Clinical Analysis in Speech and Language Therapy: Occlusal Class and Speech Production

André Araújo [1,3] Luís M. T. Jesus [2,3], Isabel M. Costa [2,3]

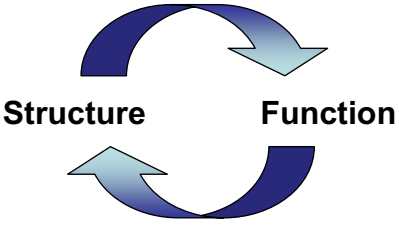
1 – Escola Superior de Tecnologia da Saúde do Porto, Portugal
2 – Escola Superior de Saúde da Universidade de Aveiro, Portugal
3 – Instituto Superior de Engenharia Electrónica e Telemática de Aveiro, Portugal

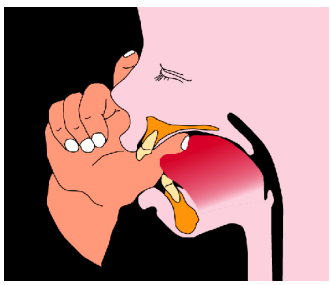
INTRODUCTION

STOMATOGNATIC FUNCTIONS

Primary – Respiration, Suction, Swallow and Mastication

Secondary – Speech (Phonation, Resonance and Articulation)





INTRODUCTION

OBJECTIVES

1. Describe and compare articulatory structures of different malocclusion class subjects.

2. Identify acoustic variations and articulatoy adaptations related with malocclusion class.

3. Determine relations between acoustic properties and articulatoy phenomena.

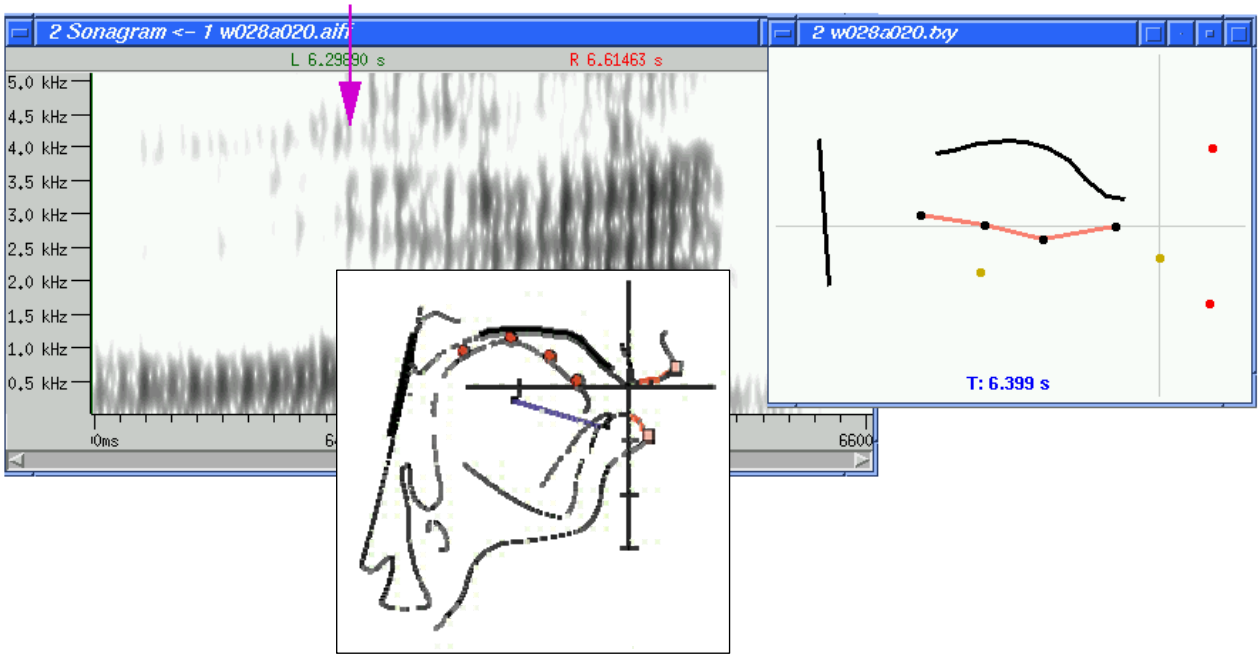
METHOD

X-Ray Microbeam Speech Production Database (XRMB-SPD)

- Created in Wisconsin University (1994)
- Signals: articulatory, acoustic and electroglotographic
- 57 speakers (25 male e 32 female)
- Language: American English (Upper Midwest dialect)
- Verbal tasks: words, phrases, texts and isolated sounds
- Non-verbal tasks: swallowing and oral diadocokynesia.

METHOD

X-Ray Microbeam Speech Production Database (XRMB-SPD)



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METHOD

SPEAKER SAMPLE SELECTION

• Division of speakers by groups of gender and malocclusion.

Inclusion criteria:

- Angle's malocclusion class I, II or III.

Exclusion criteria:

- Absence / insufficiency of files and measures;

- Dental and/or Temporo-Mandibular Joint alterations.

• Measurement of the articulatoy oral space using the Modified A-space method – Matlab.

• Selection of the most representative speakers of each group – Excel.

• Qualitative analysis of speakers' structures and non-verbal tasks.

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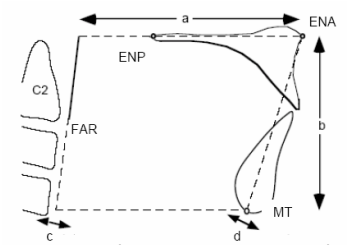
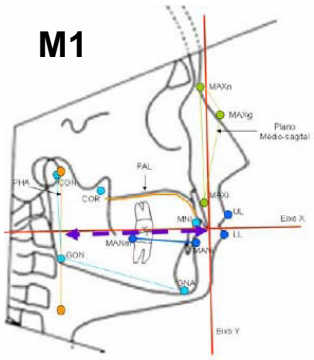
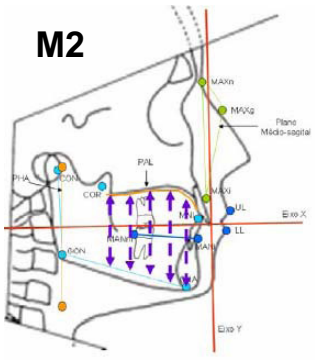
METHOD

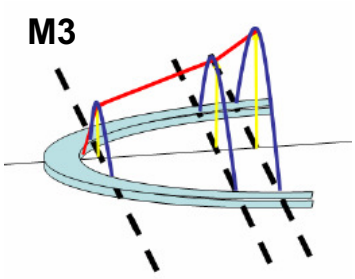
MODIFIED A-SPACE

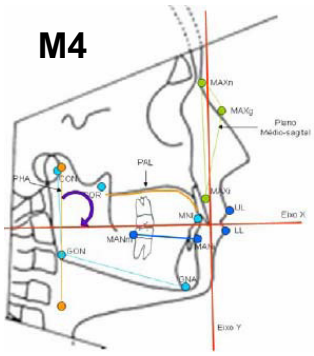


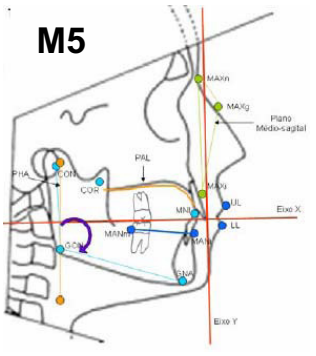
A-space (Honda et al., 1996)











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METHOD

SAMPLE

Selected 4 speakers using the “Modified A- Space” method:

- 1 class I male
- 1 class II male
- 1 class I female
- 1 class II female

CORPUS:

- 4 vowels: [i], [{], [A] and [u];
- 6 consonants: [p], [t], [k], [f], [s] and [S];
- Phonetic contexts: isolated, words and nonsense words.

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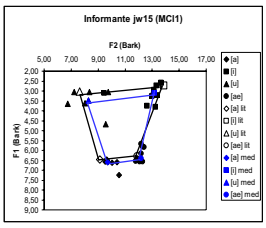
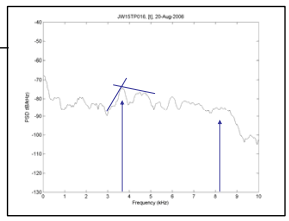
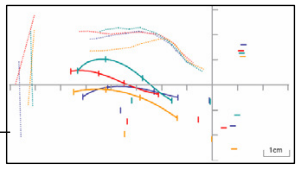
METHOD

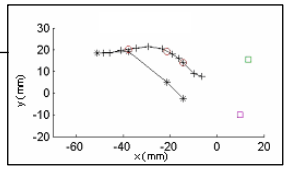
PROCEDURES

- Annotation;
- Acoustic analysis:
  - Frequency of vowel formants (F1, F2 and F3);
  - Multitaper spectra of consonants;
- Articulatory analysis:
  - Articulatory postures;
  - Articulatory measures;
- Software: Matlab, Excel and TF32.









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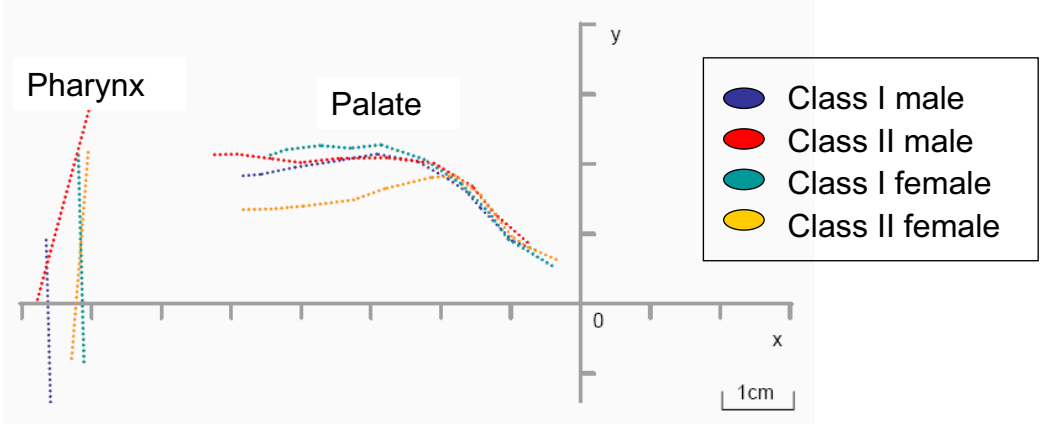
RESULTS

SPEAKER SAMPLE

Speaker	Gender	Class	Age	M1 (cm)	M2 (cm²)	M3 (cm²)	M4 (º)	M5 (º)
jw15	Male	I	22	7.6	22.8	17.5	92	118
jw61	Male	II	20	7.7	20.2	16.2	75	108
jw54	Female	I	21	7.1	20.1	15.6	92	109
jw13	Female	II	36	7.2	20.3	16.5	85	110



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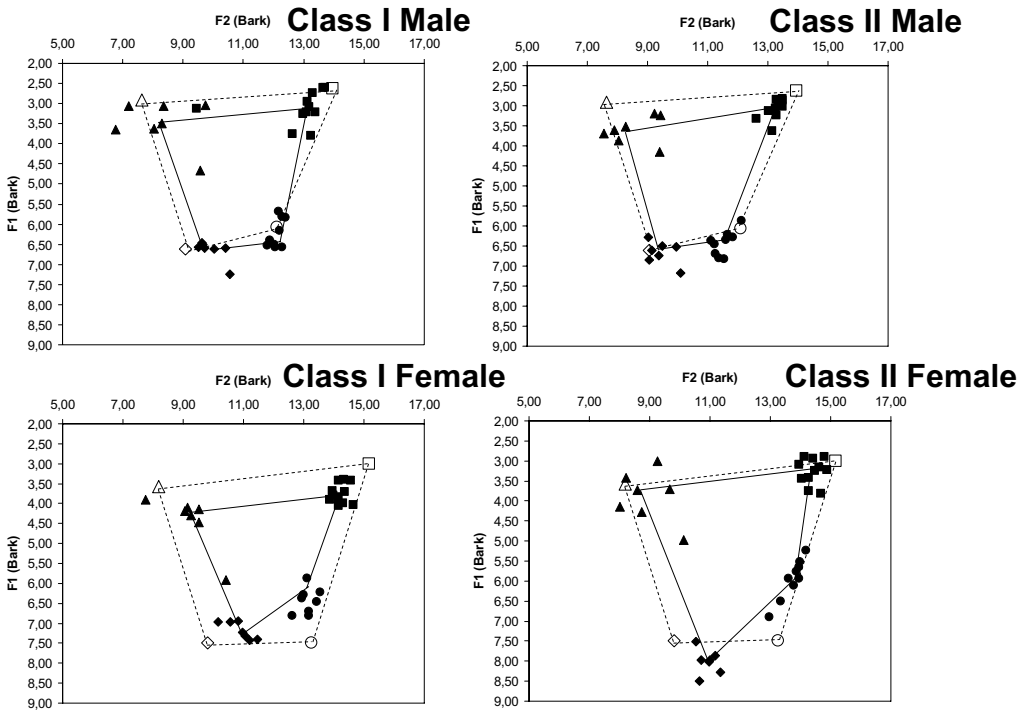
RESULTS

VOWEL ANALYSIS



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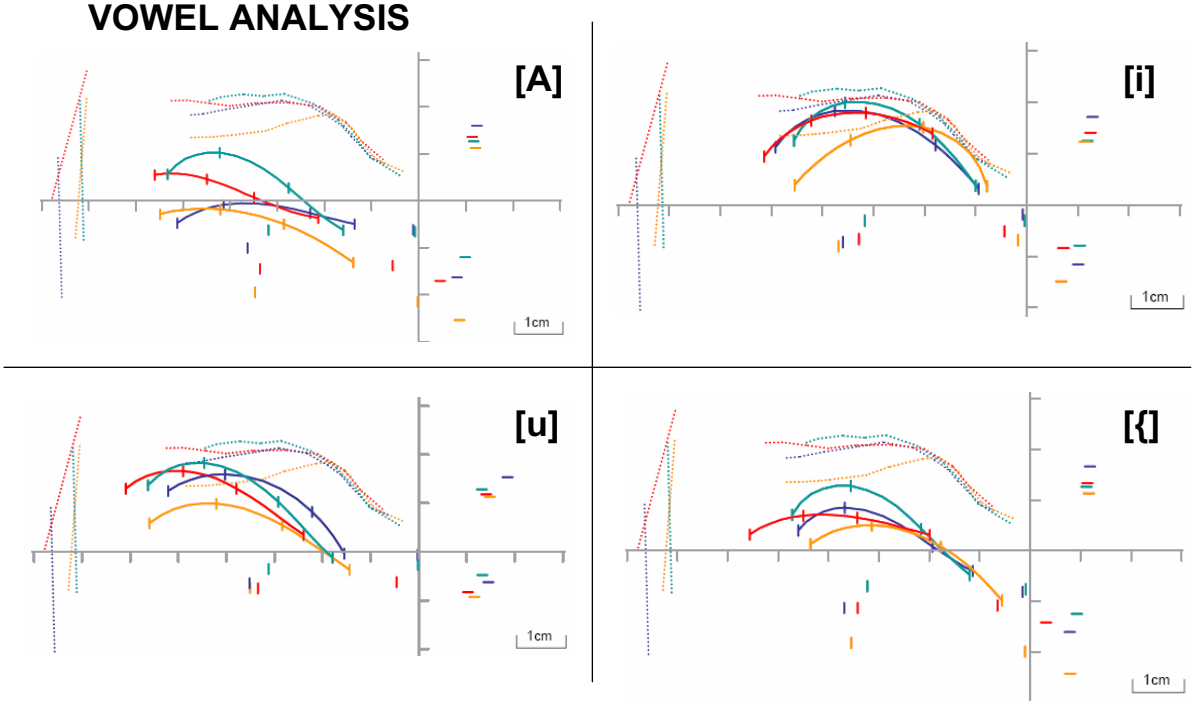

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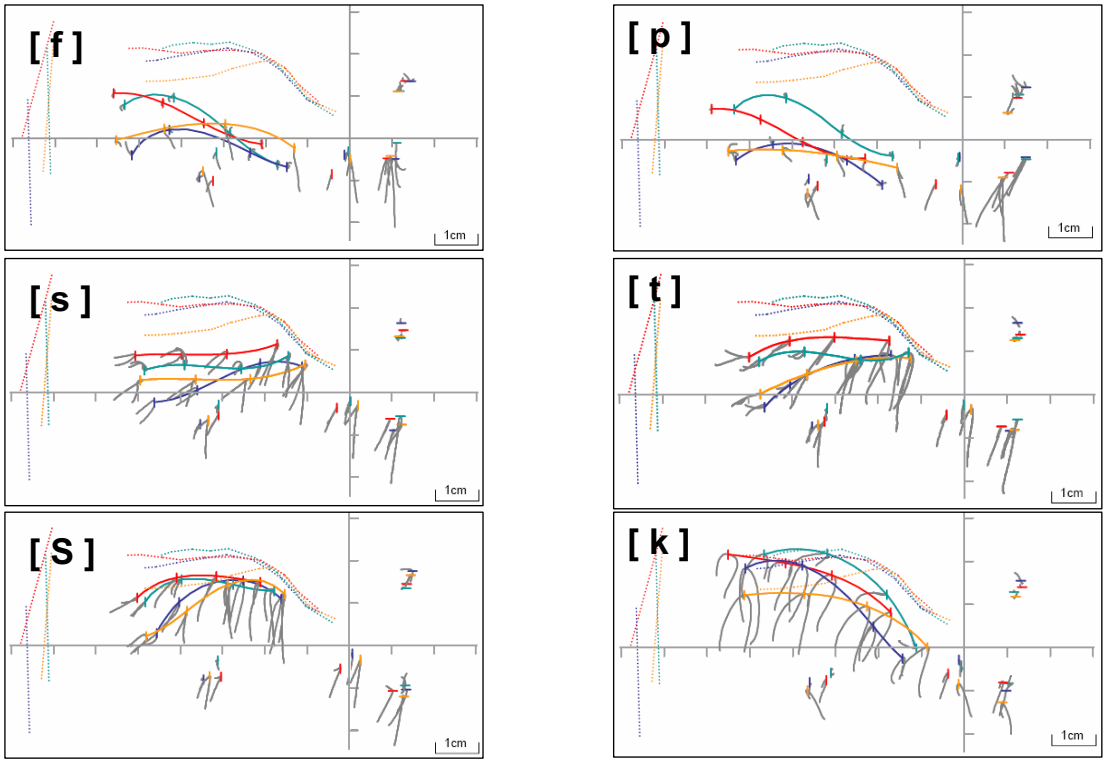
RESULTS

CONSONANT ANALYSIS



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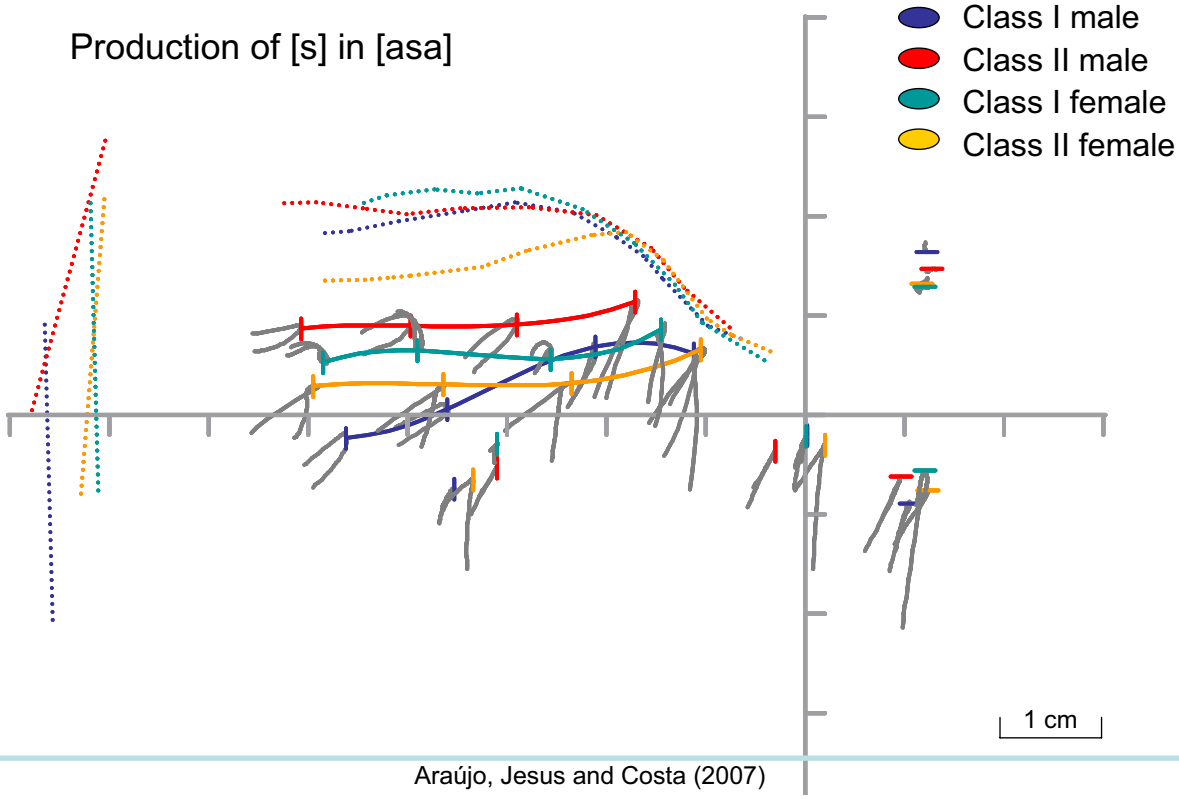

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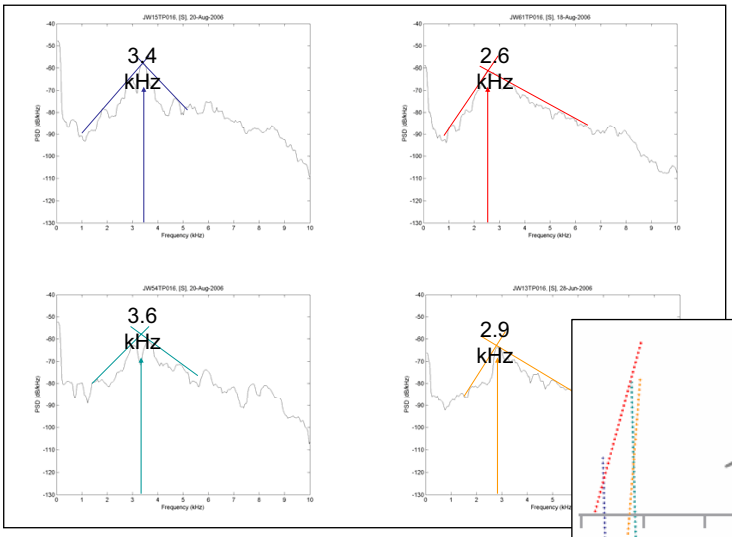
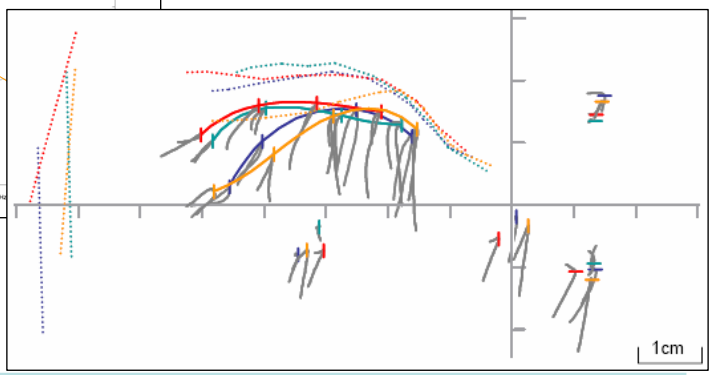
RESULTS

Production of [S] in [aSa]



- Class I male
- Class II male
- Class I female
- Class II female



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CONCLUSIONS

• Malocclusion didn't seem to be the most influent variable in the observed speech adaptations.

• There was evidence of several individual pattern adaptations related with the shape of palate and oral measures.

• It was possible to find relations between acoustic and articulatory analysis in some consonants.

Studies constructed to find normative data of speech production should use descriptive data of the speaker sample's oral tract to find common features.

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CONCLUSIONS

FUTURE WORK

• Use of Articulatory Space measures with cephalometric analysis.

• Evaluate the validity of Articulatory Space measures in Craniofacial Malformation pathologies.

• Development of SLT intervention strategies based in a multidisciplinary assessment / treatment after the analysis of Articulatory Space measures.