



**HAL**  
open science

## Automatic classification of French stops consonants

Clara Ponchard, Sergio Hassid, Didier Demolin

► **To cite this version:**

Clara Ponchard, Sergio Hassid, Didier Demolin. Automatic classification of French stops consonants. 178th Meeting of the Acoustical Society of America, Dec 2019, San diego, United States. hal-02502463

**HAL Id: hal-02502463**

**<https://hal.science/hal-02502463>**

Submitted on 9 Mar 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Automatic classification of French stops consonants

Clara Ponchard<sup>1</sup>, Sergio Hassid<sup>2</sup> and Didier Demolin<sup>1</sup>

<sup>1</sup>Laboratoire de phonétique et phonologie, UMR 7018, Sorbonne nouvelle, <sup>2</sup>Hôpital Erasme, Université Libre de Bruxelles

## Abstract

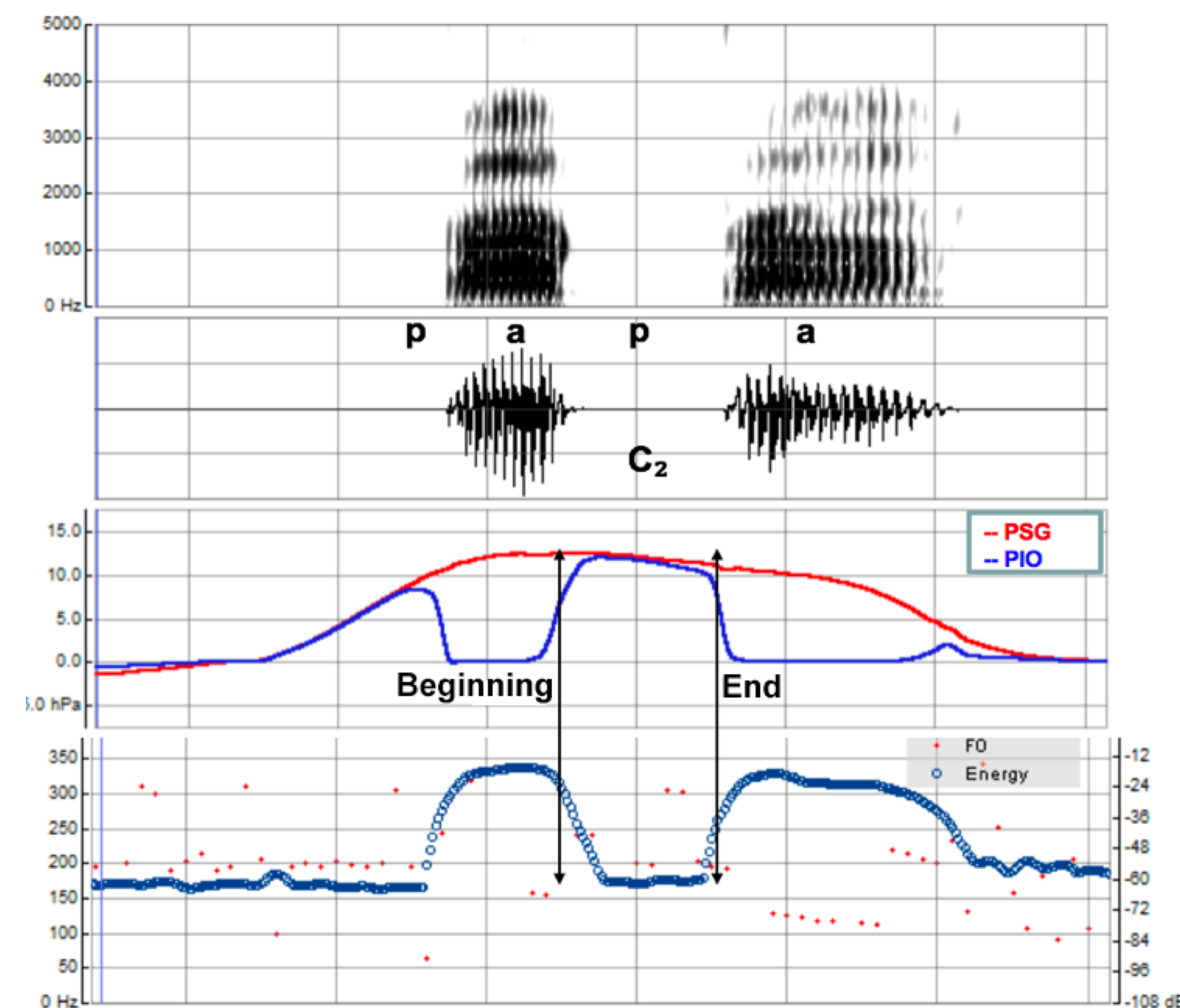
The purpose of this study is to analyze aerodynamic parameters involved in the production of French stops consonants. We focus our analysis on intraoral pressure and subglottic pressure measurements. The main goal of this study is to automate the processing of aerodynamic data in order to contribute providing reference data that are limited in the literature. We also want to analyze pressure variations according to voicing contrast, intervocalic context and different places of articulation. To do this, we carry out a phonetic analysis by means of statistical tests in order to analyze the relevant descriptors to understand variations of consonants. Then, we perform a supervised classification task to assess the relevance of these descriptors. The field of research is multidisciplinary and involves methods in phonetics, automatic language processing and machine learning.

## Materials

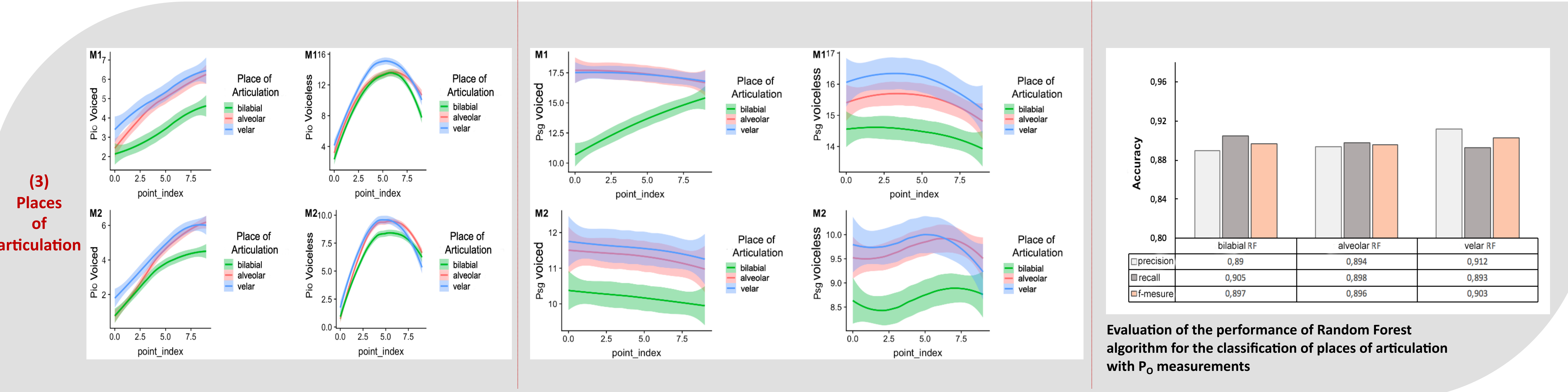
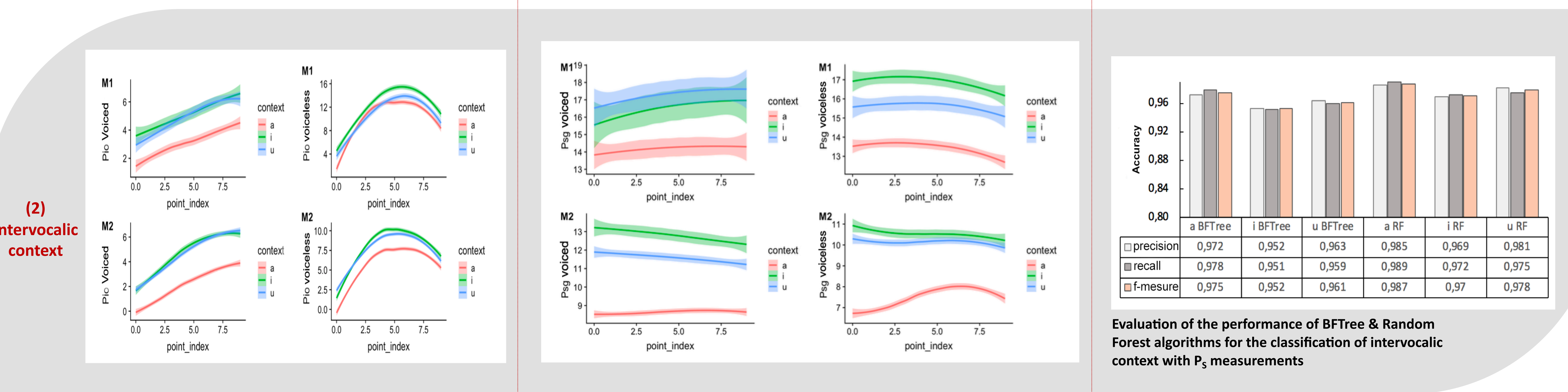
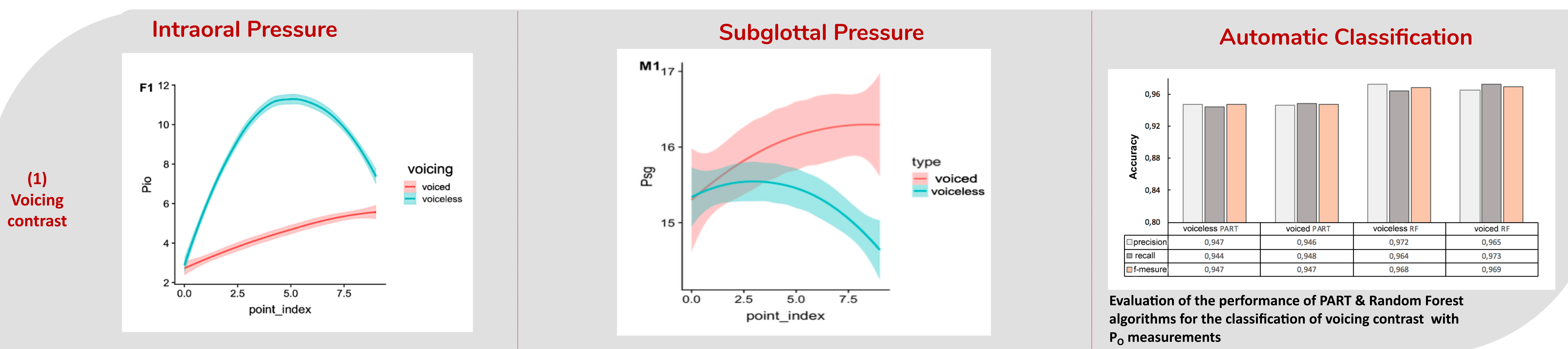
**Participants** 4 native French speakers: two women (labelled F1 and F2) and two men (labelled M1 and M2) with normal larynx and no voice problems.

**Corpus** series of logatomes combining each of the French stops consonants with the vowels /a,i,u/ inserted in the sentence "[C<sup>1</sup>VC<sup>2</sup>V] say [C<sup>1</sup>VC<sup>2</sup>V] again" (ex: "papa dit papa encore") to be repeated five consecutives times.

**Aerodynamics data** Subglottal pressure ( $P_s$ ) by tracheal puncture & Intraoral pressure ( $P_o$ ) with a tube inserted through the nasal cavity into the oropharynx.



## Results



## Conclusion

This research work has highlighted the interest of using aerodynamic data for the automatic classification of French stops consonants. Indeed, during supervised classification, we obtained a performance of 97.8328% for the intervocalic context, 96.839% for the voicing contrast and 89.8821% for the automatic classification of places of articulation. These classification tasks revealed that subglottal pressure was sufficient to detect the consonantal context. The same is true for intraoral pressure coupled with duration, which appeared to be the most relevant parameter for detecting voicing contrast and places of articulation.