Language in Italian Children With Down Syndrome and With Specific Language Impairment

Maria Cristina Caselli
Institute for Cognitive Sciences and Technologies

Laura Monaco and Manuela Trasciani
Children's Hospital Bambino Gesù

Stefano Vicari
Children’s Hospital Bambino Gesù and Libera Università Maria SS. Assunta

This article compares lexical and grammatical abilities of a mental-age-matched sample of Italian preschoolers with Down syndrome (DS), specific language impairment (SLI), or typical development. Results showed that the children with DS or with SLI performed significantly worse than did the typically developing children. Although no significant differences emerged in lexical abilities and morphosyntactic comprehension abilities between the children with DS or with SLI, significant differences did emerge in morphosyntactic production capacities. Qualitative analysis of the morphosyntactic errors revealed strong similarities between the two groups. The results are discussed in terms of the role of verbal memory abilities and the linguistic features of Italian.

Keywords: lexical repertoire, morphosyntactic difficulties, nonverbal cognition

The language abilities of children with Down syndrome (DS) and of children with specific language impairment (SLI) have generally been studied separately, and different theoretical and methodological approaches have often been adopted. However, an analysis of previous studies reveals many analogies in the linguistic profiles of the two groups of children. What remains to be clarified is to what extent this similarity depends on biological factors and if and to what extent it is linked to characteristics of the children’s native language.

Children With DS

DS is the most frequent genetic cause of intellectual disability and involves about one child in a thousand live births (Steele, 1996). Besides generalized cognitive delay, the neuropsychological profile of children with DS is characterized by a lack of developmental homogeneity between cognitive and linguistic abilities, with a greater impairment of the latter than of the former. In fact, many authors have observed that the linguistic abilities of children with DS are poorer than what is expected on the basis of their overall cognitive level. Further, in the linguistic domain, several studies have found specific dissociations among the various components of language, which differ depending on the chronological and mental ages of the children with DS. In early developmental stages, verbal comprehension seems consistent with more general cognitive abilities. This ability becomes progressively poorer with respect to the children’s level of cognitive development, though it continues to outpace the children’s language production.

Previous studies on children with DS who are acquiring different languages (e.g., English, French, or Italian) have shown that some aspects of morphosyntax are more impaired than are other aspects, such as lexical repertoire (Chapman, 1995; Fabbretti, Pizzuto, Vicari, & Volterra, 1997; Rondal, 1995; Vicari, Caselli, & Tonucci, 2000). In many cases, the spontaneous language of individuals with DS remains telegraphic, with a much reduced use of functors (articles, prepositions, pronouns, etc.). Many authors have hypothesized that specific deficits in the morphological area cannot be entirely due to the cognitive deficit but depend on perceptual–articulatory problems, which frequently affect children with DS and cause atypical construction of morphophonological representations (for a review of this topic, see Chapman, 1995; Vicari et al., 2004). This profile is similar to the one often reported as characteristic of children with SLI.

Children With SLI

Following criteria and definitions of the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; American Psychiatric Association, 1994), SLI is defined as a condition in which the acquisition of normal linguistic abilities is disturbed from the beginning and in which no neurological damage, sensory deficits, mental retardation, alterations in physiological mechanisms of speech, severe personality disorders, or environmental factors can be found. Children with SLI present various degrees of difficulty in comprehension, production, and use of language, in one or all of
the following linguistic components: phonology, semantics, syntax, and pragmatics (Bishop & Leonard, 2000). The development of these children varies over time in relation to the severity and persistence of their linguistic impairment (Bishop, 1992; Leonard, 1998).

In spite of the great variability observed among children with SLI, within every language, a common set of errors can be identified in the linguistic profiles of these children. For example, English-speaking children have particular difficulty in mastering production of the past tense (formed with -ed) and the irregular forms of the third person singular (i.e., has, does; Bedore & Leonard, 1998; Conti-Ramsden, 2003). These aspects, however, are different from those identified in Italian children with SLI. In the latter group, the weakest areas are articles, pronouns, the copula, and the use of the third person plural of verbs (Bortolini, Caselli, Deevy, & Leonard, 2002; Bortolini, Caselli, & Leonard, 1997; Leonard, Bortolini, Caselli, & Sabbadini, 1993). Some authors have hypothesized that the crosslinguistic differences found in children with SLI may depend on the phonetic, prosodic, and morphological characteristics of different languages. Specifically, for languages that are morphologically richer, greater differences have been observed in the errors and/or substitutions produced by children (Leonard, 1998, 2000).

**Direct Comparisons of Language Abilities in Children With DS and With SLI**

The common characteristics of the morphosyntactic deficit described in children with DS and children with SLI, for both English and Italian children, are theoretically important, because they bear directly on the issue of the nature of the linguistic profile of children with SLI and the extent to which the profile is unique to this population. Two recent studies on English-speaking children directly compared the linguistic abilities of children with DS, children with SLI, and children with typical development (TD), matched for mean length of utterance (MLU), calculated in morphemes (Eadie, Fey, Douglas, & Parsons, 2002), or for nonverbal cognitive abilities (Laws & Bishop, 2003). The results showed that, overall, there were no significant differences between children with DS and children with SLI, and the performance of both groups was significantly inferior to that of children with TD. In the DS and the SLI groups, verbal production was more impaired than comprehension and vocabulary was more preserved than grammar (Laws & Bishop, 2003). Both groups showed striking difficulties in evaluation of morphology and in phonological memory. Despite these similarities, subtle differences emerged. For example, the children with SLI tended to omit verbal inflections, whereas the children with DS tended to produce more incorrect forms (Laws & Bishop, 2003). Moreover, detailed analyses of abilities related to the individual morphemes studied showed different profiles for the two groups. The authors suggested that the results support the hypothesis of a close relationship between weak phonological memory and the grammatical difficulties observed.

The linguistic strengths and weaknesses of children with DS or with SLI found in English speakers should be examined among speakers of other languages. For example, the morphosyntactic demands that English places on the language learner may differ from those imposed by other languages. Hence, the especially weak morphosyntactic skills (relative to lexical skills) seen in these children, or the similar levels seen for the DS and the SLI groups, may not be generalizable to other languages. In light of these findings, our aim in this study was to compare production and comprehension among Italian children with DS, with SLI, or with TD who had been matched for mental age. Such a comparison in Italian-speaking children is important, given the grammatical complexity of the language and the previously documented differences between Italian and English in the specific aspects of grammar that are impaired. The comparison may also help us understand to what extent the cognitive deficit in Italian children with DS influences their mastery of grammar. In particular, we wished to determine both quantitatively and qualitatively whether the groups of children differed in their mastery of lexical and morphosyntactic skills.

On the basis of the evidence presented above, we predicted that the children with DS and the children with SLI would have poorer morphosyntactic skills than would members of the TD group. We also predicted that among the Italian children, unlike the English-speaking children, those with DS would perform worse than would those with SLI. This prediction was based on the assumption that intellectual impairment is responsible for atypical neuropsychological profiles, which are characterized by weak cognitive abilities that are strictly related to language acquisition and mastery, and that this weakness in cognitive abilities could have a greater effect for children who are acquiring and gaining mastery of the Italian language, which is grammatically more complex than is English.

**Method**

**Participants**

Participants included 64 children: 16 children with DS, with chronological age (CA) between 6.7 and 14.2 years; 16 children with SLI, with CA between 3.5 and 5.7 years; and 32 children with TD, with CA between 3.8 and 5.7 years, who formed a control group. The participants with DS or with SLI came from the Children’s Hospital Bambino Gesù of Santa Marinella, Rome, where they were included in clinical and rehabilitative follow-up programs. All individuals lived with their own families. The sample was selected on the basis of the following criteria. For the group of children with DS, the criteria included (a) presence of a free trisomy 21, (b) absence of neurosensory deficit, (c) absence of epilepsy or focal neurological impairments, and (d) no severe emotional or behavioral disorders. Inclusion criteria for the group of children with SLI were (a) a normal cognitive level (IQ equal to or above 90) and (b) performance below the expected mean for CA (–2 SD or lower) on one or more of the language tests used for diagnostic identification: the MLU on the Phrase Repetition Test of Devescovi and Caselli (2001) and scores on the Italian standardization of Goodglass and Kaplan’s Boston Naming Test (1972; Riva, Nichelli, & Devoti, 2000). In addition, no child showed motor or sensory problems or severe emotional or behavioral disorders.

All of the children with TD exhibited a normal cognitive level (IQ ≥ 90) and normal hearing and oral–motor function, and they displayed no signs of neurological impairment or of psychopathological disorders. All were full-term, monolingual preschoolers, and the families were from the middle social–educational class.
Each child with DS was individually matched with a child with SLI and 2 children with TD on the basis of mental age. Data relative to the participants are reported in Table 1.

Instruments and Procedures

The three groups of children were given the same tests. For evaluation purposes, the children with DS and the children with SLI were examined in the hospital on two occasions across a period of approximately 1 week. Each session lasted 30–50 min. The children with TD were examined individually at school. All of the observations were carried out after formal consent was obtained from participants and their families.

As this research focused on comparisons between groups of children matched for mental age, each child included in the study was administered the following test battery. This battery was selected on the basis of its appropriateness for children with mental age in the preschool range and was scored accordingly.

Mental age. The mental age of all children with DS or with TD was evaluated with the Stanford–Binet Scale (Terman & Merrill, 1964), in the version adapted and validated on a large sample of 735 Italian children and adolescents (Bozzo & Mansueto Zecca, 1993). The mental age of 8 of the children with SLI was assessed with the Italian adaptation of the Stanford–Binet Scale (Bozzo & Mansueto Zecca, 1993), whereas the other 8 children were evaluated with the Leiter International Performance Scale (Leiter, 1979) in the version adapted and validated on a sample of 200 Italian preschoolers (Porfiri, Quieti, Grimaldi, & Zoccolotti, 1985). These intelligence scales, which provide both IQ and mental age, allowed us to use the same instruments for all participants tested, as they have been validated for all the mental ages that we considered (3.7–5.7 years). Previous studies have reported a high correlation between Stanford–Binet Scale and Leiter Scale global scores (r = .78; Atkinson, Bevc, Dickens, & Blackwell, 1992; Bradley-Johnson, 2001).

Lexical comprehension. The Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1981) evaluates lexical comprehension. The original version of the test was administered to each group. Each child was asked to choose the figure that corresponded to the word pronounced by the examiner from four alternatives. Because 3 of the 16 children with DS refused to conclude the task, we calculated the percentage of correct responses on the basis of the total number of words included in the test.

Table 1

Demographic Characteristics of Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>DS (n = 16)</th>
<th>SLI (n = 16)</th>
<th>TD (n = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Chronological age</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>M (SD)</td>
<td>9.9 (3.7)</td>
<td>4.7 (0.6)</td>
<td>4.7 (0.6)</td>
</tr>
<tr>
<td>Range</td>
<td>6.7–14.2</td>
<td>3.5–5.7</td>
<td>3.8–5.7</td>
</tr>
<tr>
<td>Mental age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (SD)</td>
<td>4.6 (0.7)</td>
<td>4.6 (0.6)</td>
<td>4.7 (0.6)</td>
</tr>
<tr>
<td>Range</td>
<td>3.7–5.6</td>
<td>3.7–5.7</td>
<td>3.9–5.8</td>
</tr>
</tbody>
</table>

Note. DS = Down syndrome; SLI = specific language impairment; TD = typical development.

Lexical production. The Boston Naming Test (BNT; Goodglass & Kaplan, 1972; Riva et al., 2000) is a test of lexical production. The test comprises figures that correspond to words used with both high and low frequency. Each child was asked to name one figure at a time, without any help. There was no time limit. Scores were calculated by summing all of the correct responses. The test was terminated after the child had made six consecutive errors.

Morphosyntactic comprehension. The Linguistic Comprehension Test (LCT; Rustioni, 1994) is used for verification of the morphosyntactic comprehension of children between 3.8 and 8 years of age. The test comprises 78 illustrated cards, which correspond to the 78 sentences. Each card contains four drawings, representing the target and three foils, for a total of 312 drawings. Different types of sentences are used and are subdivided into simple and more complex utterances. Only words used with high frequency are adopted to construct the sentences. The types of sentences in this test include coordinated conjunctions, reflexive, reversible/syntactic order, negative, passive, relative, double negative, time, time (during), causal question, final question, conditional, adverbial, adjectives (name adjectives), verbs, and simple and compound (prepositions + article) prepositions.

The child is requested to indicate the drawing on the page that corresponds to the sentence pronounced by the examiner. A sliding procedure is adopted, in which an initial set of items is selected for presentation on the basis of the child’s mental age. If the child responds correctly to this set of items, the examiner proceeds to the next set. If the child fails to do so, the examiner presents the previous item set. Testing was discontinued and the score was calculated on the basis of procedures outlined in the manual. There was no time limit for each child’s responses, and breaks were given as needed.

Morphosyntactic production. The Phrase Repetition Test (PRT; Devescovi & Caselli, 2001), which involves repeating words and sentences, evaluates the morphological and syntactic aspects of the sentences repeated by children. Only words used with high frequency are included, so that unfamiliar words do not influence repetition. The test comprises 51 items (plus 3 practice items); each item is presented with a corresponding figure, for a total of 24 syntagms (article + noun) and 27 sentences.

The following grammatical categories are included: male and female singular and plural nouns; singular and plural definite articles (except for the articles lo and gli, which are restricted to narrow phonetic contexts and are not often used by young children); subject plus singular and plural verbs in the present indicative; modifiers; adjectives and adverbs; the simple prepositions (i.e., to and in); and article plus preposition items (i.e., to the and on the).

The 24 syntagms are subdivided as follows: 6 feminine singulars (e.g., la matita [the pencil]); 6 feminine plurals (e.g., le matite [the pencils]); 6 male singulars (e.g., il gatto [the cat]); and 6 male plurals (e.g., i gatti [the cats]).

According to the model of propositional complexity proposed by Parisi and Antinucci (1973) and adapted to language development by Taeschner and Volterra (1986), the 27 sentences are subdivided as follows: 3 sentences with nominal or adjectival predicate (e.g., la banana è buona [the banana is good]); 6 sentences with a predicate (singular or plural) with one argument (e.g.,...
il bimbo corre [the child runs]); 6 sentences with a predicate with two arguments (e.g., il bambino mangia la cioccolata [the child eats the chocolate]); 6 sentences with a predicate with three arguments (e.g., Luca mette la palla sul tavolo [Luca places the ball on the table]); 6 sentences with a predicate with one or two arguments and one element not included in the predicate’s meaning, such as a noun modifier (e.g., il cane guida la macchina rossa [the dog drives the red car]) or an adverb (il cane corre forte [the dog runs fast]).

In our study, the test was administered after an initial practice phase, during which the first three test items were presented. The test administration was videotaped. After the child was shown the figure, the examiner pronounced the corresponding sentence and asked the child to do the same. If the child did not repeat the stimulus figure at the first presentation, he or she could try a second time before moving on to the next sentence.

We evaluated test performance by considering the following: total number of sentences repeated; number of sentences repeated correctly; MLU of sentences repeated both correctly and incorrectly; total number of omissions and percentage of omissions in each grammatical category (articles, nouns, verbs, prepositions, and modifiers); and number of errors, substitutions, and insertions for each grammatical category.

**Statistical Analyses**

Data were analyzed with the Statistical Package for Windows, Version 5.0. We performed several analyses of variance (ANOVAs) with group (DS, DSL, or TD) as an independent variable and tests as dependent variables. Recall that the hypotheses of the study were that on each of the measures, the children with DS would perform more poorly than the children with SLI, who, in turn, would perform more poorly than the children with TD. Such precise and directional predictions differ from the situations in which correction procedures are warranted, namely, initial comparisons in which the pattern and direction of likely differences are unknown and specific predictions are not offered; in such situations, one must guard against Type I errors when multiple comparisons are being made. In case of homogeneity of variance, Tukey’s post hoc test was applied. When Levene’s test demonstrated that the homogeneity of variance hypothesis was not met, the Games–Howell test was chosen.

**Results**

**Mental Age**

No significant differences in mental age emerged among the groups on this measure, \( F(2, 61) = 0.14, p = .87 \). The children with DS were on average 4 years older than were the children in the other two groups. Thus, despite their comparable mental ages, they would have had more exposure to language than would members of the other two groups. CA therefore needs to be taken into account when interpreting the results. The mean scores, SDs, and ranges of results obtained by all groups of children in the different linguistic tasks submitted are summarized in Table 2.

**Lexical Comprehension and Production**

In lexical abilities, the groups differed in the percentage of words understood as well as in the number of words produced.

| Table 2: Mean Scores, Standard Deviations, and Ranges of the Results Obtained in the Different Linguistic Tasks |
|-----------------------------------------|--------|--------|--------|
| Linguistic task                        | DS     | SLI    | TD     |
| **Lexical: Comprehension and production** |        |        |        |
| PPVT (% words correctly understood)    |        |        |        |
| \( M (SD) \)                           | 28.3 (7.0) | 27.9 (7.4) | 35.1** (12.0) |
| Range                                  | 16.6–45.1 | 16.6–39.4 | 17.7–60.6 |
| BNT (No. words correctly produced)     |        |        |        |
| \( M (SD) \)                           | 15.1 (5.6) | 15.9 (3.8) | 20.4*** (6.4) |
| Range                                  | 6–25    | 8–20   | 7–36   |
| **Morphosyntactic: Comprehension and production** |        |        |        |
| LCT (No. sentences correctly understood) |        |        |        |
| \( M (SD) \)                           | 10.1 (6.0) | 18.7 (10.0) | 40.8*** (21.8) |
| Range                                  | 2–20    | 5–43   | 7–71   |
| PRT (% sentences correctly repeated)   |        |        |        |
| \( M (SD) \)                           | 54.1 (27.1) | 74.7 (21.7) | 97.4*** (4.0) |
| Range                                  | 4.2–96.1 | 13.7–98.0 | 86.0–100.0 |
| PRT (Mean length of utterances repeated) |        |        |        |
| \( M (SD) \)                           | 2.7 (0.6) | 3.2 (0.3) | 3.4*** (0.06) |
| Range                                  | 1.3–3.4 | 2.5–3.4 | 3.2–3.5 |

**Note.** DS = Down syndrome; SLI = specific language impairment; TD = typical development; PPVT = Peabody Picture Vocabulary Test; BNT = Boston Naming Test; LCT = Lexical Comprehension Test; PRT = Phrase Repetition Test. * \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \). (All \( p \)s are for group main effect.)

\( F(2, 61) = 4.00, p = .02, \) and \( F(2, 61) = 6.1, p = .004, \) respectively. Post hoc comparison showed that in comprehension (PPVT) as well as in production (BNT), both the children with DS and the children with SLI performed worse than did the participants with TD \( (p < .05 \) and \( p < .04, \) respectively, for comprehension; \( p < .03 \) and \( p < .03 \) for production). In both tasks, the children with DS and the children with SLI were similar \( (p = .99 \) for comprehension, \( p = .90 \) for production).

**Morphosyntactic Comprehension and Production**

The groups differed in the mean score of sentences correctly comprehended on the LCT, \( F(2, 61) = 21.5, p < .0001 \). Post hoc comparison demonstrated that the TD group performed better than did the DS group \( (p < .0001) \) and the SLI group \( (p < .001) \). Instead, no significant difference emerged comparing the children with DS and the children with SLI \( (p = .3) \).

Morphosyntactic production was assessed with the PRT (Devescovi & Caselli, 2001). Several different measures were applied to the children’s responses on this test. Two of these, sentences correctly repeated and MLU, are discussed in this section. The groups differed in the percentages of correct sentences repeated, \( F(2, 61) = 34.3, p < .0001 \). The post hoc comparison showed that the children with SLI performed better than did the children with DS \( (p = .004) \) and that both the children with DS and the children with SLI performed worse than did the participants with TD \( (p < .0001 \) and \( p < .001, \) respectively).
In accordance with the norms of the PRT (Devescovi & Caselli, 2001), the MLU was determined for each child. Specifically, all the elements present in the utterances repeated were summed and the MLU (that is, the ratio between the sum of all the elements and the number of utterances produced) was calculated (see Table 2). Significant difference emerged between the groups considered, \( F(2, 61) = 23.5, p < .0001 \). A post hoc comparison showed that the children with DS produced shorter utterances than did the children with SLI \( (p = .001) \) and that both groups produced shorter utterances than did the participants with TD (all \( ps < .0001 \)).

To summarize, in all these measures, the children with DS and the children with SLI performed significantly worse than did the children with TD. The lexical repertoire in comprehension and production of the children with DS was comparable with that of the children with SLI. Similarly, the morphosyntactic comprehension of the children with DS was comparable with that of the children with SLI. However, the morphosyntactic production abilities of the children with DS appeared significantly poorer with respect to those of the children with SLI.

**Error Analysis of Morphosyntactic Production Responses**

The total number of errors (substitution, number, gender, and omissions) were analyzed (see Figure 1). A two-way analysis of variance (ANOVA), with group as an independent variable and type of error (omission; substitution of gender; substitution of number; substitution within a form class, such as choice of the wrong preposition) as a repeated measure factor, revealed that the main effect of group was significant, \( F(2, 61) = 36.3, p < .00001 \). A post hoc comparison showed that the children with DS made more errors than did the SLI children \( (p = .001) \), who, in turn, made more errors than did the participants with TD \( (M = .40, SD = .70, p = .01) \). The main effect of type of error was also significant, \( F(3, 183) = 55.3, p < .00001 \), with more omissions than there were substitution, gender, or number errors.

The Group × Type of Error interaction was also significant, \( F(6, 183) = 23.9, p < .00001 \). Post hoc analyses revealed that this effect was due only to the number of omissions made by the children with DS, which was higher than the number of omissions made by the children with SLI \( (p < .0001) \). The children with SLI, in turn, showed more omissions than did the participants with TD \( (p = .0001) \).

We then analyzed the sentence production data in more detail. Due to the high number of omissions observed in both the children with DS and the children with SLI, we looked at the percentages of articles, nouns, verbs, modifiers, and prepositions present in the test and omitted by the three groups. Specifically, a two-way ANOVA was performed, with group as an independent variable and grammatical category (articles, nouns, verbs, modifiers, and prepositions) as a repeated measures factor (see Figure 2).

This analysis revealed that the main effect of group was significant, \( F(2, 61) = 34.7, p < .00001 \). The children with DS made

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**Figure 1.** Phrase Repetition Test: Total number of each type of error for each group; vertical lines depict standard errors of the means. DS = Down syndrome; SLI = specific language impairment; TD = typical development.
more omissions than did the children with SLI \((p = .0001)\), who, in turn, made more omissions than did the participants with TD \((p = .03)\). The main effect of grammatical category was also significant, \(F(4, 244) = 45.5, p < .00001\), which indicates a greater percentage of omission of elements from some categories than from others. A post hoc comparison showed that articles and prepositions were omitted more frequently than were verbs \((p = .0002\) and \(p = .00002\), respectively) and modifiers \((p < .0001\) and \(p < .001\), respectively). Moreover, verbs were omitted more frequently than were nouns \((p = .0002)\). Also, the Group \(\times\) Grammatical Category interaction was significant, \(F(8, 244) = 15.9, p < .00001\). A post hoc analysis we performed to qualify this interaction showed that, relative to the children with SLI and the children with TD, the children with DS omitted a significantly higher number of articles, verbs, and prepositions \((p < .0001\) in each case), whereas no difference was found for nouns and for modifiers. Moreover, the children with SLI omitted more articles and prepositions than did the children with TD \((p < .0001\) in each case). No difference was found for nouns, verbs, and modifiers.

On the basis of this finding, we performed another analysis that evaluated the omission of articles in syntagms and in sentences to determine the degree to which sentence length affected the number of omissions. An ANOVA revealed a significant difference among the three groups, \(F(2, 61) = 23.7, p < .00001\). The DS group made more errors than either the SLI group \((p = .0005)\) or the TD group \((p = .0001)\). No differences emerged, however, between the SLI and the TD groups \((p = .08)\).

It also emerged that the children made more omissions of articles in sentences than in syntagms, \(F(1, 61) = 59.6, p < .00001\). The Group \(\times\) Trial interaction was also significant, \(F(2, 61) = 22.0, p < .0001\) (see Figure 3). A post hoc analysis we performed to qualify this interaction showed that the children with DS or with SLI (but not with TD) omitted more articles in sentences than in syntagms \((p < .01\) in both groups). Moreover, the children with DS made more omissions than did the children with SLI or with TD in syntagms and in sentences (all \(ps < .01\)), and the children with SLI omitted more articles than did the children with TD in sentences \((p = .0001)\) but not in syntagms \((p = .4)\).

The similarity between the two groups of children with language impairment was not limited to difficulty with function words. As reported above, the children examined were generally successful in including grammatical inflections for number and for gender. For example, the stimulus *Il cane guida la macchina rossa* [The dog drives the red car] was often repeated by the children as *cane guida macchina rossa* [dog drives red car], with the omission of the function words and the inclusion of the appropriate noun, verb, and adjective inflections.

**Discussion**

In the present study, we investigated linguistic abilities in Italian children with DS or with SLI who were matched for mental age. Language in these two groups was also compared with language in children with TD who were matched for mental age. Although differences in chronological age were evident between the children with DS and the members of the other two groups, our aim was to determine similarities and differences in the linguistic profiles of children with DS or with SLI at comparable mental age levels.
Furthermore, we were interested in determining the role of general cognitive components in influencing the linguistic profiles of these two groups of children. Specifically, we studied comprehension and production of lexicon and grammar and also analyzed the types of errors the children made on a sentence repetition task.

In general, the children with DS and the children with SLI in our groups displayed significantly poorer overall linguistic performance than did the children with TD matched for mental age. The vocabulary repertoire in comprehension and production was significantly worse for members of the DS and the SLI groups than it was for the children with TD. This finding contrasts with data reported on younger children with DS (Vicari et al., 2000) or with SLI (Leonard, 1998). In early developmental stages, the lexical competence seems consistent with more general cognitive abilities, as expressed by mental age. However, lexical ability becomes progressively poorer with respect to the children's level of cognitive development. In addition, our results confirmed specific morphosyntactic deficit in production as well as in comprehension, in both groups of children with respect to the participants with TD, as already described by many authors.

Direct comparison of language abilities between children with DS and children with SLI revealed strong similarities in some linguistic areas. Specifically, the lexical repertoire in comprehension and production of the children with DS was comparable with that of the children with SLI. In morphosyntactic abilities, both groups showed similar performance in comprehension but not in production, in which the children with DS appeared significantly worse with respect to the children with SLI.

In the repetition task, the profile of errors and omissions was qualitatively similar in the two groups with respect to function words. This profile may be related to the fact that free grammatical morphemes have scarce semantic content and are short and not accented (Simone, 1988). These characteristics make it much more difficult to perceive and identify free grammatical morphemes than other parts of speech, and they obviously also influence the ability to produce (or reproduce) these elements. In agreement with other authors (Leonard, 1998; Tallal, 2000; Tallal et al., 1996), we believe that the specific deficits in the morphological area (and, in particular, in free morphology) are due to the perceptual problems that often characterize children with DS or with SLI. These problems affect the rapid processing of acoustic events (for example, verbal strings, phonemic sequences, rhythms in sequence) and thus cause atypical construction of morphophonological representations. According to the auditory-processing deficit account of Tallal et al. (1996), the surface grammatical symptoms of language deficit arise because a temporal processing deficit may disrupt the "normal sharpening of neurally represented phonetic prototypes" for the language that children with SLI are learning (Tallal et al., 1996, p. 82). This atypical process might negatively influence the language development in both receptive and expressive domains. In other words, the characteristics of the morphosyntactic deficit in children with language impairment may primarily reflect basic processing constraints rather than a defect in linguistic competence. The data we have discussed so far are in substantial agreement with those reported in studies on English-speaking children with DS or with SLI (Eadie et al., 2002; Laws & Bishop, 2003), and they provide new information about difficulties with grammar among children in these two populations. However, the parallel findings of this study and those studies that focused on English should not be interpreted as reflecting a universal linguistic profile.
for both DS and SLI. In this study, our Italian-speaking participants made greater use of grammatical inflections but exhibited more difficulties with free morphology than did the English-speaking children with DS or with SLI. Such cross-linguistic differences (even if evidenced only through an indirect comparison) make the similarities between the Italian children with DS or with SLI even more important, because they constitute converging evidence rather than a mere replication of earlier works.

Besides these similarities, in our study, significant differences also emerged between the two groups of children with language impairment for some grammatical aspects. When we made a more thorough analysis of the children’s morphosyntactic abilities in the repetition task, it emerged that MLU was significantly lower in the children with DS than in the children with SLI. When we compared the percentages of correct productions and the distribution of omissions in reproducing the various elements of the sentence in the repetition test, we also observed that the children with DS omitted a significantly higher number of functors and verbs.

The observed differences in linguistic abilities between the children with DS and the children with SLI may be attributed to differences in neuropsychological profiles. Although the two groups were matched for mental age, they are known to have very different IQ levels and distinct neuropsychological profiles. Unlike children with SLI, children with DS show impairment in multiple cognitive areas, such as phonological working memory, semantic long-term memory, executive functions, and reasoning (Vicari, 2006), which may influence their performance in repetition trials of words and sentences. In particular, the marked difficulties shown in some grammatical areas can be attributed to the reduced functioning of short-term memory. In fact, it has been extensively documented that individuals with DS show poor verbal short-term memory on span tasks compared with that shown by mental-age-matched children with TD (Jarrold, Baddeley, & Hewes, 1999; Vicari, 2006). In light of the working memory model developed by Baddeley (Baddeley, 1986; Baddeley & Hitch, 1974), this deficit seems to be independent of the articulatory difficulty often presented by children with DS. Instead, greater responsibility should be attributed to a poorly functioning phonological buffer or, even more so, to deficits of the central executive system (Jarrold et al., 1999; Vicari & Carlesimo, 2002; Vicari et al., 2004). In light of the above considerations, the finding that the differences between the two groups in our study were greater than those found in studies of English-speaking children could be due to the morphosyntactic demands placed on children by the language itself. Specifically, Italian is more grammatically complex than English and may thus pose greater difficulties for those mastering the language.

The higher number of omission errors for the children with DS than for the children with SLI may reflect a more general difficulty in remembering sentences; this could be due to the fact that Italian words generally have more syllables than do English words, which makes sentences longer and more difficult to remember. The complexity and the length of the sentences produced by preschool children in spontaneous production as well as in repetition tasks are predicted by memory span (Blake, Austin, Cannon, Lisus, & Vaughan, 1994). Moreover, the complex relationship existing between verbal memory and language development is widely documented in the literature (Baddeley, Gathercole, & Papagno, 1998).

In summary, the results of the current study may be attributed to the reduced neuropsychological functionality of the children with DS in comparison with the relatively preserved functionality of the children with SLI. This finding further confirms the role of the cognitive component in linguistic processing. Although attractive, this interpretation must still be verified, as we did not directly evaluate the verbal short-term memory abilities of the children examined in this study. Further research, including evaluation of this aspect, in larger populations of children would be necessary to confirm and extend the results of the present study.

We believe that studying these areas in Italian-speaking children provides a very interesting opportunity because of the phonetic and prosodic characteristics of Italian, as well as its morphological richness. These characteristics can demonstrate differences in the linguistic profiles of children with different pathological pictures that cannot easily be shown in children who are learning languages with different morphosyntactic characteristics. From a practical point of view, these data can provide invaluable information that will help educational psychologists and teachers plan rationally grounded interventions to alleviate the difficulties with language and with social adjustment experienced by these individuals. The theoretical importance of comparative studies on language disorders in different clinical populations may lie in what they reveal about the role of chronological age and how different cognitive and perceptual capacities affect the process of language development, which is a different issue than the independence of different domains of the brain.
Merrill [Italian adaptation of the Stanford–Binet Intelligence Scale, Form L-M in the Terman–Merrill revision]. Florence, Italy: Organizzazioni Speciali.


