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Narrative competence in Spanish-speaking adults with Williams syndrome

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Abstract

Background: Williams syndrome (WS) is a genetic disorder associated with intellectual disability and characterised by displaying an atypical neuropsychological profile, with peaks and valleys, where language skills seem better preserved than non-verbal intelligence. **Method:** This study researches the narrative competence of nine Spanish-speaking adults with WS. Oral narratives were elicited from a silent film, and narrative coherence was analysed as a function of sequential order of the events narrated at three structure levels, while narrative cohesion was assessed through the frequency of use and type of discourse markers. **Results:** WS subjects were able to remember a significant proportion of the events from the film, but coherence of narratives, i.e., sequential order of events, was more impaired. Consistently with their linguistic abilities, cohesion of narratives was better preserved, as they used discourse markers to introduce a high proportion of events. **Conclusions:** Construction of mental models of the narratives may be constrained in WS by non-verbal cognitive abilities, but narrative competence is also determined by textual pragmatic abilities to organize discourse, which should be addressed by specific intervention in narrative competence.

Keywords: Williams syndrome, oral narratives, coherence, discourse markers, Intellectual disability.

Resumen

Competencia narrativa en adultos hablantes de español con síndrome de Williams. **Antecedentes:** el síndrome de Williams (SW) es un trastorno genético asociado con discapacidad intelectual, que presenta un perfil neuropsicológico atípico, con picos y valles, donde las habilidades lingüísticas parecen mejor preservadas que la inteligencia no-verbal. **Método**: se investiga la competencia narrativa de un grupo de nueve adultos castellanohablantes con SW. Se elicitaron narraciones orales a partir de una película muda y se evaluó su coherencia narrativa en función del orden secuencial de los eventos narrados en tres niveles estructurales, así como la cohesión narrativa en función de la frecuencia y tipo de marcadores discursivos. **Resultados:** los sujetos con SW recordaban una alta proporción de los eventos de la película, pero la coherencia de las narraciones, i.e. el orden secuencial de los eventos, aparecía más alterada. En consonancia con sus habilidades lingüísticas, la cohesión de las narraciones aparecía mejor preservada ya que usaban marcadores discursivos para introducir muchos de los eventos. **Conclusiones:** la construcción de modelos mentales de las narraciones puede verse limitada en el SW por las habilidades cognitivas no-verbales, pero la competencia narrativa también está determinada por las habilidades pragmáticas textuales para organizar el discurso, que podrían abordarse mediante la intervención específica en la competencia narrativa.

Palabras clave: síndrome de Williams, narraciones orales, coherencia, marcadores discursivos, discapacidad intelectual.

Over the last twenty-five years, the cognitive sciences have become increasingly interested in people with Williams syndrome (WS). This neurodevelopmental disorder, with a prevalence of 1:7,500 live births, is due to a genetic abnormality generally caused by a submicroscopic deletion on the long arm of one of the copies of chromosome 7 (7q11.23), affecting approximately 26 contiguous genes.

In addition to certain physical and physiological characteristics of the WS phenotype such as dysmorphic facial features, elastin arteriopathy, auditory hyperacusis or delayed motor milestones, people with WS exhibit a behavioural and cognitive phenotype characterised by hypersociability, attention problems and a mild to moderate level of intellectual disability (Howlin, Davies, & Udwin, 1998). Early studies of WS described a neuropsychological profile characterised by an apparent dissociation between cognition and language, whereby notable linguistic abilities were evident despite severe cognitive deficits (Bellugi, Marks, Bihrle, & Sabo, 1988). More recently, WS has been characterised by an atypical neurocognitive profile, with "peaks and valleys", where moderate strength in verbal short-term memory contrasts with weakness in visuospatial construction (Bellugi, Lichtenberger, Jones, Lai, & St George, 2000).

WS people demonstrate a rather unusual profile within the domain of visuospatial cognition: on the one hand, they exhibit serious visuospatial and visuoconstructive impairments, exemplified by poor performance in tasks requiring understanding and manipulation of spatial elements like self-orientation, drawing

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or block construction (Pani, Mervis, & Robinson, 1999). On the other hand, their visuoperceptual functioning seems relatively unaffected, as they are surprisingly proficient in recognising faces and other objects from unusual perspectives or blurred images (Bellugi, Wang, & Jernigan, 1994; Farran & Jarrold, 2003).

Despite a certain degree of cognitive and linguistic heterogeneity (Porter & Coltheart, 2005; Stojanovik, Perkins, & Howard, 2006), WS is always associated with late onset of language, not only in relation to vocabulary and grammatical structures (Mervis & Robinson, 2000), but also in pre-linguistic elements of communication, namely gazing gestures and pointing, as compared with Down syndrome (DS) and typically developing (TD) children (John & Mervis, 2010). However, when they start using vocabulary in communication, their linguistic abilities develop rapidly, achieving relatively proficient competence compared to non-verbal abilities.

However, it seems that linguistic development in WS does not follow the typical trajectory, as subjects demonstrate persistent problems with grammatical gender, prepositions, tenses, verb-noun agreement and overgeneralization of grammatical rules (Diez-Itza, Antón, Fernández-Toral, & García-Pérez, 1998; Thomas et al., 2001; Volterra, Capirci, Pezzini, Sabbadini, & Vicari, 1996). Furthermore, research has shown that verbal abilities in WS may only reach a level comparable to that of non-verbal cognitive abilities (Karmiloff-Smith, Grant, Berthoud, Davies, Howlin, & Udwin, 1997). Several studies have questioned the idea of the conservation of linguistic abilities in WS, in particular at the pragmatic level (John, Dobson, Thomas, & Mervis, 2012; Laws & Bishop, 2004; Stojanovik, 2006).

Pragmatic abilities involved in conversational and narrative activities emerge early in typical development and may precede full mastery of morphosyntax (Diez-Itza, Snow, & Solé, 2001). On the contrary, late emergence of pointing in individuals with WS indicates that difficulty with pragmatic abilities might become apparent at early stages of verbal communication (Asada, Tomiwa, Okada, & Itakura, 2010).

The ability to tell a story or describe an event constitutes a basic pragmatic skill and therefore, narrative competence may be considered a main milestone in language acquisition (Ninio & Snow, 1996). Narrative discourse is a complex task involving the integration of information beyond the word level and requires individuals to remember concrete events and specific details, applying their knowledge of the world to construct a coherent structure of the narrative, where sequential order of events plays a key role. Research focusing on WS oral narrative tasks reported poor results for measures of narrative structure, mostly concerning coherence, where capacities of inference and integration are involved (Garayzábal-Heinze, Prieto, Sampaio, & Gonçalves, 2007; Lacroix, Bernicot, & Reilly, 2007; Marini, Martelli, Gagliardi, Fabbro, & Borgatti, 2010). Furthermore, it requires the narrator not only to remember reference information about plot and characters, but also to convey the evaluative aspect of the narrative, that is, their interpretation of the story (Shiro, 2003).

Research on WS narratives has reported a high use of evaluative and audience engaging devices (Losh, Bellugi, & Reilly, 2000; Reilly, Losh, Bellugi, & Wulfeck, 2004). In their narratives, children and young people with WS tend to use their linguistic abilities introducing discourse markers and exclamations to get the attention of the listener and usually include a higher proportion of inferences regarding the emotional state and the motivation of the characters than TD or DS subjects do (Marini et al., 2010). These characteristics, mostly concerning cohesion, helped to convey the idea that WS subjects could be 'natural story tellers' (Bellugi et al., 2000). More recent research indicates, however, limited cohesion in WS subjects compared with TD subjects showing more disfluencies, mainly hesitations, repetitions and pauses (Rossi, Sampaio, Gonçalves, & Giacheti, 2011).

Narrative competence in WS may then show areas of strength and weakness, as it involves different aspects of textual pragmatic abilities: both structural aspects of narrative organization, related to the construction of coherent discourse, and procedural aspects, related to the construction of cohesive discourse (Hickman, 2004).

The aim of this study was to evaluate both aspects of the narrative competence of WS young adults from an oral story generation task, using as measures of (i) narrative structure coherence and (ii) narrative cohesion the following:

(i) Coherence of WS narratives was assessed by means of the recall of sequential order of events (SOEs), one of the main aspects of narrative construction. Three levels of complexity in the narratives were considered: Basic level (Scenes), Intermediate level (Episodes), and Complex level (Events). To further assess if relationships could be found between narrative and visuospatial construction (i.e. recall of SOEs), a measure of local spatial processing was included (Block Design subtest).
(ii) Cohesion of WS narratives was evaluated by means of the use of discourse markers (DMs) to highlight the relationships throughout the plot and with the context. Two types of markers were considered: Progression markers and Interaction markers.

Since WS subjects present difficulties in global processing and inability to understand how a whole is made out of different parts appropriately organized (Bihrle, Bellugi, Delis, & Marks, 1989), it was expected that they would present significant deficits in narrative coherence as measured by SOEs. In contrast, as narrative cohesion is based on the use of linguistic devices, and taking into account the relatively good linguistic proficiency of WS subjects, it was expected that they would perform better in narrative cohesion as measured by DMs.

Method

Participants

The sample was composed of nine WS Spanish-speaking subjects (five females and four males), aged 18;03 – 39;04 (mean chronological age = 24;00 years, *SD* = 6;08 years) and with a mean Performance IQ (PIQ) of 70.44 (range 54 – 90, *SD* = 10.45). All subjects had been previously diagnosed with WS using the fluorescence *in situ* hybridization (FISH) test and presented the typical clinical phenotype. None of the participants had any detected hearing loss, or uncorrected visual impairment.

Instruments

Measures were obtained on receptive vocabulary, PIQ and Block Design subtest. Receptive vocabulary was assessed using the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1981). To determine PIQ, participants completed the Wechsler Adult Intelligence Scale (WAIS-III) (Wechsler, 1999).

In order to assess narrative production, the participants' narratives were elicited using the twelve-minute silent film "Frog Goes to Dinner", adapted from a text free book of the same series as the book "Frog, where are you?" (Mayer, 1974).

The choice of this oral narrative task was twofold. Firstly, the story involves a considerable number of characters expressing emotional reactions such as surprise, confusion or anger. Likewise, the task in itself demands an element of verbal production which depends on visuospatial memory and thus differs in an important way from the classic procedure employed to evaluate narrative skills using the book "Frog where are you?", which involves a more reduced cognitive spatial component and in which memory plays no role since the subject is not required to sequence the narrative in time and space. However, in the retelling of either a book story or a film the verbal codification will be not only mediated by the subject's perception and memorization of the scenes and actions of the characters, but also by his pragmatic abilities to produce a coherent and cohesive text relating the sequence of the events.

Procedure

Participants were tested individually in a quiet room at home in two non-consecutive sessions. After being administered the tests, each subject watched the film, only accompanied by the researcher. The researcher explained to each participant that they were going to watch a silent film and asked them to be very attentive because they had to narrate it later whilst being recorded on video. Participants were requested to be silent and not to ask any questions during the viewing of the film. Just immediately after watching the film, the researcher used the verbal prompt "Did you like the film?" followed by "Tell me about it" to start eliciting the narration and then provided minimal prompts throughout the storytelling. The narration was allowed to develop naturally; however, when the researcher felt that the storytelling failed to progress, she encouraged the participant to continue by asking some pre-prepared open-ended questions, as appropriate (e.g., "What happened then?"). If after such encouragement, the participant was unable to proceed autonomously with the narration, the researcher would then ask more specific open-ended questions (e.g., "And where did the frog go afterwards?").

Data analysis

A corpus of nine oral narratives was obtained. Each narration was transcribed according to the CHAT format from the CHILDES Project (MacWhinney, 2000) and ad hoc codes were designed to categorise the levels of narrative structure as well as the type of discourse marker used. Three levels of narrative structure were established:

a) Basic or general level, corresponding to the locations or spaces in which the story took place (5 scenes).
b) Intermediate or integrated level, which referred to the distinct episodes occurring within each scene and whose sequencing constituted the plot of the story (12 episodes).
c) Complex or specific level, which involved the logical sequence of all the events making up the story (40 events).

The recall of each level (scene, episode or event) was considered positive if the subject managed to remember some of the actions unfolding within them. The coding procedure for evaluating the SOEs assigned a number to each scene, episode, and event in the film, corresponding to its order in plot development. In parallel, the coding procedure for evaluating the use of DMs to mark events in the narratives, adapted from Diez-Itza & Miranda (2005), included a code of the type of DM (Progression vs. Interaction). Cohen's kappa was used to determine inter-rater reliability for coding of narrative structure ($\kappa = .991$; $p<.001$) and discourse markers ($\kappa = .971$; $p<.001$).

The transcripts were analysed using the CLAN programs provided by the CHILDES Project. Thus, lexical diversity was calculated using FREQ and mean length of utterance in words (MLUw) was computed using MLU. Statistical analysis was performed using SPSS for Windows (IBM SPSS Statistics 21).

Results

Sex and chronological age (CA) together with cognitive scores (PIQ and Block Design subtest of the Wechsler Intelligence Scales) and linguistic scores at lexical level (PPVT, Types, Tokens and Type-Token Ratio) and grammatical level (number of utterances and MLUw) are presented in Table 1.

Table 1
Participant's Sex and chronological age, Cognitive and Linguistic scores

Sex	CA	PIQ	BD	PPVT	Typ	Tok	TTR	Utter	MLUw
M	18;03.08	78	3	10;1	313	932	0.336	89	10.517
M	18;11.10	71	1	9;6	124	274	0.453	51	5.392
F	19;10.11	71	1	8;6	98	231	0.424	67	7.687
M	19;10.23	70	1	8;3	189	515	0.367	42	5.333
F	22;04.06	90	7	14;4	164	444	0.369	65	6.815
F	24;04.20	73	3	11;8	163	523	0.312	61	8.590
F	27;00.05	54	1	8;8	129	359	0.359	83	4.361
F	29;07.18	58	1	7;2	146	405	0.360	136	3.000
M	39;04.04	69	1	7;3	159	469	0.318	80	5.838

Note: CA: chronological age; PIQ: performance IQ; BD: Block Design; PPVT: Peabody Picture Vocabulary Test; Typ:Types; Tok:Tokens; TTR: Type/Token ratio; Utter: Utterances; MLUw: mean length of utterance in words

Table 2a
Percentage of event recall at the three narrative levels

	1	2	3	4	5	6	7	8	9	Mean (SD)
Basic level (Scenes)	100	100	100	100	100	100	100	60	100	95.55 (13.33)
Intermediate level (Episodes)	75	75	85	85	75	85	85	50	100	79.44 (13.56)
Complex level (Events)	50	48	48	32	52	69	52	25	55	47.89 (12.80)

Table 2b
Percentage of sequential order recall at the three narrative levels

	1	2	3	4	5	6	7	8	9	Mean (SD)
Basic level (Scenes)	50	70	62	70	58	83	46	34	70	60.33 (15.03)
Intermediate level (Episodes)	54	80	68	55	82	75	50	50	56	63.33 (12.99)
Complex level (Events)	50	85	71	78	95	79	49	59	83	72.11 (16.15)

Percentages of total recall and SOEs recall failed to correlate with cognitive measures or with linguistic measures. Frequency of use of DMs showed only correlation (r = .849, p<.01) with lexical diversity (TTR). Spatial cognition assessed through the Block Design subtest appeared as a specific deficit area within non-verbal intelligence as most subjects scored near floor. Furthermore, Block Design test scores correlated with PIQ (r = .811, p<.01). Relationships between the cognitive and linguistic domains were found with positive correlations between PIQ and scores in PPVT (r = .776, p<.01) and in MLUw (r = .639, p<.05).

The initial analysis of the narratives focused on the total recall of the three levels of the narrative structure, therefore not taking into account the SOEs. Table 2(a) records the percentage with which each participant recalled each of the three narrative levels. The joint evaluation of the three levels of narrative structure revealed that WS participants were able to remember 74.3%. Separate analyses of the three levels of narrative structure indicated that at Complex Level, subjects scored lower (47.89%) than at Intermediate Level (79.44%) and Basic Level (95.55%). Statistically significant differences were found between basic and intermediate levels (t = 5.889, p<.001), intermediate and complex levels (t = 8.094, p<.001), and basic and complex levels (t = 13.467, p<.001).

The subsequent analysis taking into account recall of the SOEs, as illustrated in Table 2(b), showed a lower percentage (65.25%) than that found for total recall, as would be expected. However, separate analyses of the three levels revealed an inverse pattern as the highest percentage of recall of the SOEs was seen at Complex Level (72.11%), followed by Intermediate level (63.33%) and Basic Level (60.33%). There were statistically significant differences between the complex level and basic (t = 2.762, p<.05) and intermediate (t = 2.509, p<.05) levels, but not between these last two levels.

As plotted in Figure 1, an interaction between recall and levels of complexity of narrative structure was therefore in operation with low complexity facilitating total recall but high complexity facilitating recall of SOEs. Statistical comparisons of the data showed significant differences between total recall and recall of SOEs at the three levels: basic (t = 8.916, p<.001), intermediate (t = 2.666, p<.05), and complex (t = -4.007, p<.01).

The analysis of use of DMs as cohesive devices showed that participants were able to linguistically mark up to 84.8% of the uttered events in their stories. Figure 2 represents the proportion of events marked by each participant. With the exception of two cases, the majority of subjects were able to mark a high proportion of events narrated. DMs with progression function were used in the WS narratives with a higher frequency (M = 27.89, SD = 9.06) than interaction markers (M = 6.22, SD = 5.95). A statistically significant difference was observed between the frequency in the use of progression and interaction function DMs (t = 5.469; p<.001).

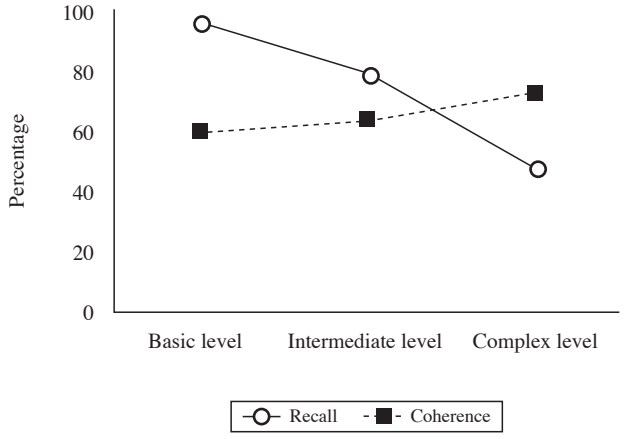

Figure 1. *Effect of complexity of recall versus coherence*

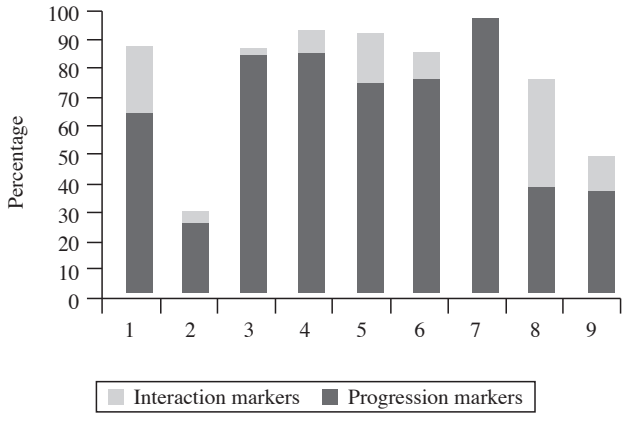

Figure 2. *Percentage of marked events and type of discourse markers*

Discussion

The first aim of this study was to evaluate coherence of WS oral narratives by means of the recall of sequential order of events (SOEs) at three levels of complexity: Basic (Scenes), Intermediate (Episodes), and Complex (Events). Although visuospatial memory could play an important role in the recall of the story, and WS subjects were a priori at a disadvantage, they were able to remember almost all of the scenes and half of the single events from the film. However, SOEs in their narratives was not so well preserved and a significant proportion of the events narrated did not follow the canonical order presented in the film, therefore affecting the coherence of the narratives produced by the subjects under study.

The fact that subjects were able to remember diverse elements or events but failed to organise them in the canonical order of presentation might be related to the specific difficulties in spatial cognition described as one of the prominent characteristics of WS neurocognitive profile, as has been found for comprehension tasks (Phillips, Jarrald, Baddeley, Grant, & Karmiloff-Smith, 2004). This relationship may be supported by the results of the present study, revealing that the narrative sequence was better preserved at the most analytical level (events), thus showing a tendency for local versus global processing. One of the first studies researching this issue had already pointed out that WS people had difficulties to organise the elements from a visual model, concluding that "they can see the trees, but not the forest" (Bihrle at al., 1989). This detailed-focused style of processing has been referred to in other developmental disorders such as the autistic spectrum disorder (Happé & Frith, 2006).

WS subjects in the present study scored near floor in the spatial processing Block Design subtest, thus confirming that block construction tasks are the weakest nonverbal ability in WS. Farran, Jarrold, & Gathercole (2001) found that performance in these tasks may relate to inability to use mental imagery, whereas processing style (local vs. global) would not differ from TD controls. Limitations in the coherent organisation of the events in narratives could be then related to construction of atypical visuospatial representations of the story. However, no correlation was found between Block Design scores and linguistic measures, or between Block Design and SOEs. Interpretation of these results may be limited by near floor scores in the Block Design subtest, so further research should be conducted to address this issue using alternative measures of spatial construction.

It may be argued that problems arise in the verbal expression of spatio-temporal representations but research indicates that nonlinguistic spatial deficits shown by children with WS have limited effects on their spatial language (Landau & Zukowski, 2003). The results from Landau & Hoffmann (2005) on the relationships between spatial representations and verbal expression in WS strongly suggest that WS children and adults, despite their specific profile of severe deficit in some aspects of spatial cognition, represent space like TD children, in terms of construction and use of reference systems to represent locations, as well as to talk about those locations. These authors nevertheless refer to developmental arrest in spatial language representing direction in WS subjects, as they did not perform better than TD 5-year-olds. This was interpreted as an indication of greater uncertainty and noise in WS spatial representations, which might lead to failure both to integrate over a relatively long distance and to linguistically map on such integration.

Limitations when integrating distant spatio-temporal relations could partially explain the interaction effect found in this study, where the SOEs narrated is poorer at the basic level of scenes, which are more distant, whereas it is proportionally higher at the more complex level of events, which are spatially and temporally immediate. This effect could be intensified by a non-linguistic bias serving as a building block for language (Lakusta & Landau, 2005). Over time, the subject attends sequentially to the components of an event, computing its spatial relationship at the end of it. Initial components of the event will be lost to memory, leaving end states as the most likely to survive. This bias might be reflected in a linguistic asymmetry, where final configuration of events tends to prevail. This is consistent with a tendency observed in previous research on WS narratives to progress rapidly towards the final scenes, episodes, and events of the story (Diez-Itza & Miranda, 2005; Garayzábal et al., 2007).

Relationships between "mental models" and the organisation of discourse have been addressed by classical experimental research on explanation of cognition (Johnson-Laird, 1993). Overall, empirical evidence suggests a careful distinction between underlying events and the representation of these events in discourse. The structure of a model therefore corresponds to the structure of the situation, not to the linguistic structure of discourse.

As Bruner (1991) pointed out, there is a great difficulty in distinguishing what may be called the narrative mode of thought from the forms of narrative discourse. He also argued that narrative comprises an ensemble of ways of constructing and representing the sequential, diachronic order of human events but what underlies the different forms of representing them is a "mental model", whose defining property is its unique pattern of events over time.

From that point of view, comprehension and production of narratives would involve not only the cognitive abilities to construct a mental model accounting for events occurring over time, but also textual pragmatic abilities to organise discourse following principles of immediate integration, completeness, and isomorphism in order to facilitate comprehension. Garnham, Oakhill, & Johnson-Laird (1982) found that referential contiguity of narratives had a strong effect on their re-construction and recall, independently of the cohesion introduced by linguistic devices.

The results concerning the cohesion of WS narratives, the complementary goal in the present study, are consistent with these findings. In spite of the lack of coherence found in narratives, due to alterations of the SOEs, the majority WS of subjects managed to introduce cohesion by means of linguistically marking and linking the elements of the story narrated. Most of the DMs used were progression markers, thus specific to the narrative task. Although it has been described that WS subjects use fewer interaction markers than DS subjects (Diez-Itza & Miranda, 2005), the low frequency of interaction markers found in this study may be strongly affected by the elicitation task. The fact that these SW subjects employed fewer interaction DMs could be directly related to absence of scaffolding provided by the listener, which could explain differences from previous studies on other Romance languages reporting a higher frequency of engaging mechanisms in WS (Gonçalves et al., 2010; Lacroix et al., 2007; Marini et al., 2010) and on English (Reilly et al., 2005; Stojanovik et al., 2001).

Narrative competence in WS may be then more impaired in terms of coherence, as related to the construction of mental

models and the organisation of discourse, than in terms of use of cohesive devices, in line with their relative strength in grammatical competence. The positive correlation found between use of DMs and lexical diversity (TTR) is consistent with this asymmetry of textual pragmatics in WS.

Although results in the present study do not support the initial hypothesis presenting WS as a case of cognition-language dissociation (Bellugi et al., 1988), since a positive correlation was found between PIQ and PPVT and MLU scores, they may help to describe the specificity of pragmatic impairment that has been observed in WS people despite their fairly proficient expressive language abilities and sociability (John et al., 2012; Laws & Bishop 2004; Stojanovik, 2006).

Previous studies about adequacy of conversation or understanding of metaphors (Stojanovik, Perkins, & Howards 2001; Sullivan, Winner, & Tager-Flusberg, 2003) argued pragmatic inability despite grammatical strength. However, these results involve enunciative and interactive pragmatic abilities, different from those of narrative production, based on textual pragmatics. The results of this study do not allow then to consider the ability to use linguistic cohesive devices independently of grammatical competence. Consequently, research in more depth is needed to further explore the nature of pragmatic impairment in WS, and other developmental disorders.

The results of the present study support the approach of Thomas & Karmiloff-Smith (2003), who related confirmed language alterations in genetic syndromes to basic cognitive processes and the type of learning difficulty presented by the subjects. More specifically, Phillips et al. (2004) found impaired comprehension of spoken spatial terms in WS, shedding light on the ways in which spatial cognition may interact with language performance in WS.

However, the results found here also point out that textual pragmatic impairment when organising discourse should be analysed at the interface between cognitive construction and narrative production. Thus, narrative competence in WS depends not only on non-verbal cognitive abilities but also on text organisation and cohesion abilities.

Pragmatic intervention focused on narrative production could then be essential to promote more effective communication in WS people, on the basis of their linguistic and social abilities (Mervis & John, 2010; Sullivan et al., 2003). The intervention could be based on the adaptation of different proposals (Hudson & Farran, 2013; Meyer & Ray, 2011), like the use of structure strategies to build coherence among the parts of text and the mental models, or the use of DMs and other linguistic cohesive cues as facilitators, in a parallel way as in spatial cognition tasks.

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