errors (OTH: NOU, POS, RPR, QNT, ADV). Therefore, the profile of the DS group also differed in that it presented more errors and in all the part-of-speech categories than those of the WS and TD groups.

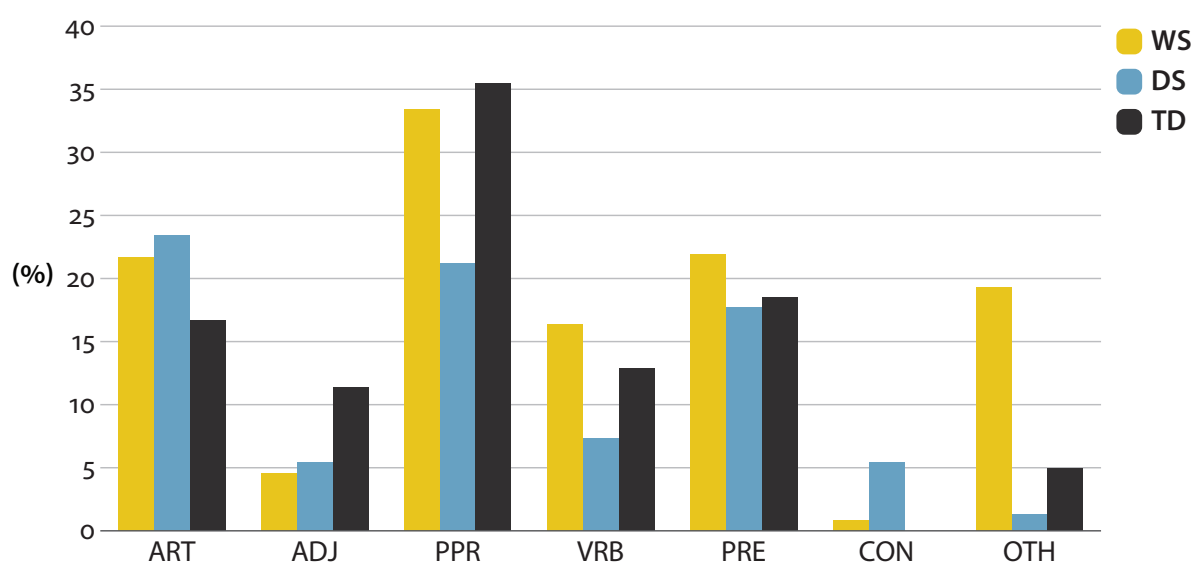


Figure 1. Percentage distribution of errors by part-of-speech categories

Note: *ART* Articles, *ADJ* Adjectives, *PPR* Personal Pronouns, *VRB* Verbs, *PRE* Prepositions, *CON* Conjunctions, *OTH* Other Categories

Concerning the types of error, they were not equally frequent in each group. Table 4 reflects the average number of morphological errors of each type (Omission, Substitution and Addition) that was observed in each group. The DS group showed a significantly higher frequency of all types of error than the WS and TD groups.

Likewise, the WS group showed a significantly higher frequency of Omission and Addition errors than the TD group.

Table 4. Frequency of morphological errors by type of error

	DS	WS	TD	DS vs. WS	DS vs. TD	WS vs. TD
	Mean (SD)	Mean (SD)	Mean (SD)	Mann-Whitney Test (Z) (p)		
OMI	61.36 (34.693)	3.33 (3.932)	.50 (.547)	-2.887 (.004)**	-2.923 (.003)**	-1.996 (.046)*
SST	33.93 (9.108)	3.33 (2.250)	2.16 (2.316)	-2.892 (.004)**	-2.903 (.004)**	-1.083 (.279)
ADD	4.26 (1.990)	1.00 (.632)	0 -	-2.119 (.034)*	-3.077 (.002)**	-2.739 (.006)**

Note: OMI Omission, SST Substitution, ADD Addition

Relative distribution of the types of error represented in Figure 2 also revealed atypical profiles of the DS and WS groups when compared with the TD group. The WS group and the DS group showed both a lower proportion of substitution errors (SST) than the TD group. However, their profiles differed in the proportion of omission errors (OMI), which was much higher in the DS group, and in the proportion of addition errors (ADI), which was much higher in the WS group.

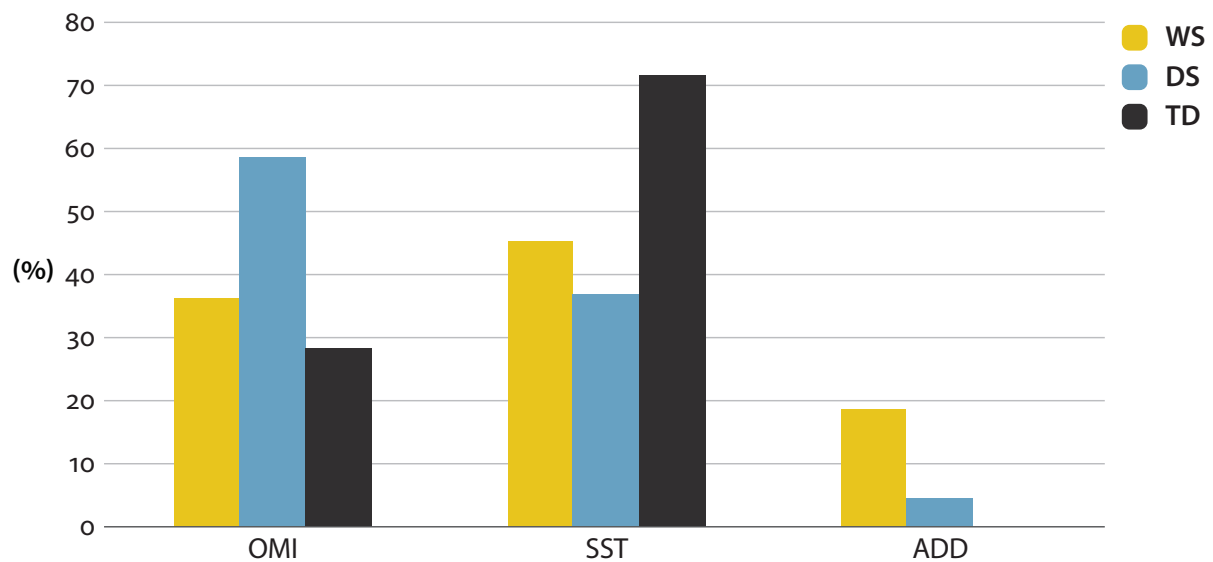


Figure 2. Percentage distribution of errors by types

Note: OMI Omission, SST Substitution, ADD Addition

Discussion

In this chapter, results from a comparative study of the morphological profiles of adolescents with WS and DS were presented. Contrary to our first prediction, the distribution of the part-of-speech categories in the speech samples revealed differences between the groups. The most striking differences concern the DS group, where a lower percentage of verbs, personal pronouns and relative pronouns together with a higher percentage of nouns was observed when compared to the WS and TD groups. Furthermore, the adolescents with WS showed less use of articles than the TD group, a relevant difference that had not been uncovered in the previous study by Diez-Itza et al. (2017). Such results confirm the necessity of taking into account the different proportion of each part-of-speech category in the language samples as a more reliable way of weighting the relative impact of the morphological errors.

The proportion of morphological errors in the DS group, nearly 10% of word tokens, is much higher than in the WS group, where less than 1% of the word tokens are affected by errors. Thus, results of the present study are coincident with previous studies indicating that grammatical morphology constitutes an area of specific weakness in persons with DS, as the observed number of morphological errors lies far beyond that expected for lexical verbal age (Fowler, 1990; Chapman et al., 1998; Miller, 1988; Singer-Harris et al., 1997; Vicari et al., 2000). On the other hand, contrary to our previous findings (Diez-Itza et al., 2017), the rate of morphological errors in the adolescents with WS was not significantly higher than that of the 5-year-old children in the TD group. The disparity between these findings may be attributed to age differences in the samples, as WS participants in the previous study included children, adolescents and adults. Nevertheless, the present study confirmed that grammatical morphology is not intact or preserved in adolescents with WS (Bellugi et al., 1988, 1990; Diez-Itza et al., 1998, 2017; Karmiloff-Smith et al., 1997; Mervis, 2006; Volterra et al., 1996).

When it comes to explaining the nature and the significance of the morphological errors observed in the adolescents with WS, debate arises amongst those who consider that they reflect either a selective impairment of some component (Clahsen & Almazan, 1998, 2001; Clahsen et al., 2004), or they present characteristics that respond to atypical trajectories of development (Thomas et al., 2001; Thomas & Karmiloff-Smith, 2003). Although to a lesser extent, a similar debate exists about whether the apparently deviated grammatical performance observed in the individuals with DS is the result of the asynchronous modular interaction of not deviant developmental patterns (Schaner-Wolles, 2004), or whether differences in the grammatical morphology are not only quantitative but also reveal an atypical trajectory of development (Diez-Itza & Miranda, 2007; Vicari et al., 2002, 2004).

To contribute to these discussions, we analysed the relative proportion of errors, that is to say, their distribution by grammatical categories, as in our previous studies of children and adolescents with DS (Diez-Itza & Miranda, 2007) and with WS (Diez-Itza et al., 2017). Nevertheless, in the present study, in contrast to previous research, we weighted the proportions according to the distribution of the parts of speech in the language samples. As it was already observed in the previous studies, the present findings confirmed our prediction that the percentage of errors would not be equal or homogeneous in all part-of-speech categories, which is against the hypothesis of a generalised grammatical delay in adolescents with DS (Fowler, 1990).

The adolescents with DS in the present study showed a high incidence of error in articles, personal pronouns and connecting words (prepositions and conjunctions), which indicates the same atypical profile observed in the previous study by Diez-Itza & Miranda (2007). Nevertheless, the results of that study should be qualified by considering the relative proportion of the different parts of speech. Relative frequency of errors, both in articles and in connecting words, which was previously estimated at around 30%, in the present study decreases to 25%. Conversely, the estimate of the relative incidence of errors in personal pronouns increases from 10% in the previous study to 20% in the present study. Overall, these three categories continue representing more than two-thirds of the total number of morphological errors. Thus, these results confirm the specific problems that can be observed in DS concerning the production of free morphemes (Fabbretti, Pizzuto, Vicari, & Volterra, 1997). We also found that relative incidence of error in verbs, less than 10%, is even lower than the observed in our previous study, which is consistent with the results in previous studies that observed unexpectedly low error rates in verb inflexion (Eadie et al., 2002; Schaner-Wolles, 2004).

Despite much lower error rates in the WS group, the relative distribution of morphological errors by parts of speech remained atypical in some aspects, which was also observed in the previous study by Diez-Itza et al. (2017). As in the DS group, the great majority of errors of the adolescents with WS were produced in articles, connecting words and personal pronouns. Thus, the advantage of the adolescents with WS in the production of free morphemes was only quantitative but, in relative terms, they presented an atypically high frequency of errors in function words similar to that of individuals with DS (Fabbretti et al., 1997). The main differences between the profiles of both groups lay in the very high relative incidence of errors in personal pronouns, nearly 35%, showed by the individuals with WS, which was also the only salient characteristic shared by the TD group and the WS group.

Finally, the analysis of the types of errors confirmed the prediction of a specific profile of the adolescents with DS characterised by a greater tendency for

Omission errors than for Substitution errors. While the tendency for Omission of free and bound morphemes has been highlighted as a characteristic of the DS profile that is shared with SLI (Eadie et al., 2002), it is important to point out that our results confirm that the tendency for Omission is also significantly greater in the WS group than in the TD group (Diez-Itza et al., 2017). The adolescents with WS also showed a significantly higher frequency of Addition errors than the TD children. Furthermore, the relative proportion of Addition errors in the WS group (18.5%) was much higher than in the DS group (4.5%), which constituted the principal difference between the morphological profiles of WS and DS. Atypical substitutions and additions had been previously described in both syndromes (Vicari et al., 2002; Volterra et al., 1996).

The differences observed in the grammatical profiles of the WS and DS groups could not be explained in terms of preservation of grammatical morphology in WS. Furthermore, differences observed in DS would not only be of grade as suggested by Finestack and Abbeduto (2010) when comparing DS with FXS. On the contrary, the morphological profiles of the WS and DS groups presented differential characteristics compared to those of the 5-year-old TD children, and therefore they may not correspond to a developmental delay (Benítez-Burraco et al., 2017). The results observed in the adolescents with WS and DS seem more consistent with the hypothesis of trajectories or patterns of divergent development from early stages in which the specificities are not yet appreciated (Galeote et al., 2014; Karmiloff-Smith, 1998). In the same vein, the profiles of grammatical morphology observed in adolescence could be interpreted as a developmental outcome of early morphological and phonological processing deficits (Danielsson, Henry, Messer, Carney, & Rönnerberg, 2016; Lázaro et al., 2013).

Limitations of the study should be acknowledged. First, this was a preliminary study with a small sample size. Second, individual differences were not analysed even though they have repeatedly been described in DS and WS (Fabbretti et al., 1997; Stojanovik, Perkins, & Howard, 2006). Third, the choice of controls for studies of disordered groups remains controversial as TD controls matched for verbal age necessarily differ in many other aspects (Zukowski, 2005). Fourth, while the method based on the analyses of spontaneous speech samples provides an advantage regarding ecological validity, it is not exempt from limitations. In addition to the differences between participants regarding conversational contexts, grammatical production of individuals with intellectual disabilities is less complex in spontaneous speech contexts (Abbeduto, Benson, Short, & Dolish, 1995).

Conclusions

The results of the present study confirmed findings from many previous studies indicating that the linguistic profile of DS shows a specific impairment in grammatical morphology. In contrast to the interpretations suggesting a global and non-specific delay in grammar, it was observed that adolescents with DS presented atypical characteristics in the distribution of the part-of-speech categories and in the frequency of omission of free morphemes. Even though the rate of error was much lower in the WS group than in the DS group, the morphological profile of the WS group also presented certain atypical characteristics that were similar to those observed in the DS group, such as the high relative proportion of errors in free morphemes, while others could be specific, such as the high relative proportion of addition errors. Overall, although it would be necessary to take into account the individual differences, as well as those introduced by the method of elicitation, the results obtained are compatible with dynamic approaches that interpret the distinct morphological profiles of the adolescents with WS and DS as the outcomes of atypical trajectories of development.

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