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## French Williams syndrome's ability to produce judgments of grammaticality



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### ABSTRACT

This article reports grammatical judgment data from eighteen French Williams syndrome (WS) (mean CA = 21.10; Mean MA = 11.2). Participants had to detect ungrammatical sentences (13 amongst a set of 26 sentences) in telling whether a given sentence was well said or not. Agrammaticality could be due to errors in tense, person agreement, gender agreement, derivational or inflectional morphology, word order and so on. As a group, WS participants scored as seven-year-olds did, far below CA-controls and MA-controls. Scores did not improve with chronological age or mental age but they were related to total IQ and verbal IQ. They showed an important variability, one similar to what was observed in four-year-olds. Although a few WS individuals had good metasyntactic abilities, these abilities generally plateau in our WS group. They were not deviant, however, as the WS's profile of difficulties across items was qualitatively very similar to the one seen in seven-year-olds.

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## 1. Introduction

Although linguistic abilities in individuals with Williams syndrome (WS) have been, and still continue to be, the topic of many experimental reports (see Brock, 2007; Mervis, 2006; Mervis & John, 2010, for reviews), far less attention has been devoted to metalinguistic abilities in this syndrome. In their seminal studies, Bellugi and colleagues (Bellugi, Marks, Bihrlle, & Sabo, 1988; Bellugi, Wang, & Jernigan, 1994) reported good metalinguistic abilities in WS. However, subsequent results on WS individuals' metaphonological, metasyntactic and metapragmatic abilities now seem to portray a rather different picture. WS's metalinguistic abilities have been shown to be below those of CA-controls and more in line with those of MA-controls, with a higher variability across individuals than the one seen in TD groups. They have also been said to be initially delayed, to develop at a slower rate than in controls and to even plateau as to never reach CA-controls' level (Lacroix, Aguert, Dardier, Stojanovic, & Laval, 2010; Mervis, 2009; Zukowski, 2001). In this article we first review the available evidence on WS' metalinguistic abilities. We then report data pertaining to one aspect of French WS individuals' metalinguistic abilities, namely, their ability to detect ungrammatical sentences.

Bellugi et al. (1988) tested three WS adolescents aged 11–16 (with IQs ranging from 49 to 54) on their ability to detect agrammaticality in subcategorization features, phrase structure rules and pronoun use. Participants were able to detect ungrammatical sentences and to supply more correct alternatives, which, the authors claimed, demonstrated 'a sophisticated awareness of the constraints that determine syntactic well-formedness' (p. 189). In a subsequent report, Bellugi et al. (1994) presented results from metalinguistic tests given to 10 WS adolescents aged 10–20 (Bellugi, Bihrlle, Neville,

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Jernigan, & Doherty, 1992; Bellugi, Bihrlé, Jernigan, Trauner, & Doherty, 1990). Tasks involved sentence completion, sentence correction, and the correct completion of syntactically complex tag questions. WS participants clearly outperformed Down syndrome participants and their scores in the sentence completion task and the sentence correction task reached a high level of accuracy (Bellugi et al., 1994, Fig. 2b).

However, a study by Zukowski (2001) shows that WS's metasyntactic abilities might not be as good as claimed by Bellugi and colleagues. Zukowski used a grammatical judgment task to assess WS participants' knowledge of the legal versus illegal distributional contexts for the negative polarity item *any* or its positive counterparts *some*. Ten WS participants aged 10–16.3 (mean CA = 12.5) and 8 MA-controls aged 4.6 to 7.6 (mean CA = 6.6) were tested. In addition to experimental sentences with *any* or *some*, participants were also given sentences with normal versus jumbled word order, acting as filler items. Participants were asked to judge whether sentences were good or bad. Results showed that WS participants were generally more willing to accept ungrammatical sentences (i.e., false alarms) than MA-controls, for both filler items and experimental items, although the difference was significant in only one condition out of 7 (i.e., the one involving *any* in affirmative contexts). WS participants and MA-controls showed very similar profiles and the same hierarchies of difficulty across conditions although the WS group showed a higher variability in the rate of false alarms. A small scale follow-up study with four adults with WS (with ages 18, 27, 29, 30) showed that none of them matched the performance of the adult control group ( $N = 12$ ). Younger WS's metasyntactic skills thus seem barely at their MA-controls' level and the adult data further suggest that they might plateau.

Considering metaphonological skills in WS, Mervis (2009) showed that WS's performance in phonological awareness tasks was actually not that good and showed important variation across individuals. Fifty-five WS participants aged 6.03–12.9 (mean CA = 8.89) were given the phonological processing subtest from DAS-II (Elliott, 2007) which is normed for ages 5–12. This test measures phonological awareness through a variety of skills such as rhyming, blending, deletion, and phoneme identification and word segmentation. As a group, WS scored below the mean for the general population ( $T$  score = 40 vs.  $T$  score = 50), although 14 WS individuals (25%) scored at or above the mean. WS's scores were not correlated with CA and they showed a variability ( $SD = 13.28$ ) much higher than the one observed in the general population ( $SD = 2.15$ ).

As part of their study on French WS's comprehension of idioms, Lacroix et al. (2010) presented data bearing on WS's metapragmatic abilities. They examined whether participants were able to provide appropriate explanations for the conventional use of the idioms whose comprehension was assessed in a first phase of the experiment. Nineteen WS individuals aged 7.4–17.4 (mean CA = 12.2; mean verbal mental age = 7.6) and thirty-nine children aged 6.0–9.10 (mean CA = 7.9; mean VMA = 7.9) were tested. Results showed that WS's performance was generally in line with that of VMA-controls. Further analyses showed that performance increased with VMA in both groups, although with a delayed onset and at a slower rate in the WS group.

Taken together, the results summarized so far suggest that WS's metalinguistic abilities might be no better than those of MA-controls. They would be characterized by a delayed onset of development, a higher variability across individuals, a slower rate of development, and, possibly, a plateau. This is a provisional extrapolation, however: It is of course currently unknown how metalinguistic abilities in WS should eventually be best characterized. These might turn out to be reducible to a general ability that it is relatively independent of what it bears on. Alternatively, they might happen to be a juxtaposition of specialized and differentially skilled meta-abilities. Further data on WS's metasyntactic abilities are thus obviously needed. First, Bellugi et al.'s and Zukowski's WS studies pointed to different conclusions and both samples were rather small. Second, the Zukowski' study only spoke to a very circumscribed set of syntactic phenomena, which raises the issue of generalization. Third, whether metasyntactic development in WS might be a protracted process or whether it might plateau is an issue that must be addressed: The actual rate of metasyntactic development in this syndrome is currently unknown and Zukowski's negative results in 4 WS adults deserve replication attempts (recall that both Bellugi et al.'s and Zukowski's main WS samples were in the 10–20 age range).

In this article, we therefore examine French WS adolescents' and adults' (aged 15–29) ability to detect and identify ungrammatical sentences. We ask whether a relatively high level of accuracy in responses could be found in such an age group of WS or whether our WS group's scores would still be no better and possibly lower than those of MA-controls. If metasyntactic abilities in WS are subject to an extremely delayed development our WS participants' scores should be a function of chronological or mental age. Alternatively, if those abilities depends primarily on the severity of the impairment and thus are likely to plateau in some individuals or in the group as such, no such relationship should be found: Rather, metasyntactic scores should be related to IQs. Finally, in keeping with the latter prediction and with a recurrent finding in the WS literature, we should observe an important variability in WS's metalinguistic scores (as Mervis, 2009, found on phonological awareness): There should be WS individuals with very good metalinguistic abilities (something which Bellugi et al. found) but also WS individuals with very poor such abilities.

## 2. Method

### 2.1. Participants

A total of 18 adolescents and adults with WS and 81 typically developing (TD) children, adolescents and adults participated in the experiment. The WS participants were 10 females and 8 males aged 15.1–29.5 ( $M = 21.10$ ,  $SD = 4.6$ ). Their IQ scores (WISC-R, Wechsler, 1996) were as follows: Verbal IQ ranged from 45 to 86 ( $M = 57.5$ ), performance IQ ranged from

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