# THE RELEVANCE OF A NONWORD REPETITION TASK TO ASSESS INDIVIDUALS WITH DOWN'S SYNDROME PHONOLOGICAL SHORT-TERM MEMORY.

Annick COMBLAIN*

* University of Liège, Laboratory of Psycholinguistic
Boulevard du Rectorat, 5 (Bât. B32)
B-4000Liège (Belgium).
Tel.: +/32/(0)4/366.20.07
Fax: +/32/(0)4/366.29.06
e.mail: A.Comblain@ulg.ac.be

## ABSTRACT

Phonological short-term memory capacity is generally measured with a word span task or a digit span task. Another way to measure it is to use a nonword repetition task. Gathercole and Adams (1993) claimed that this procedure can be used with children as young as two-years old. It seems that in normally developing children the quality of nonword repetition is influenced both by the nonwords length and by their degree of wordlikeness. Can individuals with Down's syndrome phonological short-term memory be assessed with a nonword repetition task ? In order to answer this question, we decided to replicate Gathercole and collaborators' experiments (1991,1993) but with individuals with Down's syndrome. The quality of nonword repetition in individuals with Down's syndrome is, as in normally developing children, influenced both by the nonwords' length and by their degree of wordlikeness. Furthermore, our results seem to confirm the hypothesis according to which nonwords are temporarily stored in the phonological short-term memory system. As this system has a limited capacity, subjects (normally developing children and people with Down's syndrome) recall more short nonwords than long nonwords. In conclusion, nonword repetition is a reliable task allowing to assess phonological short-term memory in individuals with Down's syndrome as well as in normally developing children.

## INTRODUCTION

Gathercole and Baddeley (1990) and Gathercole, Emslie, Willis and Baddeley (1991) suggested that nonword repetition allows a purer measure of short-term memory abilities than classical memory span tasks (i.e., digit span and word span). The probability that subjects use their lexical knowledge in order to facilitate the recall is higher in the case of digits and familiar words than in the case of non-familiar phonological forms such as nonwords. This assertion has been discussed by some researchers (cf. Snowling, Chiat & Hulme, 1991; Hulme Maughan & Brown, 1991) and it is generally accepted that lexical knowledge also influences the quality of nonword repetition (see Gathercole, 1995 and Baddeley, Gathercole & Papagno, 1998 for a review of the literature). Gathercole, Emslie, Willis and Baddeley (1991, 1992) and Gathercole (1995) suggested that the relationship between nonword repetition and lexical knowledge can be explained in two different ways. The first explanation is called the linguistic hypothesis : children with high lexical knowledge are able to repeat more nonwords than children with low or limited lexical knowledge. They assumed that children with high lexical knowledge can benefit from the presence of familiar phonological segments (assimilated to some morphemes of their first language) in the nonwords in order to facilitate repetition. Children with low lexical knowledge cannot benefit in the same way from these segments. According to this hypothesis, the lack of morpheme knowledge limits the nonword repetition performance. This hypothesis seems to be reinforced by the research of White, Power and White (1989) who showed that children often used familiar morphological components in order to guide the semantic interpretation of non-familiar words. The second explanation is called the mnesic hypothesis : subjects used the short-term memory representations of nonwords (or of the non-familiar phonological forms) to build permanent lexical representations of the phonological forms.

In order to test these two hypothesis, Gathercole and collaborators created a list of 40 nonwords. The nonwords differed one from the others by several features: the length (1 to 4 syllables), the articulatory complexity (composed of single consonants or of consonantic clusters) the degree of resemblance with a real English word (note on a graduated 5 level scale) and the number of lexical and grammatical morphemes contained in the nonwords. If the mnesic hypothesis is correct, the shorter nonwords will be the most easily repeated (according to the word length effect; Baddeley, Thomson & Buchanan, 1975; Baddeley, 1986). If the linguistic hypothesis is correct, the number of familiar segments contained in the nonwords will influence the quality of the repetition. In other terms, the more "wordlike", the nonwords are, the better they will be repeated. Gathercole and collaborators think that a third situation can occur: nonword length and linguistic familiarity can both influence the quality of repetition. In such a case, one will be confronted with a more complex model in which nonword repetition will be influenced both by phonological short-term memory abilities and by the subjects' lexical knowledge. This is effectiveley what Gathercole and collaborators found.

If nonword repetition is a reliable test of young children's short-term memory abilities, one might ask wether this task is equally relevant to test individuals with Down’s syndrome short-term memory abilities. In her 1998's study, Laws showed that nonword repetition is a reliable pmeasure of phonological short-term memory in children and adolescents with Down's syndrome. Futhermore, she noticed that nonword repetition performance in subjects with Down's syndrome can predict language comprehension and reading ability. Nevertheless, two more questions can be asked regarding the nonword repetition task: 1] How is the quality of nonword repetition in individuals with Down’s syndrome related to the length, to the degree of wordlikeness, and to the structural complexity ? In other words, do phonological short-term memory capacity, long-term lexical learning and articulatory competence respectively influence

the accuracy of nonword repetition ? 2] Is the pattern of results obtained by individuals with Down's syndrome the same than the one observed in normally developing children ? In other words, is nonword repetition in Down's syndrome also influenced both by the length and the degree of wordlikeness ?

## METHOD

### - Participants :

Thirty six subjects with Down's syndrome were individually tested. All were native French speakers. Their chronological age (CA) ranged from 6 years and 10 months to 42 years and 10 months (mean: 19;8 years-old). Their mental age (MA) ranged from 3 years 2 months to 7 years 8 months (mean: 4;4 years-old). The mental age was calculated with the Echelles Différentielles d'Efficience Intelectuelle (E.D.E.I.; Perron-Borelli, 1974). The subjects can be distributed in three sub-groups according to their chronological age.

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Insert Table about 1 here

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### - Procedure :

Subjects were asked to repeat 40 nonwords composed of 1, 2, 3 or 4 syllables (see Appendix for the list of nonwords).

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Insert Figure about 1 here

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The nonwords were orally presented. Half contained single consonants and half consonants in clusters. The subjects were asked to repeat each nonword immediately after the examiner. A

nonword was considered as correct if it was repeated without any omission, substitution or addition of sound. Systematic sound distorsions (i.e. sigmatism) were not considered as errors.

The nonwords were evaluated for their degree of resemblance with real French words (degree of "wordlikeness") by twenty normal French speaking adults. The task was to estimate on a five level graduated scale the degree of wordlikeness of each nonword. A score of "1" represented a low level of wordlikeness and a score of "5" represented a high degree of wordlikeness.

- RESULTS:

The mean repetition score of the whole group was 16.97 nonwords (standard deviation - SD- : 10.21). The mean repetition score of the children with Down's syndrome was 11.00 nonwords (SD: 2.52), the score of the adolescents was 18.71 nonwords (SD: 10.21) and the score of the adults was 18.64 nonwords (SD: 11.39).

In all statistical analysis the significant level was fixed at $p<0.05$. When it was indicated, we used an a-posteriori Newman-Keuls test (comparison of means).

A significant correlation between the subjects MA and their nonword repetition performance ($r = 0.67$, $p<0.0001$) was observed but no significant correlation was found between CA and nonword repetition performance.

## Influence of the phonological short-term memory factor: nonword length

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Insert Figure 2 here

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As can be seen in Figure 2, subjects repeated more short nonwords than long nonwords. More precisely, the most accurately repeated nonwords contain 1 or 2 syllables and single

consonants. The nonwords containing more than 2 syllables and consonant clusters are the less accurately repeated.

### *The whole group*

We conducted a two way ANOVA on our data. The dependent variable was the "percentage of correct repetitions", the first independent variable was the "nonwords length" (4 levels: 1, 2, 3, or 4 syllables) and the second independent variable was the "consonant complexity" (2 levels: single consonant, consonant cluster). We observed a significant effect of the variable "nonword length" [$F(3,32) = 22.66$, $p<0.0001$)], a significant effect of the variable "consonant complexity" [$F(1,32) = 8.35$, $p<0.01$], and a significant interaction between both variables [$F(3,32) = 3.00$, $p<0.05$].

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Insert Table 2 here

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A-posteriori comparisons of the means show that one and two syllable nonwords are better repeated that three and four syllable nonwords ($p<0.01$ in each case). The mean repetition scores for one and two syllable nonwords are not statistically different. The mean repetition scores for three and four syllable nonwords are not statistically different.

Nonwords containing single consonants (mean: 48.24 %, SD: 27.65) are better repeated ($p<0.01$) than nonwords containing consonantic clusters (mean: 35.81 SD: 17.25).

There is a significant interaction between the variable "nonwords length" and the variable "nonword complexity".

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Insert Table 3 here

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The mean values shown in Table 3 were compared with Newman-Keuls a-posteriori tests.

1. Nonwords of the same length but of different consonant complexity: One and two syllable nonwords containing single consonants are better repeated than one and two syllable nonwords containing consonantic clusters (respectively, $p<0.05$ and $p<0.01$). Repetition scores for three and four syllable nonwords containing single consonants do not differ significantly from repetition scores for three and four syllable nonwords containing consonantic clusters.

2. Nonwords of the same consonant complexity but of different length: The mean percentage of correct repetitions for one and two syllable nonwords containing single consonants do not differ significantly. The mean percentage for correct repetitions of three and four syllable nonwords containing single consonants do not differ significantly. One and two syllable nonwords containing single consonants are better repeated than three and four syllable nonwords containing single consonants ($p<0.01$ in each case). One syllable nonwords containing consonantic clusters are better repeated than three and four syllable nonwords (respectively $p<0.05$ and $p<0.01$). The other means do not differ significantly.

### *The subgroup of children*

The same two way ANOVA taht was previously conducted on the whole sample, was repeated for the children sub-group data. There was a significant effect of the variable "nonword length" [$F(3,32) = 13.98$, $p<0.0001$)] and a significant effect of the variable "consonant complexity" [$F(1,32) = 6.52$, $p<0.05$]. There was no significant interaction between the two variables.

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Insert Table 4 here

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A-posteriori comparisons of the means shows that one and two syllable nonwords are better repeated that three and four syllable nonwords ($p<0.01$ in each case). The mean

repetition scores for one and two syllable nonwords do not differ significantly. The mean repetition scores for three and four syllable nonwords do not differ significantly.

Subjects repeat more nonwords containing single consonants (mean: 35.56 %, SD: 35.80) than nonwords containing cluster consonants (mean 19.44 %, SD: 20.35) ($p<0.01$). The absence of significant interaction between the variable "nonword length" and the variable "nonword complexity" does not allow us to conduct an a-posteriori mean comparison test on our results. However, Table 5 shows that the mean percentages of correct repetitions tend to decrease as the number of syllables and the nonwords complexity increase.

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Insert Table 5 here

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***The subgroup of adolescents***

The same two way ANOVA that was previously conducted, was again conducted on the adolescents subgroup data. There was a significant effect of the variable "nonword length" [$F(3,32) = 14.58$, $p<0.0001$)]. Contrarily to what we observed in the two previous groups, there was no significant effect of the variable "consonant complexity". There was no significant interaction between the two variables.

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Insert Table 6 here

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A-posteriori comparisons of the means show that one and two syllable nonwords are better repeated that three and four syllable nonwords ($p<0.01$ in each case). The mean

percentages of repetition of one and two syllable nonwords do not differ significantly. The mean percentages of repetition of three and four syllable nonwords do not differ significantly.

There is no significant effect of the variable "consonant complexity". Nonwords containing single consonants are as well repeated as nonwords containing consonantic clusters. For information, let's note that the mean percentage of correct repetitions for simple nonwords was 50.72 % (SD: 27.80) and the mean percentage of correct repetition for complex nonwords was 42.86 % (SD: 23.18). The difference of 7.76 % between the two means is not statistically significant. The absence of significant interaction between the variable "nonword length" and the variable "nonword complexity" does not allow us to conduct an a-posteriori means comparison test on our. However, Table 7, shows that the mean percentages of correct repetitions tend to decrease for one and two syllable nonwords as complexity increase.

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Insert Table 7 here

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***The subgroup of adults***

We conducted a final two ways ANOVA on the data from the subgroup of adults. The dependent variable was the "percentage of correct repetitions", the first independent variable was the "nonword length" (4 levels: 1, 2, 3, or 4 syllables) and the second independent variable was the "consonant complexity" (2 levels: single consonant, consonant cluster). We observed a significant effect of the variable "nonword length" [$F(3,32) = 16.51$, $p<0.0001$)], a significant effect of the variable "consonant complexity" [$F(1,32) = 11.28$, $p<0.005$]. In this case, a significant interaction between the two variables was observed [$F(3,32) = 3.42$, $p<0.05$].

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Insert Table 8 here

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A-posteriori comparisons of the means (Newman-Keuls test) showed that one and two syllable nonwords were better repeated that three and four syllable nonwords ($p<0.01$ in each case). The mean percentages of repetition of one and two syllable nonwords do not differ significantly. The mean percentages of repetition of three and four syllable nonwords do not differ significantly.

Subjects repeat more nonwords containing single consonants (mean: 53.93 %, SD: 27.37) than nonwords containing cluster consonants (mean 39.29 %, SD: 13.01) ($p<0.01$).

As noted, there is a significant interaction between the variable "nonword length" and the variable "nonword complexity". So, a-posteriori tests (Newman-Keuls) were conducted in order to compare the different means.

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Insert Table 9 here

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1. Nonwords of the same length but of different consonant complexity: One and two syllable nonwords containing single consonants are better repeated than one and two syllable nonwords containing consonant clusters ($p<0.01$ in each case). Concerning three and four syllable nonwords, the degree of consonant complexity (single consonants or clusters) does not influence the accuracy of the repetition.

2. Nonwords of the same consonant complexity but of different length: The mean percentages of correct repetitions of one and two syllable nonwords containing single consonants do not differ significantly. The mean percentages of correct repetitions of three and four syllable nonwords containing single consonants do not differ significantly. One and two syllable nonwords containing single consonants are better repeated than three and four syllable nonwords

containing single consonants ($p<0.01$ in each case). One syllable nonwords containing consonant clusters are better repeated than three and four syllable nonwords ($p<0.01$ in each case). The other means do not differ significantly.

## Influence of the linguistic factor: nonwords wordlikeness

In the previous analysis, we see that the quality of nonword repetition is influenced by the nonwords' length but one cannot exclude that the quality of nonword repetition is also influenced by the subject's lexical knowledge. In this view, phonological forms can be stored in the phonological memory and representations coming from the lexicon can also be added in the phonological memory. So, the percentage of correct repetitions can be influenced both by a phonological memory factor (nonword length) and by a linguistic factor (nonword wordlikeness).

We conducted Pearson correlations between percentages of correct repetitions, non-words length and degree of wordlikeness.

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Insert Table 10 here

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In the whole group as in children, adolescents and adults, there iwass a positive correlation between the percentage of correct repetitions and the degree of wordlikeness of the nonwords. As expected given results of the previous analysis, there is a negative correlation between the percentage of correct repetitions and the nonwords' length (the longer nonwords are, the poorer they are repeated). It is important to note that a negative correlation was observed between the nonwords' length and the degree of wordlikeness ($r = -0.45$, $p<0.003$). So, the longer the nonwords were, the less they sounded like a real word.

In order to determine the real percentage of the variance of the repetition scores

explained by the degree of wordlikeness, partial correlations were conducted on these data. Once the variance due to the nonwords' length has been controlled, the degree of wordlikeness still explains 39.69 % of the variance of the repetition scores in the whole group (32.04 % in the children sub-group, 29.94 % in the adolescents sub-group and 33.87 % in the adults sub-group). So, the influence of the nonwords' wordlikeness on the percentage of correct repetitions is not onsolelyly due to the fact that longer nonwords are less wordlike.

## CONCLUSION

The longer nonwords are, the poorer they are repeated. This is consistent with the phonological short-term memory hypothesis. Gathercole, Willis, Emslie and Baddeley (1991) provided evidence for that hypothesis with young normally developing children. Our data with individuals with Down's syndrome also seem to support this hypothesis.

In their 1991 experiment, Gathercole et al. obtained superior repetition scores for two syllable nonwords than for one syllable nonwords. This is a surprising result which does not fit with the phonological short-term hypothesis. Gathercole et al. explained this result in the following way. One syllable nonwords were consonantly more complex than two syllable nonwords : one syllable nonwords contained fricative and affricate phonemes while two syllable nonwords mainly contained occlusive phonemes. Despite this phenomenon and given the important nonword length effect observed for the other nonwords, Gathercole et al. considered that their results are consistent with the phonological short-term memory hypothesis. In our experiment, we tried to control the phonemic variable. Consequently, we did not observed this difference between one syllable and two syllable nonwords. The mean repetition scores of these two sets of nonwords were not significantly different.

Contrarily to Gathercole et al. (1991), we did not observe a significant difference between three and four syllable nonwords repetition scores. Nevertheless, repetition scores for three syllable nonwords are higher than repetition scores for four syllable nonwords (+7.30% for the whole group, +8.89% for the children, +8.57% for the adolescents and +5.00 % for the adults). We do not think that this phenomenon constitute a problem for the phonological short-term memory hypothesis. Effectively, this pattern of results can be explained in the following way : three and four syllable nonwords both exceed individuals with Down's syndrome short-term memory capacity, so they are equally badly repeated. Therefore, as Gathercole et al. did for their subjects, we conclude that the longer the nonwords are, the poorer they are repeated.

In our experiment, we also studied the "wordlikeness" effect on nonword repetition accuracy. We noted that the effect of length is independent of the effect of wordlikeness. Thus, it appears that the influence of nonword length is not based on a linguistic factor such as the degree of wordlikeness. These results are qualitatively similar to those obtained by Gathercole et al. (1991) with normally developing children. In their 1991's study, Gathercole et al. considered a second linguistic factor: the number of grammatical morphemes present in the nonwords. As is the case for the first linguistic factor (the degree of wordlikeness) the second linguistic factor does not influence the nonword length effect. Finally, the consonant complexity (single consonants or clusters) of the nonwords influences the repetition scores (expect in the subgroup of adolescent). In other words, the articulatory programs' complexity used to construct and produce the nonwords significantly influences the repetition accuracy.

At the end of the study, it appears that the mnesic factor (the length) is more important in a nonwords repetition task than the linguistic factors (consonant complexity and number of "grammatical" morpheme). Concerning the degree of wordlikeness, we must be more careful. It appears (Gathercole, 1995) that the degree of wordlikeness of the nonwords can be

an important factor influencing repetition accuracy. Our results and those of Gathercole and collaborators (1991) indicate that highly wordlike nonwords are better repeated than low wordlike nonwords. Furthermore, in her 1995's paper, Gathercole stressed the strong relationship between classic memory span and nonword repetition. Then, she concluded that there is a common underlying phonological short-term memory factor in the two tasks.

In conclusion, it seems that nonwords repetition is a reliable task allowing to assess phonological short-term memory in individuals with Down's syndrome as in normally developing children. The pattern of results we find is similar to the one obtained by Gathercole et al. (1991, 1993) with normally developing children. Then, it appears that nonwords repetition which is a more simple task than classical span tasks, can be used to assess individuals with Down's syndrome phonological short-term memory.

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**Table 1.** Details of the three groups.

| | | Group | | |
|---|---|---|---|---|
| | | **Children (N=9)** | **Adolescents (N=13)** | **Adults (N=9)** |
| **Chronological age (years;months)** | Mean | 9;2 | 18;5 | 28;8 |
| | Range | 6;10-11;3 | 14;5-21;8 | 22;3-42;10 |
| **Mental age (years;months)** | Mean | 3;5 | 5;1 | 4;8 |
| | Range | 3;1-3;7 | 3;6-7;8 | 3;3-5;11 |

**Table 2:** Mean percentages of correct repetitions according to the nonword length (standard deviation).

| | | |
|---|---|---|
| **Length:** | **1 syllable** | 63.51 % (17.20) |
| **Length:** | **2 syllables** | 55.14 % (19.16) |
| **Length:** | **3 syllables** | 38.38 % (12.95) |
| **Length:** | **4 syllables** | 21.08 % (13.59) |

**Table 3:** Mean percentages of correct repetitions according to the nonword length and the consonant complexity. (standard deviation).

| | Complexity: single consonants | Complexity: consonant clusters |
|---|---|---|
| **Length: 1 syllable** | 74.59 % (11.87) | 52.43 % (14.75) |
| **Length: 2 syllables** | 69.19 (16.28) | 41.08 % (8.20) |
| **Length: 3 syllables** | 27.57 % (5.86) | 19.19 % (18.47) |
| **Length: 4 syllables** | 21.62 % (18.82) | 20.54 % (7.78) |

**Table 4:** Mean percentages of correct repetitions according to the nonword length (standard deviation) in the sub-group of DS children.

| | |
|---|---|
| **Length: 1 syllable** | 53.33 % (28.11) |
| **Length: 2 syllables** | 41.11 % (32.73) |
| **Length: 3 syllables** | 12.22 % (9.73) |
| **Length: 4 syllables** | 3.33 % (7.50) |

**Table 5:** Mean percentages of correct repetitions (standard deviation) according to the nonword length and the consonant complexity in the sub-gourp of DS children.

| | Complexity: single consonants | Complexity: consonant clusters |
|---|---|---|
| **Length: 1 syllable** | 66.67 % (26.06) | 40.00 % (25.58) |
| **Length: 2 syllables** | 60.00 (36.52) | 22.22 % (13.61) |
| **Length: 3 syllables** | 13.33 % (9.30) | 11.11 % (11.11) |
| **Length: 4 syllables** | 2.22 % (4.97) | 4.44 % (9.94) |

**Table 6:** Mean percentages of correct repetitions according to the nonword length (standard deviation) in the sub-group of DS adolescents.

| | |
|---|---|
| **Length: 1 syllable** | 67.14 % (14.75) |
| **Length: 2 syllables** | 62.86 % (17.10) |
| **Length: 3 syllables** | 32.86 % (20.26) |
| **Length: 4 syllables** | 24.29 % (19.69) |

**Table 7:** Mean percentages of correct repetitions (standard deviation) according to the nonword length and the consonant complexity in the sub-group of DS adolescents.

| | Complexity: single consonants | Complexity: consonant clusters |
|---|---|---|
| **Length: 1 syllable** | 72.86 % (11.74) | 61.43 % (16.45) |
| **Length: 2 syllables** | 74.29 (11.95) | 51.43 % (13.74) |
| **Length: 3 syllables** | 30.00 % (9.31) | 35.71 % (28.58) |
| **Length: 4 syllables** | 25.72 % (26.05) | 22.86 % (13.74) |

**Table 8:** Mean percentages of correct repetitions according to the nonword length (standard deviation) in the sub-group of DS adults.

| | |
|---|---|
| **Length: 1 syllable** | 66.43 % (19.94) |
| **Length: 2 syllables** | 56.43 % (16.31) |
| **Length: 3 syllables** | 34.28 % (12.05) |
| **Length: 4 syllables** | 29.28 % (17.96) |

**Table 9:** Mean percentages of correct repetitions (standard deviation) according to the nonword length and the consonant complexity in the sub-group of DS adults.

| | Complexity: single consonants | Complexity: consonant clusters |
|---|---|---|
| **Length: 1 syllable** | 81.43 % (12.97) | 51.43 % (12.78) |
| **Length: 2 syllables** | 70.00 (10.59) | 42.86 % (5.05) |
| **Length: 3 syllables** | 34.28 % (10.59) | 34.29 % (14.64) |
| **Length: 4 syllables** | 30.00 % (26.44) | 28.57 % (5.05) |

**Table 10:** Correlations between the percentage of correct repetitions, nonword length and nonword wordlikeness.

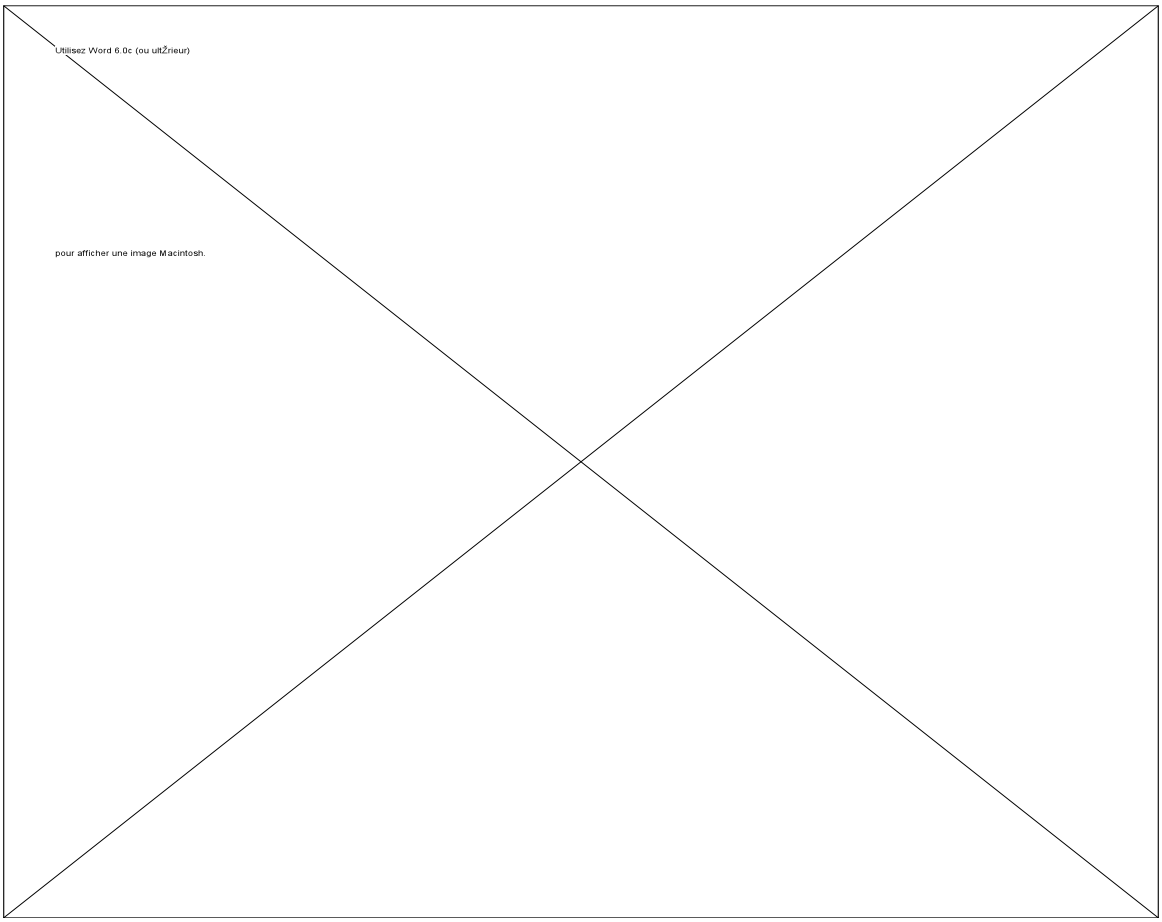
| | | Length | Wordlikeness |
|---|---|---|---|
| **Percentage of correct repetitions** | **Whole group** | - 0.74 ** | 0.71 ** |
| | **Children** | - 0.68 ** | 0.65 ** |
| | **Adolescents** | - 0.70 ** | 0.65 ** |
| | **Adults** | - 0.68 ** | 0.66 ** |

Significant level accepted $p<0.05$

**Figure 1.** Nonwords structure.

| 40 nonwords | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20 with single consonants (at the initial, middle and final of the nonwords) | | | | 20 with consonant clusters (at the initial, middle and final of the nonwords) | | | |
| 1 syllabe | 2 syllabes | 3 syllabes | 4 syllabes | 1 syllabe | 2 syllabes | 3 syllabes | 4 syllabes |

**Figure 2:** Percentage of correct repetition in the three sub-groups of DS subjects according to the nonword length and the articulatory complexity (sc = single consonant, cc = consonant cluster).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## Appendix.

## Appendix. Nonwords list.

| One syllable nonwords | Three syllable nonwords |
|---|---|
| bo | moubano |
| jou | lurissin |
| poif | bipeva |
| leu | takodon |
| uf | gauzico |
| bro | upticou |
| ort | chauprouto |
| bji | abrova |
| icht | dzipfoba |
| vlou | olchavra |

| Two syllable nonwords | Four syllable nonwords |
|---|---|
| taudon | toukoupinlan |
| minu | dépéguilin |
| cussi | fonvopouri |
| paveu | paveuradi |
| gauzi | inaukereu |
| advo | grapodu |
| opfu | minbirnéné |
| drifeu | untlodaula |
| blasto | advolola |
| vlirou | ichtogoula |