EvalDy: Assessment of Speech Disorders in Dysarthric Subjects based on the MonPaGe-2.0.2-S Protocol

Pauline Deghorain (a,b), Veronique Delvaux (a,b,c), Kathy Huet (a,b), Myriam Piccaluga (a,b), Virginie Roland (a,b)

(a) Service de Métrologie et Sciences du Langage ; (b) Institut de Recherche et Sciences et Technologies du Langage, Université de Mons, Belgique ; (c) Fonds National de la Recherche Scientifique, Belgique

THEORETICAL INTRODUCTION

« Dysarthria is "a collective name for a group of neurologic speech disorders resulting from abnormalities in the strength, speed, range, steadiness, tone, or accuracy of movements required for control of the respiratory, resonation, articulatory, and prosodic aspects of speech production. » (Pinto & Ghio, 2008)

Variability

- Interindividual variability inherent to speech
- Diversity of clinical presentations for the same etiology
- Diversity of etiologies (Jayaraman, 2024)
- Influence of treatment (Pinto et al, 20I0)
- Methodological divergences (task, measures,...) (Ngo et al., 2022)
- Dysarthria
  - Hypokinetic
  - Hyperkinetic
  - Flacid
  - Spastic
  - Ataxic
  - Mixt
  - Unknown
- Dimensions of speech affected (Pinto & Ghio, 2008 ; Stewart & Riedel, 20I6)
  - Parkinson's disease
  - Wilson's disease
  - Huntington's disease
  - Amyotrophic lateral sclerosis
  - Multiple sclerosis
  - Friedrich's ataxia
  - Cerebellar vascular accident
  - Brain Injury

Proposition of a comprehensive methodology that includes the majority of dysarthria-related parameters

EVALDY PROJECT

The **overall aim** of Evaldy is to characterize and evaluate voice and speech disorders in dysarthria.

Step 1 : Building up an extensive data collection **Step 2 :** Development of specific measurement tools

Identification of relevant acoustic indicators

- Several pathologies
- Various dysarhria
- Differents severities

Acoustic data · Articulatory data · + Acoustic and physiologic measures combination

To meet specific objectives :

- Early dyagnostic (Roland, 2019)
- Differential diagnostic (Laganaro et al., 2021)
- Long-term evaluation
- Retrogenesis hypothesis
- Intelligibility (Pommée et al., 2022)

PATIENTS SELECTION

Inclusion criteria

- Dysarthria
- Diverses etiologies
- Various severity
- 18y and +
- 20 subjects (10 male, 10 female) per pathology

Exclusion criteria

- History of speech-language disorder

Data collection procedure

Anamestic data collection + questionaires administration

Protocol MonPaGe administration

- in 2 sessions of 30-40 minutes
- with H5 micro zoom

Day 1

Days of the Week
Articulation
Intelligibility
Diadochokinesia
Glides
Picture description

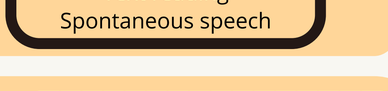
Day 2

Pneumophonatory control
Phonetic flexibility
Prosody
Naslity
Text reading
Spontaneous speech

Rédaction

Location ?
Number of modules ?

Quitness? Collaboration ?
Cognitive state ? Fatigue ?



MATERIALS

Basic modules

Intelligibility
Evaluates how well spoken words are understood in an interactive task with an examiner.

Pneumophonatory Control
Assesses vocal quality and control through sustained vowel and intensity exercises.

Articulation
Measures precision with repetition of pseudowords reflecting French phonetics.

Diadochokinesia
Tests speed and accuracy with quick repetition of specific syllables (homo and hetero DDK).

Prosody
Examines the ability to use intonation in distinguish different phrases with prosodic contrasts

Days of the week
Evaluates the production of automatic series like days of the week during 30 seconds.

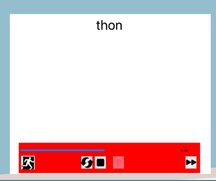
Text reading
Examines continuous reading of a story and evaluates fluency, speech rate and expressive prosody

Picture description/ spontaneous speech
Elicits semi-spontaneous speech production by description of a detailed scene or by responding to questions

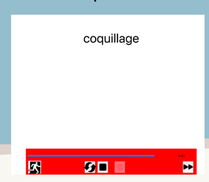
Complementary modules

Add crucial dimensions to analysis : in-depth understanding of articulatory dynamics and compensatory mechanisms in dysarthric patients

Nasality
Examines the articulation of all nasal vowels and consonants in French by repetition of 36 words and 4 sentences



Glides
Evaluates the dynamics of the vocalic gesture by testing the articulatory precision of the French semi-vowels or glides /w/ and /j/ by repetition of 18 words and 18 pseudowords/



Phonetic flexibility
Evaluates the ability to adapt the vocal behavior according specific tasks :

- (a) repetition of an oral model
- (b) repetition with explicit instruction to mimic the oral model
- (c) repetition with explicit instruction to inhibit imitation of the oral model
- (d) production with visual support

NEW

Anamnestic data

General informations
Birth date · Sex · Laterality · Language

Dysarthria
Type · Severity

Others
DBS ? · Speech therapy?

Disease
Disease · Type · Grade · Diagnostic years · Features · Treatments · Comorbodities

Questionnaires by pathology

Pathology	Tools	BDI-II (Beck et al., 1988)	VHI (Jacobson et al., 1997)	DIP (Walshe, et al., 2009)	MoCa (Nasreddine et al., 2005)	Others	QoL
Parkinson's disease		X	X	X	X	MDS-UHDRS (Goetz, 2010)	PDQ-39 (Jenkinson et al, 1997)
CVA		X	X	X	X	X	SS-QoL (Williams et al., 1999)
Brain Injury		X	X	X	X	X	QOLIBRI (von Steinbüchel et al., 2010)
Multiple sclerosis		X	X	X	X	X	SEP-59 (Vernay et al., 2000)
Amyotrophie lateral sclerosis		X	X	X	X	X	SF-36 (Ware & Sherbourne, 1992)
Friederich's ataxia		X	X	X	X	X	SF-36 (Ware & Sherbourne, 1992)
Wilson's disease		X	X	X	X	X	SF-36 (Ware & Sherbourne, 1992)
Huntington's disease		X	X	X	X	UHDRS (HSG, 1996)	H-QoL-I (Clay et al, 2014)

DISCUSSION

Perspectives

Articulatory measures will be integrated alongside acoustic indices to comprehensively assess dysarthric disorders, enhancing the documentation of **laryngeal and supralaryngeal phenomena** and establishing stable **relationships** between these parameters for more reliable assessment tools (Carignan, 2021 ; Styler, 2017 ; Saxon et al., 2020).

Objectives

This collection of recordings from dysarthric subjects with varied etiologies and severities will enable us, in the next phase of the project, to address **five major objectives** defined in relation with the needs of clinical practice and fundamental research. We plan to develop and **validate specific tools to meet targeted this objectives** in clinical practice and research.

Benefits

Few standardized tools exist in French for assessing motor speech disorders (Laganaro et al. 2018), prompting the development of the **MonPaGe protocol**, an **objective, computerized tool** for French-speaking subjects. MonPaGe-2.0.2-S, a screening battery for detecting atypical speech patterns, enables detailed analysis of dysarthric speech across multiple acoustic parameters, crucial for **comprehensive initial assessments.**

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