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# A karaoke-based game to improve the ability of French primary school pupils in planning pauses and breathing while reading aloud

Andrea Briglia<sup>1</sup>, Erika Godde<sup>2</sup>, Delphine Charuau<sup>1</sup>, Marie-Line Bosse<sup>3</sup>, Gérard Bailly<sup>1</sup>

<sup>1</sup>GIPSA-CRISSP, Université Grenoble-Alpes, CNRS, Grenoble INP

<sup>2</sup>LEAD – CNRS UMR5022, Université de Bourgogne, Dijon, France

<sup>3</sup>LPNC, Université Grenoble-Alpes, CNRS

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## 1. INTRODUCTION

- Phrasing is an important aspect of reading fluency
- Adequate phrasing requires planning pauses and intonation in line with the text's syntax
- Planning pauses requires coordinating breathing and speech [1]
- Pupils rely on punctuation and syntax to plan their pauses [1,3]
- Young and non-fluent readers make more breathing pauses and ungrammatical pauses than elder and fluent readers [2, 3]
- Pause planning and breathing coordination develops with reading skills [3,4]



crayon à papier est parti. »  
 Cela dura de nombreuses années. Mais au bout d'un moment, la maîtresse d'école de ma grand-mère en eut assez de cette agitation. Alors, un matin, elle a organisé avec ses élèves une chasse au crayon à papier. Ils ont fermé les portes et capturé tous les crayons à papier avec leur filet à papillons.

Word highlighting

Breathgroup highlighting

RAKE (Reading Assistance by Karaoke) : audio-visual reading while listening task. Children read the text following the highlighting on the tablet and the audio of an expert reader

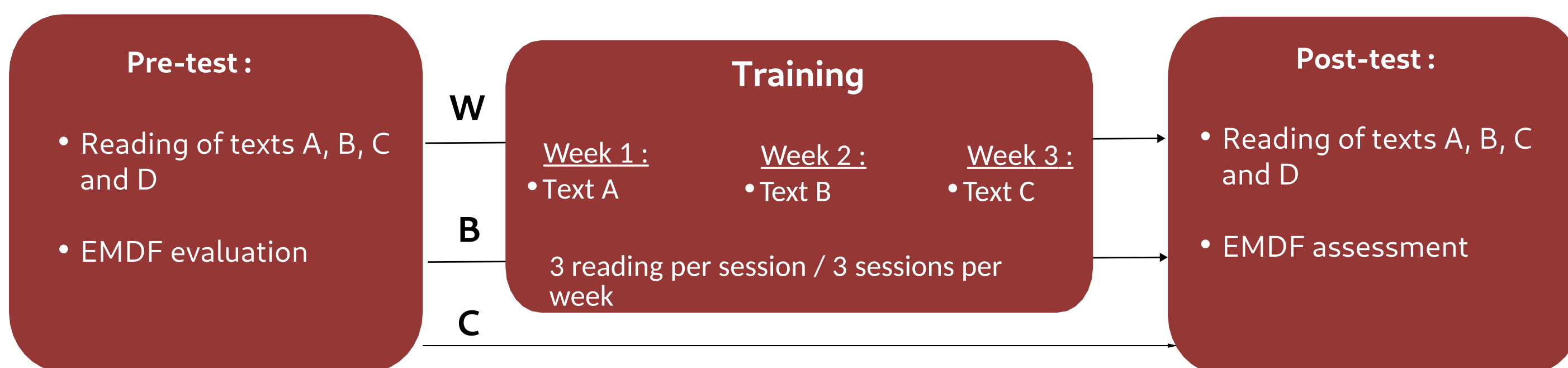
↳ Based on choral and repeated reading [5, 6, 7]

- Audio-visual cues in a karaoke app helps pupils plan their breathing [5]
- Karaoke app improve prosodic reading in children from grade 3 and 4 [6]

## 2. METHOD

97 pupils (2nd-5th graders) ⇒ 66 pupils (9y3m±17 months) :

- W: word, B: breath C : control
- Pupils were selected and divided in 3 groups according to their EMDF score [9]



### Data Analysis

- ↳ Subjective assessment with EMDF [8, 9]
- ↳ Acoustic measure :
  - ↳ pauses number, duration and grammaticality
  - ↳ Inhalation to phonation delay (IPD) in breathing pauses
  - ↳ Test differences between pre and post test

Dimension	1	2	3	4
Expression	Jamais	Un peu	La plupart du temps	Toujours ou presque
(partie simple du texte)	Pas d'expression monotone Voix faible	Commence à utiliser sa voix pour sonner naturel Sur de rares parties du texte Volume inapproprié	Plusieurs passages expressifs Expressivité parfois peu adaptée au texte Volume approprié	Passage lu en grande partie avec une expressivité adaptée au texte Sonne comme du langage parlé
Phrase*	Mot à mot	Lecture hachée	Phrase incorrecte	Phrase correcte
(partie simple du texte)	Pas d'intonation au niveau des phrases	Fréquentes phrases de 2 à 3 mots Intonation inappropriée en fin de phrases et de propositions.	Mélange de longs phrases sans pause et d'arrêts inappropriés pour respirer Nombreuses pauses ne respectent pas la syntaxe adaptée.	Phrase généralement correcte, respectant la syntaxe du texte Intonation adaptée.
Décodage**	Très difficile	Nombreuses difficultés	Quelques difficultés	Sans difficulté
(partie complexe du texte)	Longues pauses fréquentes, hésitations, faux départs, chuchotements, répétitions, essais multiples, mots modifiés	Plusieurs points difficiles avec hésitations, longues pauses, erreurs de lecture	Rupture occasionnelle de la fluidité sur des mots et/ou des structures particulières Quelques erreurs de lecture	Lecture généralement fluide avec quelques ruptures mais résolues rapidement, en général en l'auto-corrigeant
Vitesse	Laborieux	Lent	Irégulière	Constant et conversationnel
(tout le texte)			Trop rapide ou Mélange irrégulier de lecture lente et rapide	

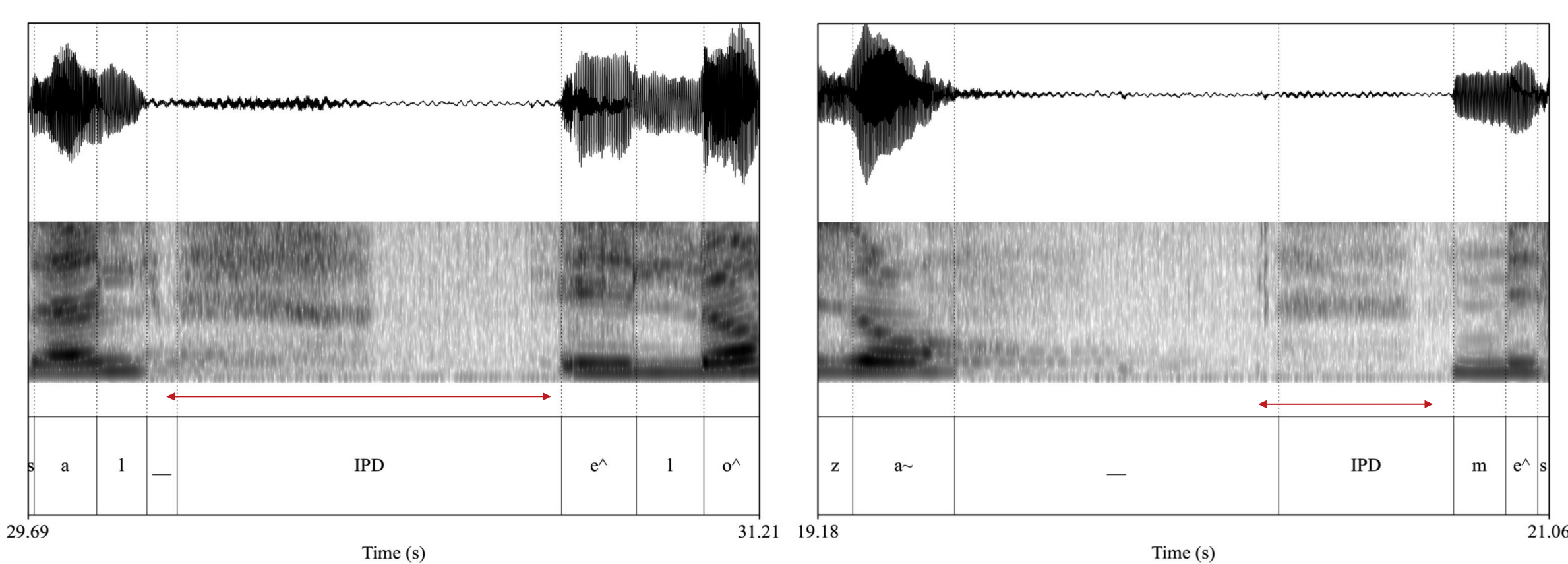


Figure 1. IPD illustration for a non fluent reader (left) and a fluent reader (right)

## 4. DISCUSSION AND PERSPECTIVES

Global positive effect of the karaoke on breathing and pauses planification on trained text  
 No transfer of reading/motor abilities on the untrained text (D) => not enough sessions ?  
 Larger results on subjective assessment => effect of assessment time ?

No difference between the 2 highlighting styles  
 => link with attention ? More effect of auditory modality ?

Differences between text A and C => Influence of text complexity ?

**Perspectives** : 10 weeks training on 10 texts increasing in complexity with adaptive highlighting

## 3. RESULTS

### 1. Phrasing

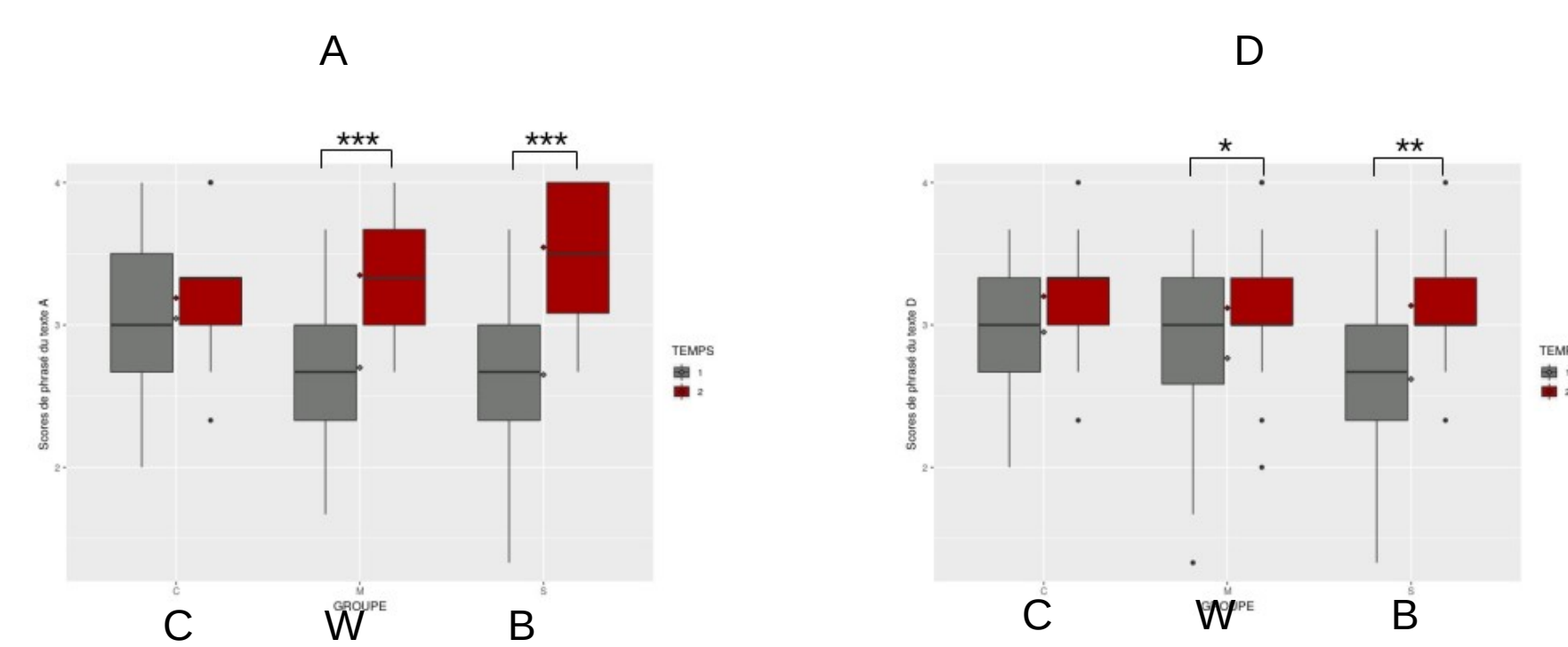


Figure 2. Mean difference between pre and post-test on phrasing results at EMDF for each group

### 2. Non grammatical pauses ratio

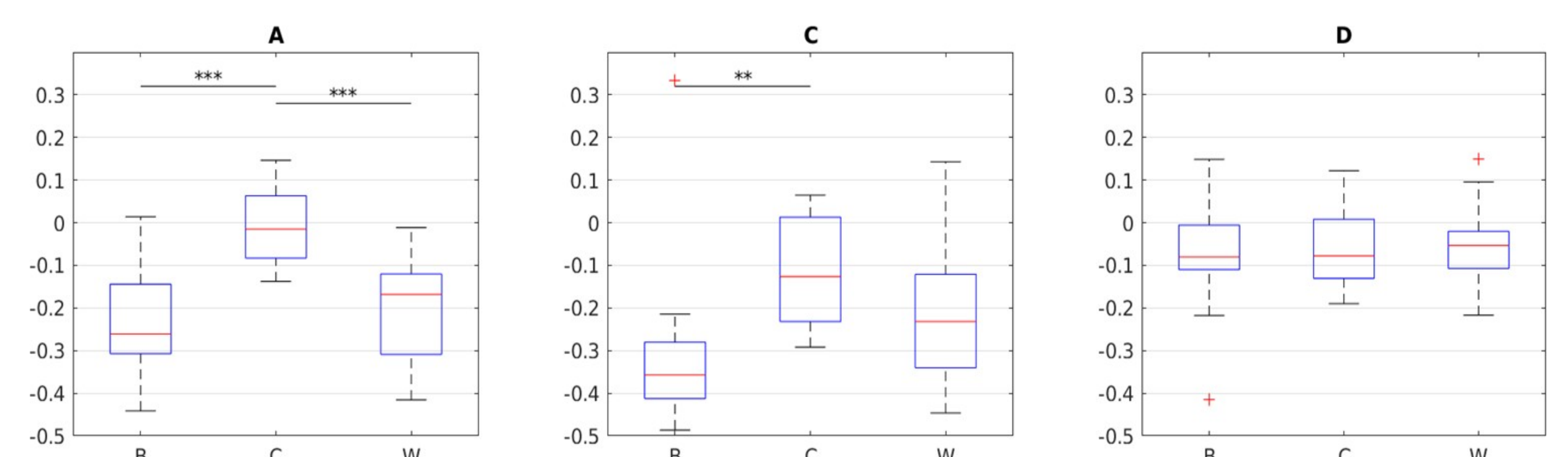


Figure 3. Difference between pre and post tests in ratio of ungrammatical pauses for each group.

### 3. Inhalation to phonation delay

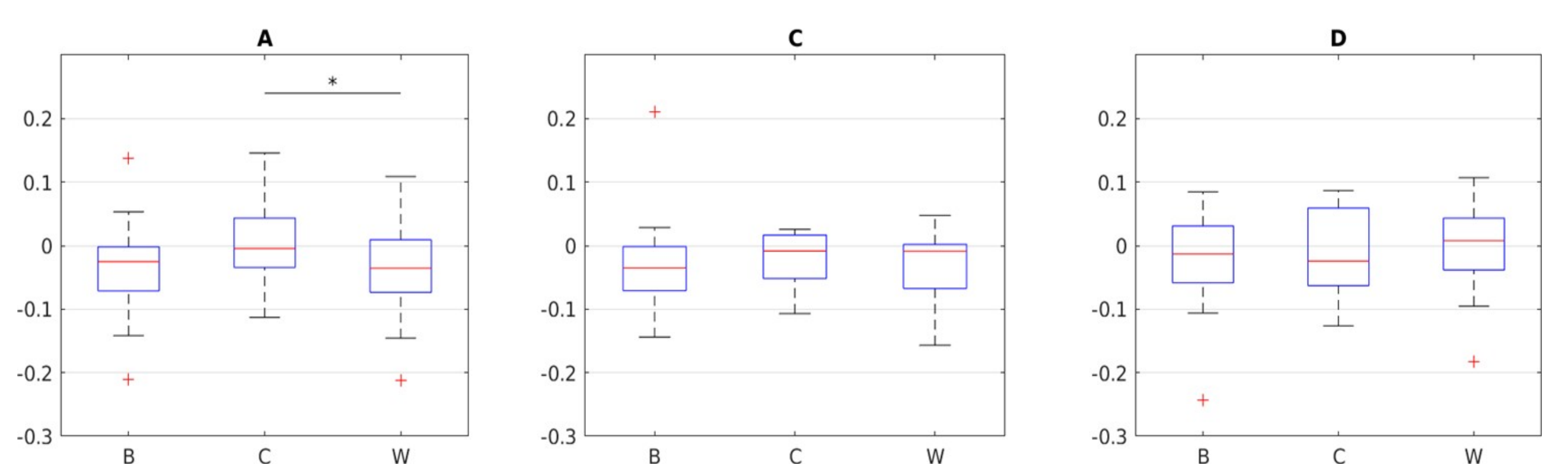


Figure 4. Difference between pre and post tests in IPD for each group.

- Better phrasing (assessed with EMDF) for text A, C and D for experimental groups
- Less ungrammatical pauses for text A and C for experimental groups
- Shorter IPD for text A and word highlighting group only
- No effect of training on text D on acoustic measures

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