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Early identification and intervention to prevent reading difficulties -A longitudinal study on french-speakers at kindergarten-

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Background: What can be done at school to reduce the number of children having difficulties in learning to read, especially those considered at risk for academic under-achievement, such as those who live in poverty ? This research seeks to identify early predictors of reading in French children from low-income families, and to develop and test the efficacy of 3 different reading training programs to 5 years old children. What are their direct and indirect effects on later reading ? Are they limited to what have been trained or have they a more general effect ? Do their benefits maintain over a one year period of reading instruction, when children finish grade one ?

Method: A control group is compared to 3 experimental ones which benefit from 3 pre-reading programs. Both experimental groups received 1 or 2 training sessions a week during 20 weeks, in small groups of 4 to 6 children. Tutorials are delivered by trained teachers in their class.

Trainings: **G1** = meta-phonological program fostering on syllable, rhyme, phonem awareness, letter-sound correspondance. **G2** = training simultaneous or successive processes on visual and phonological stimuli. **G3** = training metacognition while comparing and categorising visual and phonological stimuli.

T1 5 years Beginning Kindergarten	Trainings at kindergarten		
	G1 - phonological awareness	T2 5,9 years End Kindergarten	T3 6,9 years End Grade 1
	G2 - successive and simultaneous processes		
	G3 - metacognition		
G4 - control group			

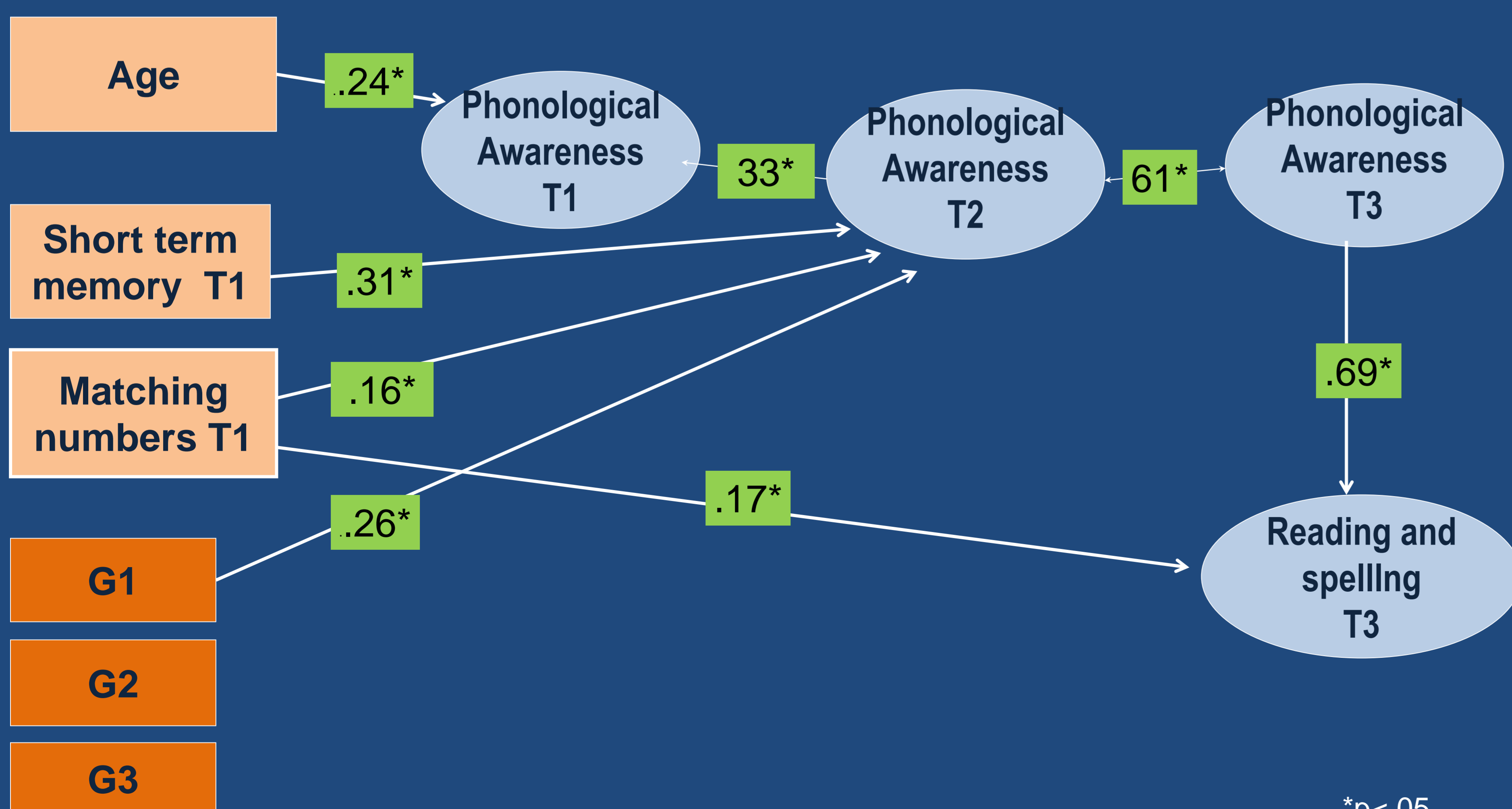
Fields	Tests	T1	T2	T3
Non-verbal reasoning	Raven's Coloured Matrices	+	+	+
Information processing (Das & Naglieri Cognitive Assessment System)	Planning tests: <i>matching numbers, planned codes</i>	+	+	+
	Attention tests: <i>number detection, expressive attention</i>	+	+	+
	Simultaneous tests: <i>figure memory, verbal-spatial relations</i>	+	+	+
	Successive tests: <i>speech rate, words series</i>	+	+	+
Short-term memory	Digits span	+	+	+
Base of knowledge	Vocabulary	+	+	+
Compréhension	Oral and reading comprehension		+	+
Métaphonology	Phonological awareness	+	+	+
School achievement	Reading, spelling, comprehension, mathematics			+

Participants: 396 preliterate 5 years old french speakers kindergarteners are divided in 4 groups. As groups were not strictly equivalent at the beginning of the study, children were matched 4 by 4, on age, Raven and vocabulary. Analysis are conducted on these 4 groups of 37 children (N=148).

Parental Occupational Status is controled and is homogenous between groups recruited in urban special needs education areas.

Assessment: At three points in time over a 2 years period the children were submitted to standardized cognitive and linguistic tests given individually. At T3 : addition of tasks measuring academic achievement in French and mathematics.

Results: 5 years old children, from low income families, considered at risk for reading difficulties can benefit from early interventions at school. But programs have differential effects in the short and medium-term and all are not helpfull: G2 is rarely different from the control one. The analysis performed with the EQS program give the structural organisation below ($\chi^2_{(45)}=480, p<.001, GFI=.92, CFI=.88, RMSEA=.13$).



*p<.05

Training:

A meta-phonological program has a positive direct effect on phonological awareness (PA) and a indirect effect on reading and spelling skills at Grade 1. A program focusing on metacognition has no direct effect on PA and on decoding at Grade 1 (but it has one on comprehension). No positive effect of these programs on mathematics at Grade 1..

Predicting: PA at T3 determines a large part of reading and spelling. Early PA and short term memory have an indirect effect on later reading and spelling. An outsider for reading acquisition: matching numbers? This test predict at 5years a part of reading performance at Grade 1 independently of phonological awareness and short term memory. This visual analysis of digit strings task can be an indicator of visual attention span (= number of distinct visual elements which can be processed in parallel). Further research is required to investigate this hypothesis.

Ref: Bianco, M., Bressoux, P., Doyen AL., Lambert, E., Lima, L., Pellenq, C., Zorman, M. Early training in oral comprehension and phonological skills: results of a three-year longitudinal study. (submitted) . Cèbe, S., Goigoux, R., Bailleux, C., Pellenq, C., Paour, J. L., Blaye, A., Gilles, P. Y. (2003). L'influence des pratiques pédagogiques à l'école maternelle sur l'apprentissage de la lecture au cours préparatoire. *Les Dossiers des Sciences de l'Éducation*, 10, 77-92.