

# Building a data base for automatic speech recognition in Parkinson's disease

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## Objective

Describe the rationale and process for acquiring speech data to contribute to increasing accessibility to speech recognition for patients with Parkinson's Disease (PD).

## Background

Disordered speech and voice may limit access to everyday voice activated devices (e.g., mobile phones, smart speakers). These devices have automatic speech recognition (ASR) systems that have been trained on non-disordered speech. This makes it frustrating for individuals with speech disorders, such as those accompanying PD, to utilize these devices. Project Euphonia is an initiative by Google to make speech technology more accessible to individuals with non-standard speech. The first step in this process is to gather large numbers of speech samples from disordered speakers in order to train speech recognition systems. This paper reports initial work to collect speech data from individuals with PD to contribute to this project.

**Project Euphonia is a Google Research initiative focused on helping people with atypical speech be better understood.**

## Method

While there is a vast literature on automatic speech recognition algorithms, to teach these algorithms to understand disordered speech, they need sufficient speech samples from disordered speakers. Because of our over twenty years of research on speech and voice in PD (e.g., Ramig et al., 1995; Ramig et al., 2001a, 2001b; Ramig et al., 2018), including years of gathering acoustic data on patients with PD as well as having access to a large PD community, our research team at LSVT Global was invited to collaborate on Project Euphonia.

## Results

After a series of pilot studies, procedures were established to optimize successful data collection supported by speech therapy mentors. Screening procedures were established for technology, cognitive, motor challenges and potential home support. Recruiting was expanded to include eight major Parkinson's disease organizations. By completion of the final pilot study, 75,356 phrases were collected from patients with PD, MSA, CBD, and PSP. Outcomes of the speech recognition data analysis are reported here.

Total of **54** people with PD completed sufficient recordings to be used in our research (as of February 2021).

The samples from each individual were used to train a personalized Automated Speech Recognition (ASR) model\*

Word error rate was improved by approximately **80%** for speakers rated as MILD, MODERATE and SEVERE, but only **24%** for the 2 speakers rated PROFOUND.



Severities were rated by speech professionals yielding:  
24 MILD  
20 MODERATE  
8 SEVERE  
2 PROFOUND

Tested accuracy for phrases from the "home automation" domain

\*held out 10% of utterances from each individual for testing model performance.

## Conclusions

A feasible data collection procedure has been established and the project will scale up to include larger numbers of patients, disorders and dialects.

ON DEMAND Webinar: <https://register.gotowebinar.com/register/9048479732243754767>



Drs. MacDonald, Jiang, and Cattiau are employees of Google.

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Dr. Ramig, Ms. Hodges, Ms. Reed, Ms. Spielman, Ms. Nauman, and Ms. Bergey are employees of LSVT Global, Inc.

