Hôpital des Enfants

Intensive training in developmental dyslexia : non specificity of the effects.

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(*Toulouse & **Paris)

Developmental dyslexia
Introduction (1)

- Deficit in phonological processing = central core deficit
  (Snowling, 1995, Ramus et al., 2003) with impairments:
  - Phonological awareness
  - Rapid automatised naming
  - Phonological short-term memory
- Aetiology unknown ? 2 classes of explanatory hypotheses
  - Deficit in categorical perception and explicit access to symbolic representations evoked from long-term memory
  - On-line and implicit processing of transient and/or sequential events via short-term memory

Developmental dyslexia
Introduction (2)

- The Temporal processing theory *(Tallal et Percy, 1973; Tallal 1980)*
- Training programs based on exercices with modified speech (Fast ForWord) *(Tallal et al., 1996; Merzenich et al., 1996)*
- Few studies have assessed effects of phonological training with modified speech in children with dyslexia
  - Improvement after training of auditory temporal processing *(Habib et al., 2002; Agnew et al., 2004)*
  - Improvement of phonological abilities but without generalised effect on reading performances *(Hook et al., 2001; Habib et al., 2002; Agnew et al., 2004)*
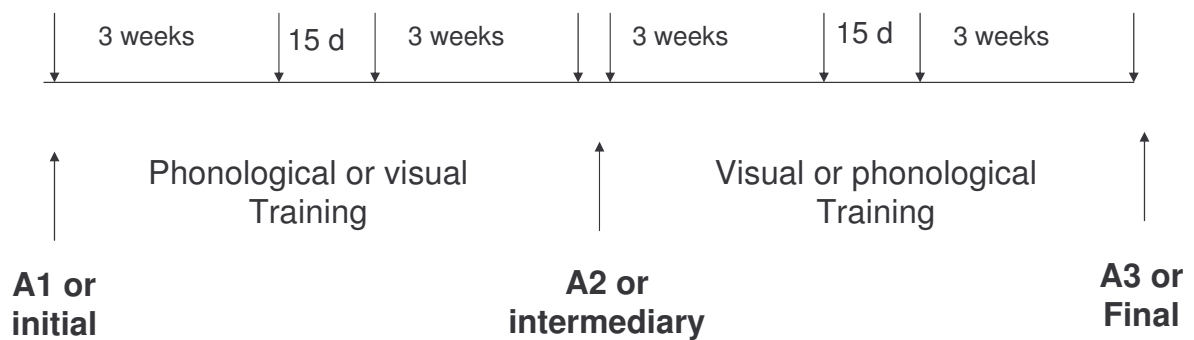
Present study:
aims

- Determine the effect of an intensive phonological **training with modified speech rate on phonological and reading abilities**

- Investigate the **specificity** of phonological training

In a group of children with pure phonological or mixed dyslexia without associated SLI or ADHD

Method : Participants

- 23 children included – 8 to 12y – 2 different language and learning disabilities centers *(Toulouse –Kremblin-Bicêtre)*
- Criteria of developmental dyslexia with reading age at least 18 years below chronological age and normal IQ (F IQ > 80)
- Pure visual dyslexia were not included
- Dyslexics children with associated SLI or ADHD were also excluded

Method : Study design

3 weeks | 15 d | 3 weeks | 3 weeks | 15 d | 3 weeks

Phonological or visual
Training

Visual or phonological
Training

**A1 or
initial**

**A2 or
intermediary**

**A3 or
Final**

Method : Training phases

- **Temporal Order Judgement Task** in a preliminary session [succession of 2 consonants /p/ /s/ within a phonetic cluster aspa versus apsa *(M Habib et V Rey)*]
  - 12 children underwent PT with modified speech
  - 11 children underwent PT with normal speech
- **Implicit** training procedure
- Training phases were presented in a **counter-balanced order:**
  - PT-VT sub-group: intensive training beginning with phonological training phase (12 children)
  - VT-PT sub-group: intensive training beginning with visual training phase (11 children)

Tasks	Normal speech		Modified speech		Group	Session	Interaction
	Pre-training M(SD)	Post-training M(SD)	Pre-training M(SD)	Post-training M(SD)			
Reading CR	34,5(7,8)	38,3(7,5)	27,5(8,9)	33(10,5)	ns	p<.001	ns
Reading T	1301,8 (353,6)	1168,3 (298)	1858,4 (389,3)	1525,8 (574,7)	p<.05	p<.01	ns
Syllable subtr. CR	7,3(1,5)	7,6(1,3)	5,7(3,4)	5,2 (4,6)	ns	ns	ns
Syllable subtr. Time	63,3 (36,9)	47,4 (23,6)	67,8 (14,6)	56,9 (18,4)	ns	p<.01	ns
Phoneme subtr. CVC CR	9,6(1,9)	10,2(1,9)	5,3(5,3)	8,4(4,5)	ns	p<.05	ns
Phoneme subtr. CVC Time	58,2 (54,8)	36,9 (26,6)	68,1 (13,2)	53,4 (23,1)	ns	p<.05	ns
Phoneme subtr. CCV CR	6,6(2,7)	8,6(2,1)	5,6(3,5)	6,6(3,2)	ns	p<.05	ns
Phoneme subtr. CCV Time	85,7 (78,1)	40,5 (12,3)	62,5 (13,9)	57 (21,4)	ns	p<.05	ns
Phonological STM	45,8(16,3)	54,1(18,8)	55,5(16,8)	67,0(15,9)	ns	p<.01	ns

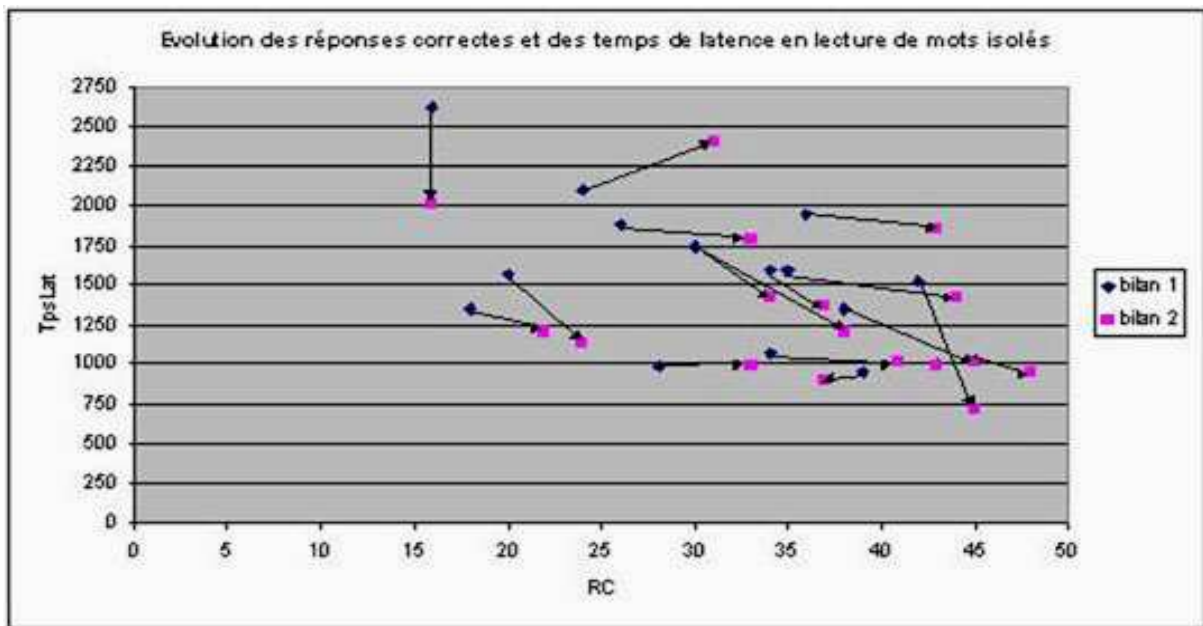| Tasks	PT-VT			VT-PT			GR	SE	I
	Intial M(SD)	After PT M(SD)	After VT M(SD)	Intial M(SD)	After VT M(SD)	After PT M(SD)			
Reading CR	30(9,7)	31,4(12)	33(9,9)	33,5(7,7)	37,6(8,1)	39,6(6,7)	ns	p<.001	ns
Reading T	1535,7 (529,8)	1439,6 (544,6)	1326,02 (402,5)	1525,5 (389,6)	1361,4 (491,2)	1311,2 (547,5)	ns	p<.01	ns
Syllable subtr. CR	6,1(3,1)	5,8(3,7)	5,8(3,6)	7(2)	8,3(1,5)	7(3,7)	ns	ns	ns
Syllable subtr. Time	66,6 (33,6)	49,3 (25,5)	52,5 (26,9)	64,4 (16)	56,3 (11,6)	52,2 (10,7)	ns	p<.001	ns
Phoneme subtr. CVC CR	7,2(4,7)	8,7(3,7)	9(3,9)	7,5(4,5)	8,7(2,7)	9,7(3,3)	ns	p<.05	ns
Phoneme subtr. CVC Time	65 (49,3)	44,2 (23,8)	46,2 (28,9)	61,2 (17,8)	48,5 (16,3)	44,8 (22,2)	ns	p<.01	ns
Phoneme subtr. CCV CR	6,2(2,9)	7(2,6)	7,9(3,3)	6(3,6)	5,7(4,3)	7,1(2,2)	ns	ns	ns
Phoneme subtr. CCV Time	79,9 (72)	47,2 (17,4)	44,4 (19,5)	65,1 (13,2)	64,3 (13,9)	55,4 (17,7)	ns	p=.05	ns
Phonological STM	58,3 (13,3)	62,5 (14,4)	63,9 (15,6)	62,1 (15,1)	69,7 (19,4)	71,2 (15,1)	ns	ns	ns

Discussion & Conclusions (1)

- **Whatever** speech rate of phonological training, order of training or response assessment :
  - Significant **improvement of phonemic analysis capacities**
  - and **Transfer to reading abilities**
- Modification of speech based on Temporal Processing Theory **did not confer a significant advantage**
- Children benefited from intensive training **regardless of the modality**

Discussion & Conclusions (2)

- Absence of specificity of training effects might:
    - be linked to some features of training: **implicit versus explicit training**
    - underscore the impact of **non-specific cognitive factor as attention**
    - relate to the **important inter-subject variability**

inter-subject variability: correct responses and reading time latency of word for each subject before and after training.

Evolution des réponses correctes et des temps de latence en lecture de mots isolés

Thank you for your attention