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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

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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 maitresse 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

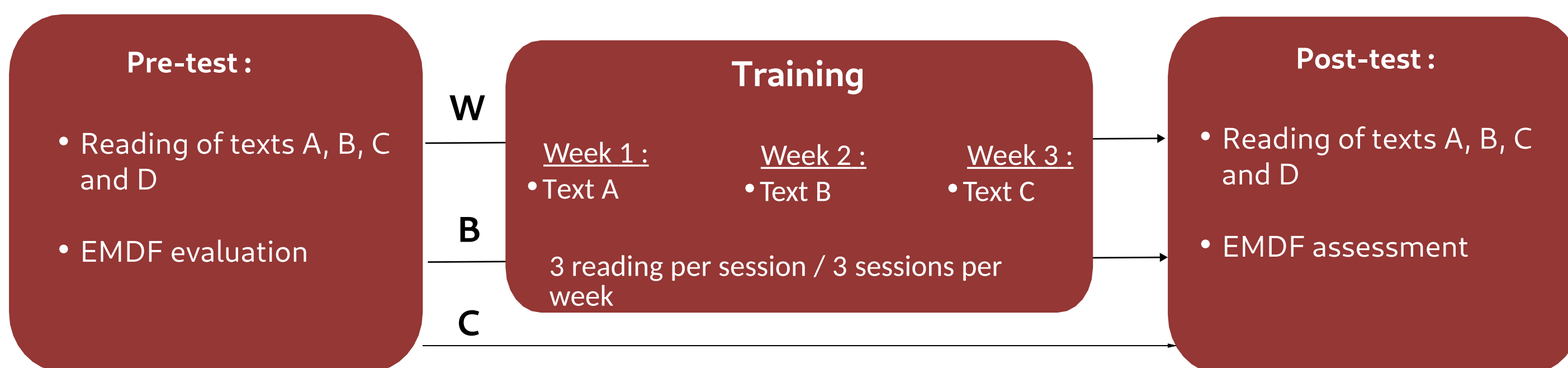
Based on choral and repeated reading [5, 6, 7]

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

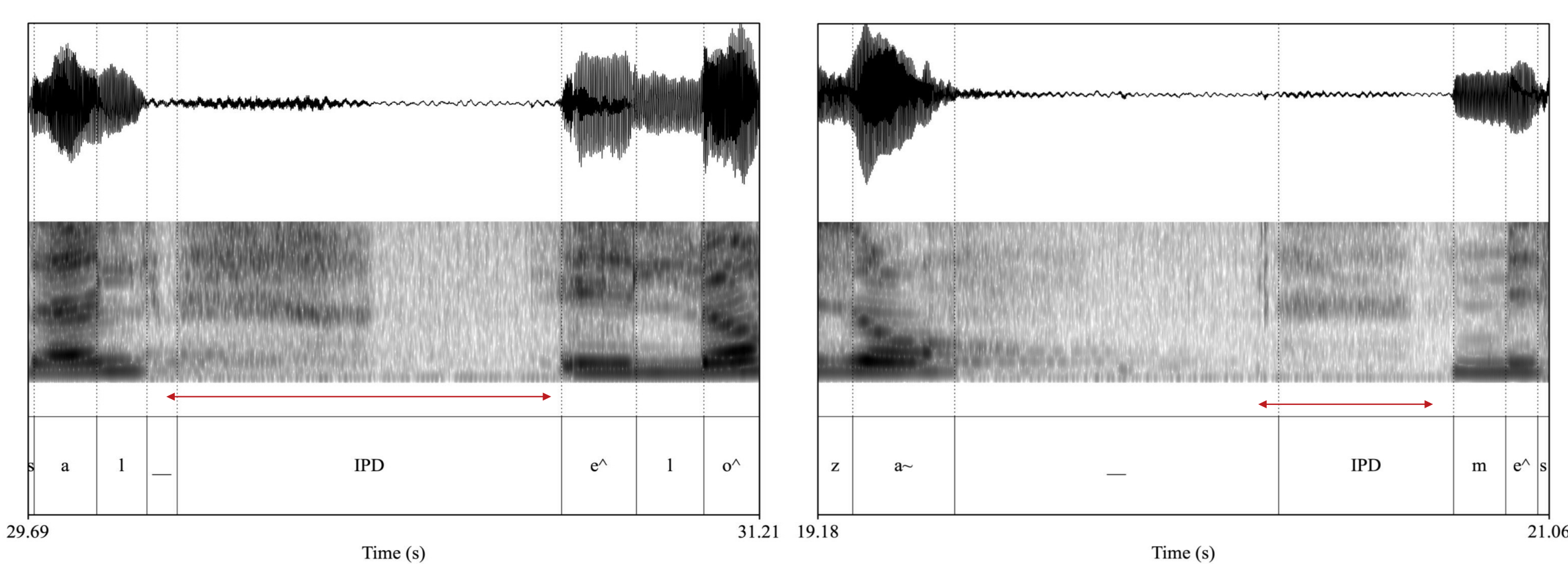


Figure 1. IPD illustration for a non fluent reader (left) and a fluent reader (right)

## 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

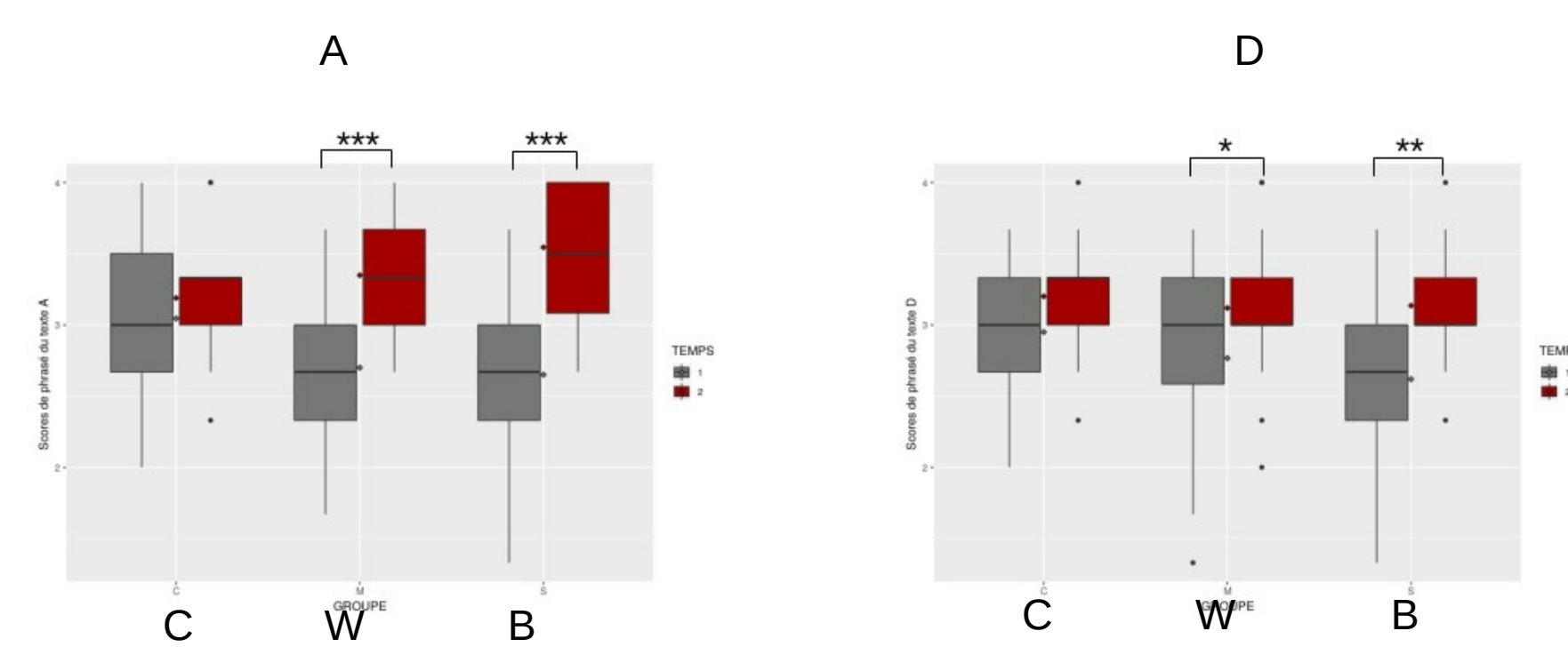


Figure 2. Mean difference between pre and post-test on phrasing results at EMDF for each group

### 2. Non grammatical pauses ratio

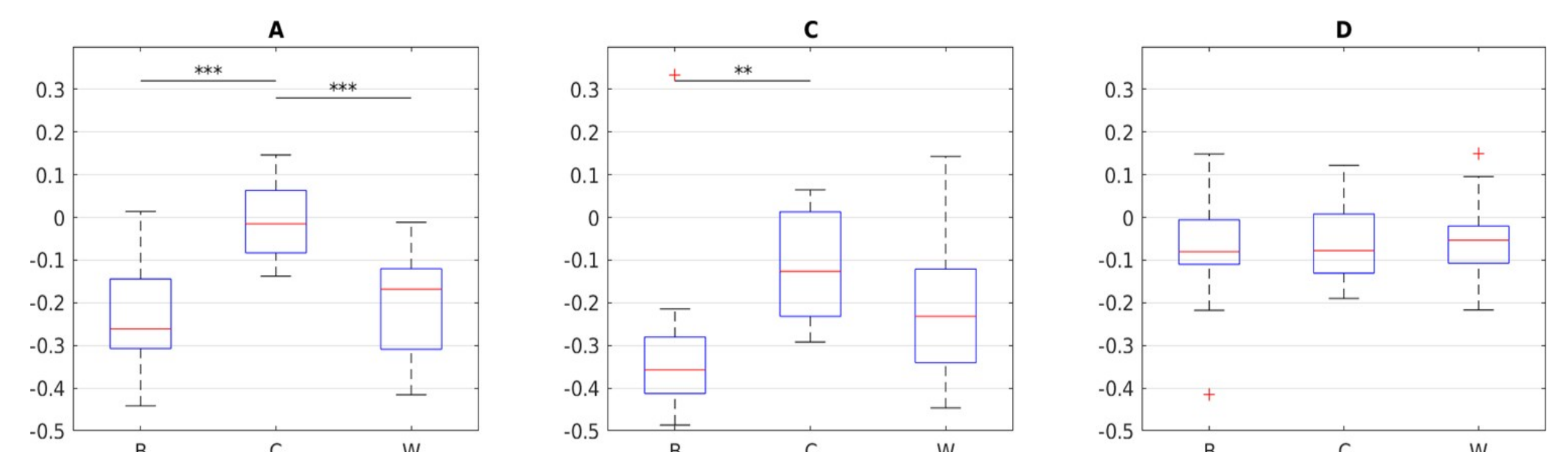


Figure 3. Difference between pre and post tests in ratio of ungrammatical pauses for each group.

### 3. Inhalation to phonation delay

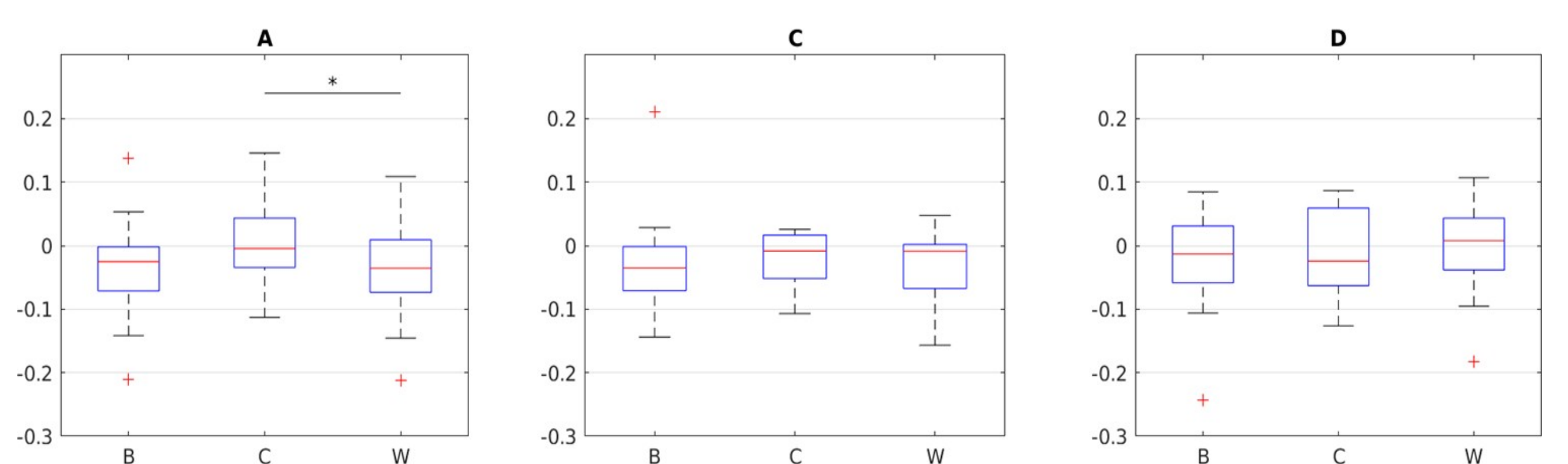


Figure 4. Difference between pre and post tests in IPD for each group.

- 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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