

WORKING MEMORY IN DOWN SYNDROME : TRAINING THE REHEARSAL STRATEGY

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Verbal short-term memory skills of Down's syndrome subjects are very poor (Hulme & MacKenzie, 1992; Bower & Hayes, 1994). The poster reports on the verbal short-term memory skills in Down syndrome and on the possibility of increasing durably memory span by using a rehearsal training strategy. Three tasks (letters span, digits span and words span) have been presented to two groups of 12 Down's syndrome subjects as a pre-test. Each group contained 4 children, 4 teenagers and 4 young adults. The groups had similar memory span and mental age at the beginning of the study. None of these subjects seemed to rehearse. One group has been exposed to an intensive rehearsal training during 8 weeks (half an hour / week) (methodology inspired from Hulme & MacKenzie, 1992, and Broadley & MacDonald, 1993). The other group did not receive any training. After the training, the 3 initial memory tasks have been presented to the 2 groups as a post-test. The trained subjects significantly improved their memory span (on the 3 measures and on a global measure) whereas the non-trained subjects did not improve at all. We must notice that the young adults needed a longer training (10 weeks) in order to show a significant improvement for the three measures. Only the trained subjects showed, at this time, clear signs of systematic rehearsal. Six weeks after the first post-test a second post-test has been conducted. The trained subjects did not seem to rehearse systematically anymore, their memory performances felt significantly lower than

after the first post-test but remained significantly higher than at the beginning of the study.

SUBJECTS

2 groups of 12 DS subjects

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12 experimental subjects	12 control subjects
* 4 children	* 4 children
- MA : mean 3; 6 years	- MA : mean 3; 5 years
- CA : mean 9; 1 years	- CA : mean 8; 10 years
- MS: mean 1,58	- MS: mean 1,84
* 4 adolescents	* 4 adolescents
- MA : mean 4; 7 years	- MA : mean 4; 3 years
- CA : mean 18; 2 years	- CA : mean 15; 9 years
- MS: mean 2,25	- MS: mean 2,5
* adults	* adults
- MA : mean 4; 10 years	- MA : 4; 0 years
- CA : mean 29; 4 years	- CA : mean 24; 6 years
- MS: mean 2,08	- MS: 1,42

MA = Mental Age; CA = Chronological Age; MS = Memory span

METHOD

* Mental age measure: E.D.E.I. (Echelles Différentielles d'Effcience Intellectuelle)

* Memory span mesure : mean between digits span - letters span - words span

1] First memory span evaluation (for the 24 subjects)

2] 8 weeks of rehearsal training with 12 subjects (1 session of 30 min / week)

3] Second memory span evaluation (for the 24 subjects): immediately after the training period

4] Third memory span evaluation (for the 24 subjects): 6 weeks after the second evaluation

REAHEARSAL TRAINING

* **Material** : color pictures (5 semantic categories: animals, fruits, vegetables, furniture and toys)

* **Procedure** :

- **Step 1 → Step 4** : visual presentation of the items

. Step 1 : visual presentation of pictures from the same semantic category

i.e.: E:dog - S:dog ; E:dog+cat - S:dog+cat,

. Step 2 : visual presentation of pictures from different semantic categories

i.e.: E:dog - S:dog ; E:dog+apple - S:dog+apple,

. Step 3 : visual presentation of pictures from the same semantic category

i.e.: E:dog - S:dog ; E:cat - S:dog+cat,

. Step 4 : visual presentation of pictures from different semantic categories

i.e.: E:dog - S:dog ; E:apple - S:dog+apple,

- **Step 5 → Step 8** : verbal presentation of the items (same procedure)

RESULTS

Experimental group		Memory span Pre-test	Memory span Post-test 1	Memory span Post-test 2
Children	Subject 1	1,67	2,33	2,00
	Subject 2	1,33	2,67	1,67
	Subject 3	2,00	3,33	3,00
	Subject 4	1,33	3,00	3,00
	<i>Mean</i>	<i>1,58</i>	<i>2,83</i>	<i>2,42</i>
Adolescents	Subject 5	2,33	3,67	3,00
	Subject 6	2,33	3,33	3,00
	Subject 7	2,33	3,33	2,67
	Subject 8	2,00	3,00	2,00
	<i>Mean</i>	<i>2,25</i>	<i>3,33</i>	<i>2,67</i>

Adults	Subject 9	2,33	3,33	3,00
	Subject 10	2,33	3,33	3,00
	Subject 11	2,67	3,33	3,00
	Subject 12	1,00	2,00	1,67
	<i>Mean</i>	<i>2,08</i>	<i>2,99</i>	<i>2,67</i>
Group mean		1,97	3,05	2,58

Control group

Children	Subject 13	1,67	1,67	1,67
	Subject 14	1,67	2,33	1,67
	Subject 15	2,00	1,67	1,67
	Subject 16	2,00	1,67	1,67
	<i>Mean</i>	<i>1,84</i>	<i>1,89</i>	<i>1,67</i>
Adolescents	Subject 17	2,00	2,00	2,00
	Subject 18	3,00	2,67	2,67
	Subject 19	2,33	2,00	2,00
	Subject 20	2,67	2,00	2,00
	<i>Mean</i>	<i>2,50</i>	<i>2,18</i>	<i>2,18</i>
Adults	Subject 21	1,00	1,00	1,00
	Subject 22	1,67	1,67	1,67
	Subject 23	2,00	2,00	2,00
	Subject 24	1,00	1,00	1,00
	<i>Mean</i>	<i>1,42</i>	<i>1,42</i>	<i>1,42</i>
Group Mean		1,92	1,83	1,75

No significant difference in memory span between the two groups at the beginning of the study

Experimental group:

1] No significant effect of the variable generation (children, adolescents, adults)

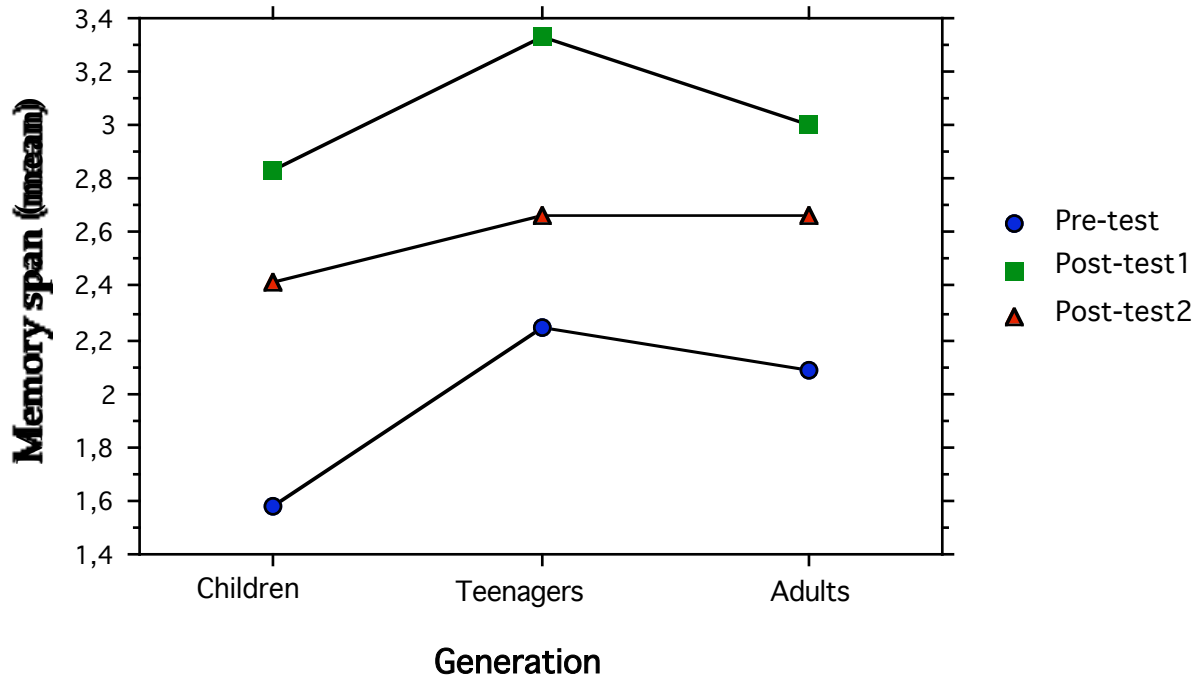
Pre-test: $F=2.12$ (NS); Post-test 1: $F=1.11$ (NS); Post-test 2: $F=.22$ (NS)

2] Significant effect of the variable time ($F=12,68$)

- significant increase of the performance between pre-test and post-test1 ($p<0.05$ - Scheffe):
- significant increase of the performance between pre-test and post-test 2 ($p<0.05$ - Scheffe):

3] Decrease of the performance between post-test1 and post-test2 but NS

Interaction Time * Generation - Experimental group
Dependant variable : Memory Span

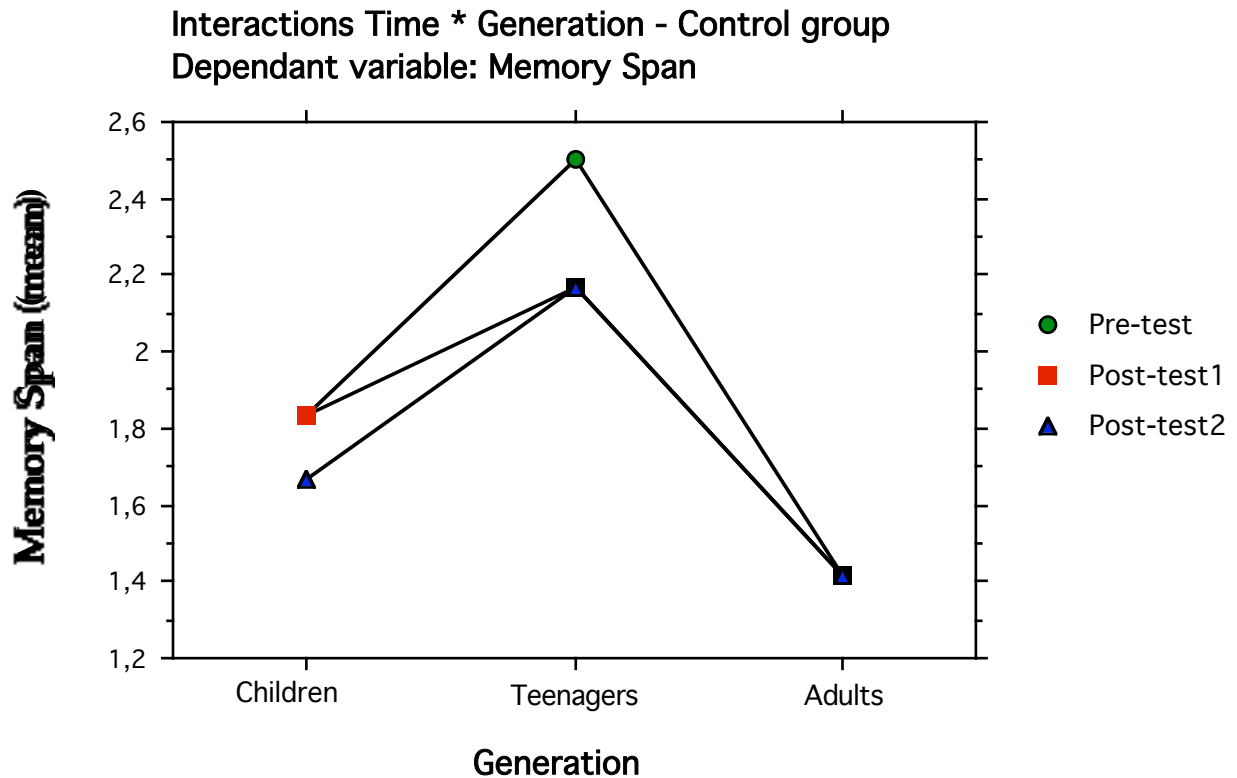


Control group:

1] Significant effect of the variable generation:

- Pre-test: $F=7.56 \rightarrow$ adolescents performances significantly higher than adults performance ($p<0.05$ -Scheffe)
- Post-test 1: $F=3.59 \rightarrow$ adolescents performances significantly higher than adults performance ($p<0.05$ -Scheffe)
- Post-test 2: $F=4.817 \rightarrow$ adolescents performances significantly higher than adults performance ($p<0.05$ -Scheffe)

2] No significant effect of the variable time ($F=0,59$): performance = similar at pretest, post-test1 and post-test2



CONCLUSION

1] It is possible to increase significantly memory span in DS during a few weeks

2] Subjects did not clearly use memory strategy use before the study

but

They seem to use a memory strategy after the rehearsal training

* 4 adolescents and 2 adults: clear lips movements

* 4 children and 2 adults: use of the fingers

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- Hulme, C., & MacKenzie, S. (1992). Working memory and severe learning difficulties. Londres: Erlbaum.