Current Research in Disordered Speech

Department of Speech & Hearing Sciences

A TRADITION OF INDEPENDENT THINKING
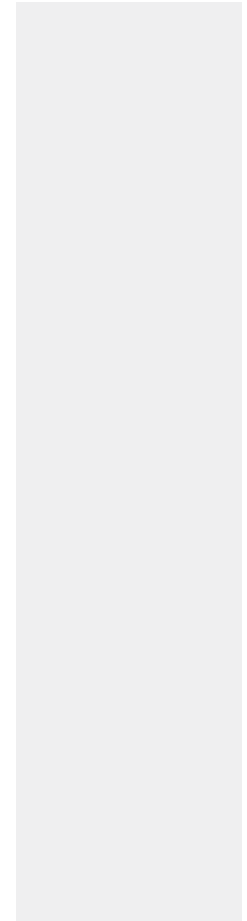
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Research Interests in Speech & Speech Disorders

- Faculty members:
  - Nicole Muller
  - Alice Lee
  - Nicola Bessell
  - Fiona Gibbon (Emeritus Professor)
- Researcher / Postgraduate student:
  - Jennifer Harte
  - Deirdre O'Leary

Research Facilities

- Instrumentations for investigating speech disorders:
  - Electropalatography (EPG)
  - Ultrasound
  - Electroglottography (EGG)
  - Nasometer
  - Digital recorders, microphones, headphones, computers for Acoustic analysis
  - Portable Audiometers
- Speech & Hearing Lab (LG103); clinic rooms; audiology clinic/lab – for speech recordings & perceptual judgements of speech

Nicola Bessell

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Dr. Nicola Bessell

- Clinical case study database
    - Teaching, examining, research with clinicians, clinical training
    - Phonetics and phonology

- Foreign Accent Syndrome
    - phonetic documentation and analysis protocols
    - language processing models
    - develop Irish database

- Acoustics and articulation of varieties of Irish English
    - Munster dialects
        Cork county and city
        Clonakilty, Macroom
    - Newfoundland Irish English

- Fieldwork in indigenous languages and language documentation
    - Haida, Salish, Tlingit, Cant/Gammon

Alice Lee & Jennifer Harte

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Research Interests/Expertise

- Typical speech production & speech disorders due to different causes

- Articulation, resonance, prosody

- Perceptual & instrumental investigation of speech

- Instrumental measures: electropalatography, ultrasound, acoustic analysis

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Electropalatography (EPG) Studies

- Alice and Fiona has published together a number of EPG studies on typical speech production by children & adults and speech disorders in children (e.g. SSDs, cleft palate).

- Types of data for EPG studies: audio files, EPG data files

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Ultrasound Study

- Research interests:
  - Speech disorders in different clinical populations
  - Use of ultrasound for biofeedback in speech intervention
- We've collected data from 2 children with speech sound disorders & 2 age-matched typically developing (TD) children
- Types of data for ultrasound studies: video files, audio files

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Prosodic Skills in Children

- Project: Profiling Receptive and Expressive Prosodic Skills in Children with Spina Bifida and Hydrocephalus (SBH)
  - PI: Alice Lee
  - Co-I: Fiona Gibbon
  - Collaborators: Damhnait Ní Mhurchú, Olivia O'Mahony
  - Consultant: Sue Peppé
 - Research Assistant(s): Jennifer Harte, (Deirdre O'Leary)

Prosodic Skills in Children

1. To identify the strengths and weaknesses of expressive and receptive prosodic skills in children with SBH.

2. To discover if there are differences in prosodic ability between children with SBH and TD children (age- & language age-matched).

3. To find out if prosodic skills are correlated to language skills in children with SBH.

4. To describe the phonetic and perceptual features of expressive prosody in children with SBH.

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Prosodic Skills in Children with Spina Bifida

- Tool: Profiling Elements of Prosody in Speech-Communication (PEPS-C) (Peppé & McCann, 2003)

- A computerised test that assesses the perception and production of (1) turnend; (2) affect; (3) boundary; (4) stress; (5) intonation & prosody.

- Types of data of this project: PEPS-C scores, language test scores (can be summarised in spreadsheet or MS Word), audio files (for acoustic analysis)

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Prosodic Skills in Children

PEPS-C Results
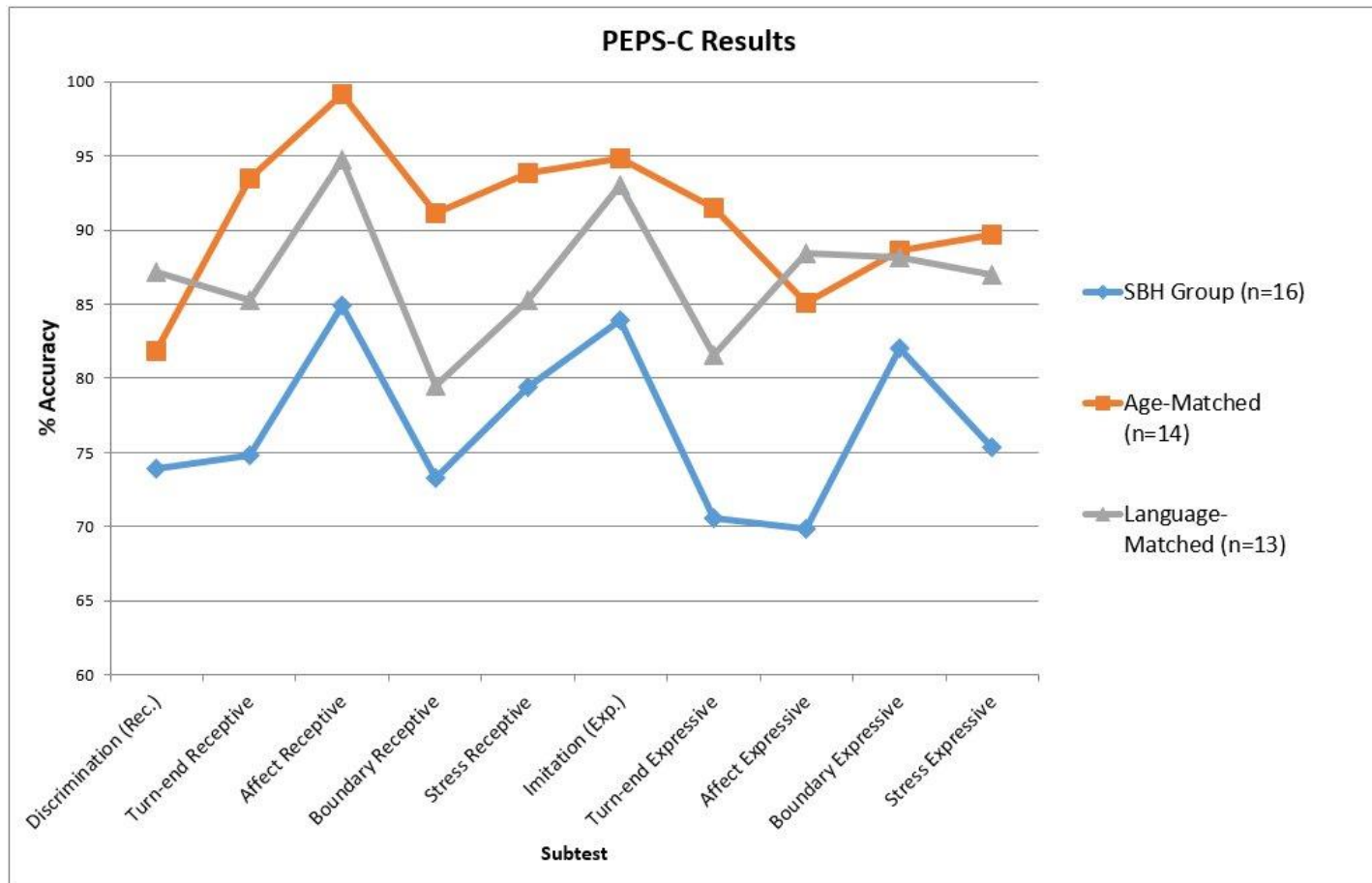
Accent Comprehension in Children with Speech Sound Disorder
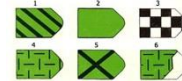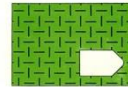

Session 1:
Language Ax.
CELF-P (Core)

Audiological screening test

Session 2:
Cognitive Ax. (Raven's test of Progressive coloured Matrices)

Speech & Oro-motor Ax. (DEAP)

Session 3:
Accent Task

Deirdre O'Leary

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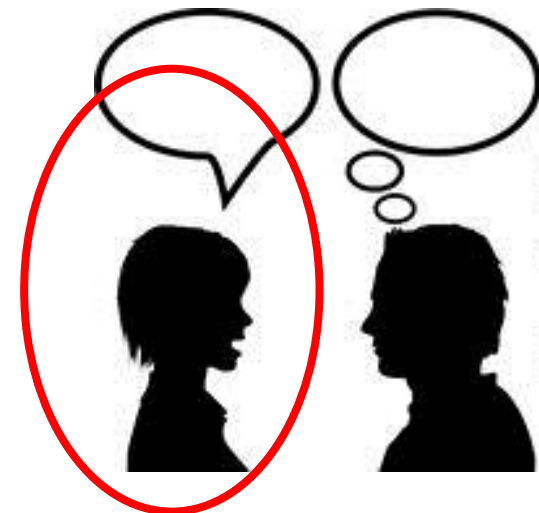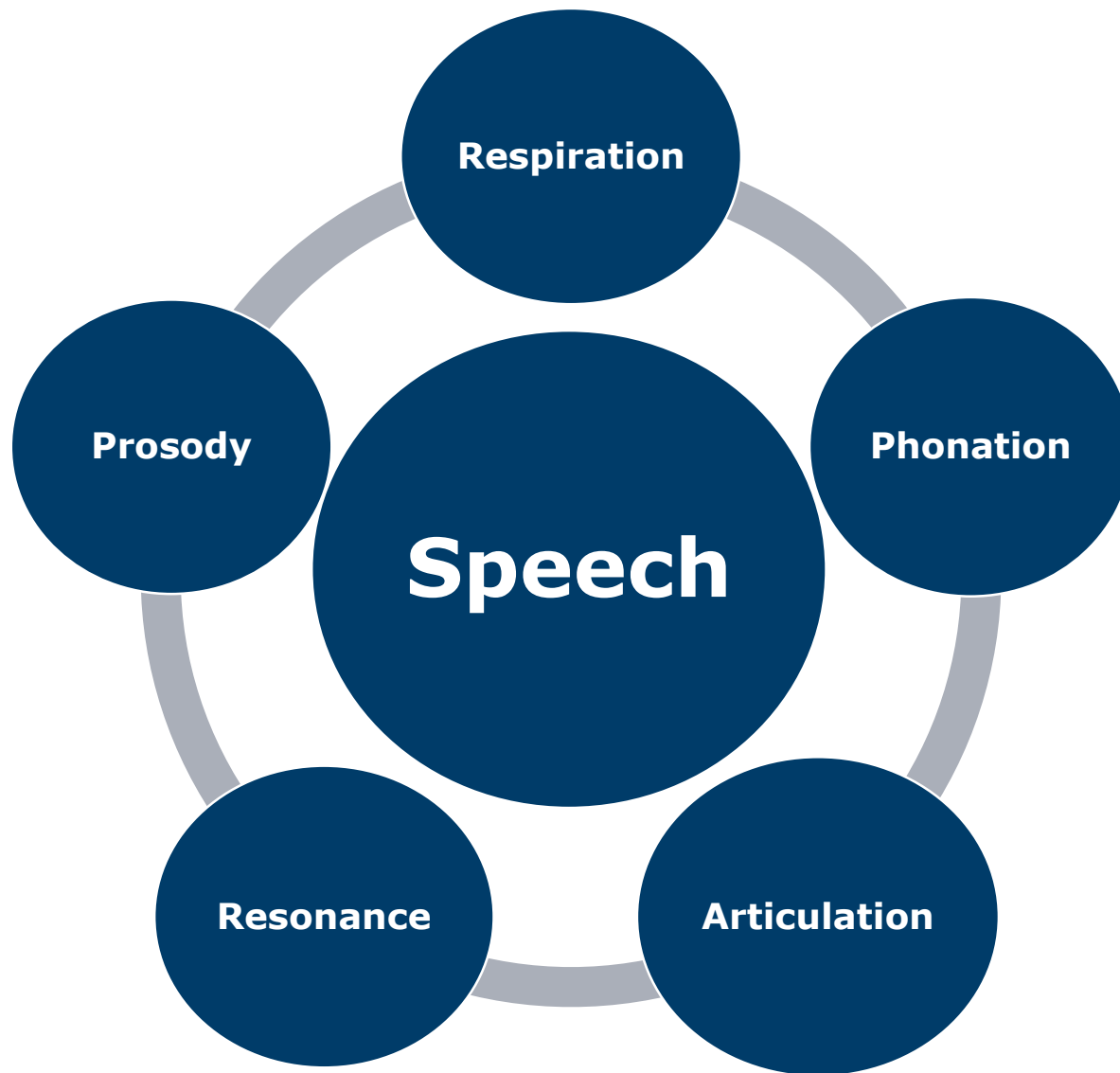# Speech Intelligibility in Down syndrome

Deirdre O' Leary, Dr Alice Lee

Dr Ciara O' Toole, Prof Fiona Gibbon

A TRADITION OF
INDEPENDENT
THINKING
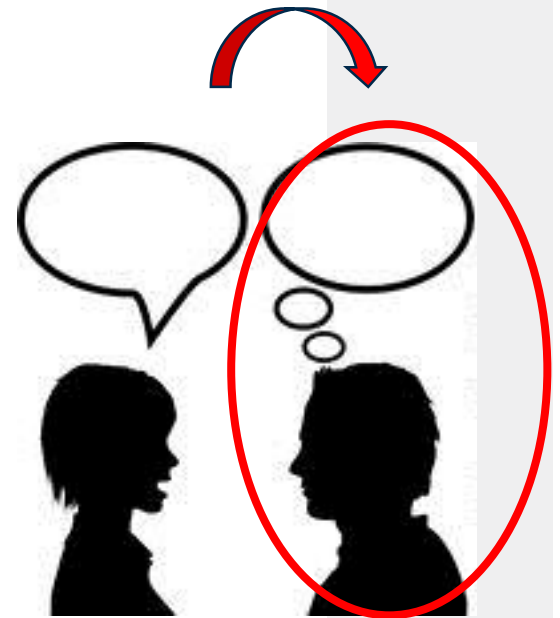
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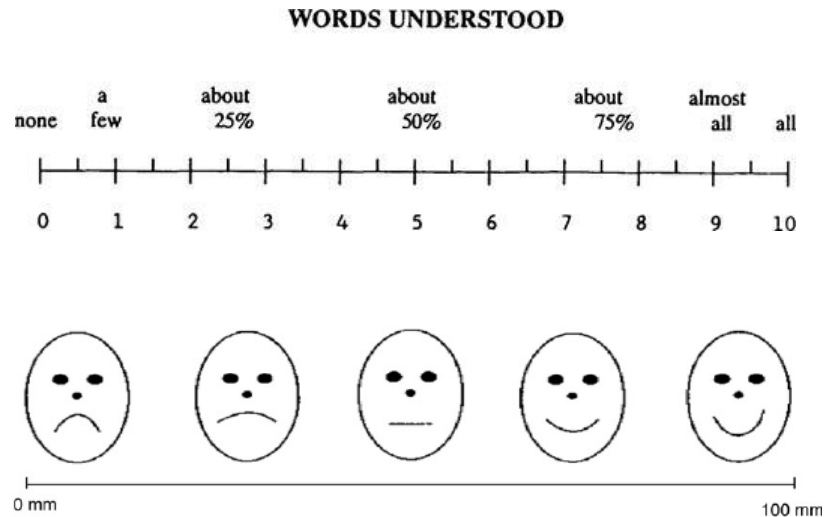
Speech Intelligibility

How much of the speech output that a listener can understand

Assessment of Intelligibility

Perceptual Methods

- Listener's judgement
- Rating scales
- Transcription

WORDS UNDERSTOOD

(Hustad, 2007; Keuning et al., 1999; Magnus et al., 2011)

Assessment of Intelligibility

Acoustic Methods

- Objective evaluation
- Specialised software
- Specific properties
- Frequency; amplitude, duration, etc
- The relationship between acoustic parameters and speech intelligibility is then investigated

(Hustad, 2007; Keuning et al., 1999; Magnus et al., 2011)
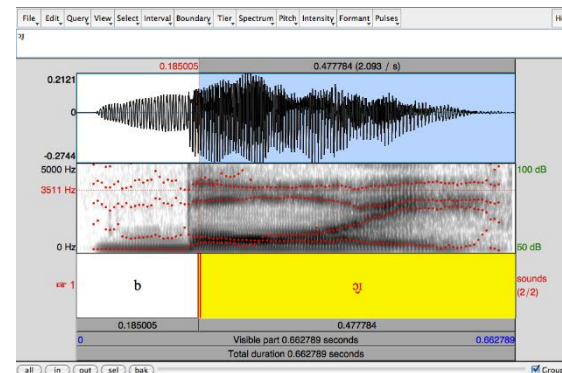
Aims of Study

- To assess the 1. perceptual features and 2. the acoustic features of each speech component in Down syndrome, and their influence on speech intelligibility

- To investigate the impact of listener experience on speech intelligibility scores in Down syndrome

- To investigate the relationship between speech intelligibility and language ability in Down syndrome

Participants

(N=30 in each group)
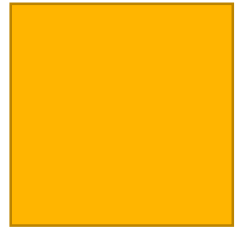
Speakers with DS (N=30)

- Aged 16 year+
- DS as only diagnosis
- Communicate in spoken sentences
- Monolingual English speakers
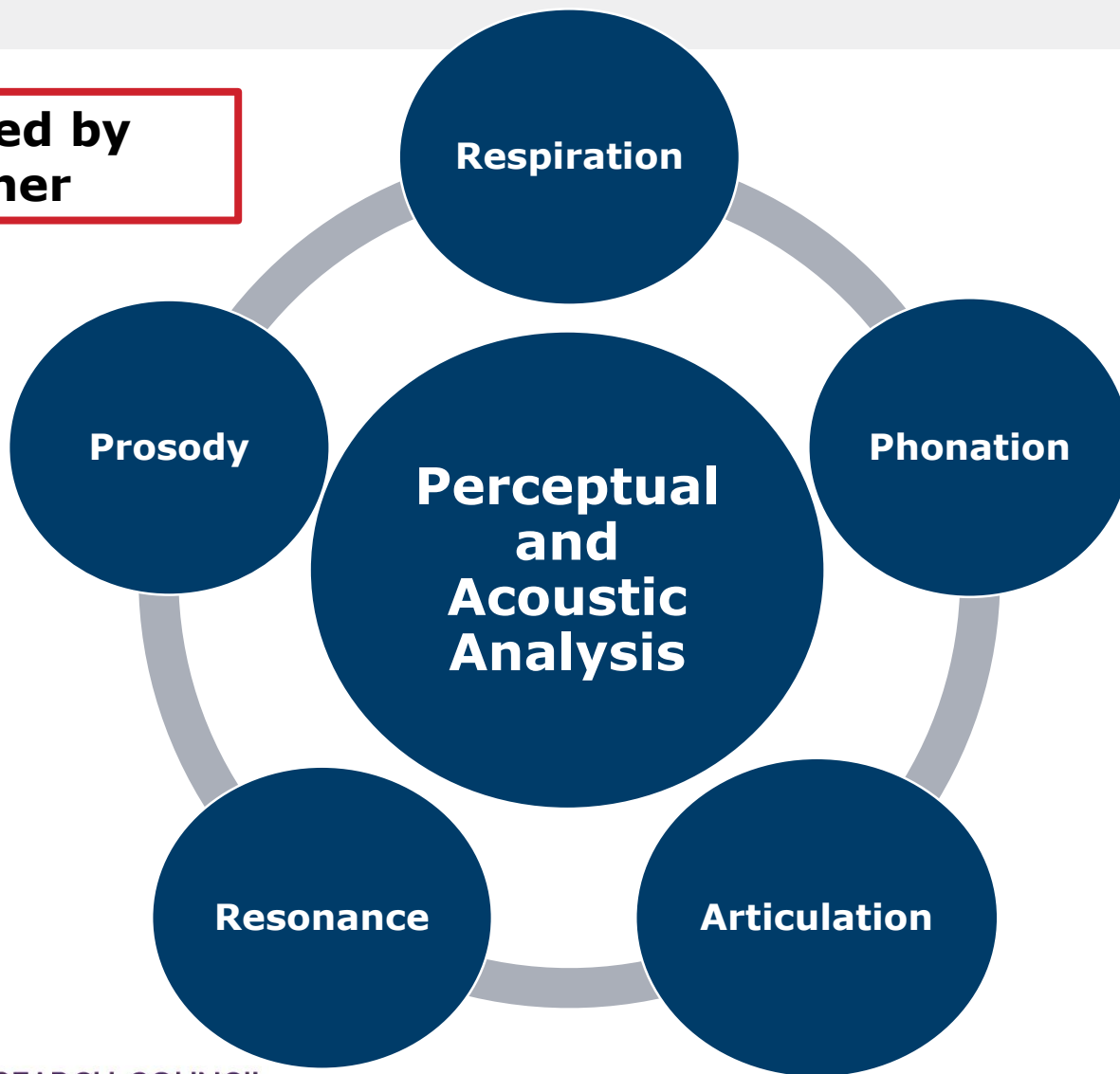- Mild-moderate range of ID

Typical Speakers (N=30)

- Matched for age (year) and gender
- Monolingual English speakers
- Pass hearing screen

Provide various speech samples for analysis

Speech Analysis

Conducted by Researcher

- Respiration
- Phonation
- Articulation
- Resonance
- Prosody

Perceptual and Acoustic Analysis

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Participants

Listeners

- Typical adults
- Monolingual English speakers
- Live in Ireland for three years
- Pass hearing screen

Naive Listeners (n=20)

No training in judgement of speech disorders

No regular contact with individuals with an ID

Experienced Listeners (n=10)

SLTs working full time with individuals who have speech difficulties, for ≥3 years

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Listener Tasks

Rating

- Hear a short speech sample
- Rate on a visual analogue scale how clear/unclear the speaker's speech is

Extremely unclear speech ———————————— 100% clear speech

Intelligibility score = score out of 100

Transcription

- Hear sentences from repetition/reading sample
- One repetition allowed
- Write down what they hear
- Researcher will compare to target

Intelligibility score = (number of words correctly transcribed/total number of words) x 100

Data

Both Groups

Recordings of:

- Spontaneous speech sample

- Prolonged vowels /a/ /i/

- Vowels /i/, /u/, /æ/, /ɑ/, /ʊ/, /ɛ/ (hVd)

- Plosives /b/, /p/, /d/, /t/, /g/, /k/ (plosive + /i/)

- Fricatives /s/, /f/, /v/, /ʃ/, /z/ (plosive + /i/)

- Sentences (read/repeated) from Assessment of Intelligibility of Dysarthric Speech (AIDS)

(produced in carrier phrase "I see _____ again")

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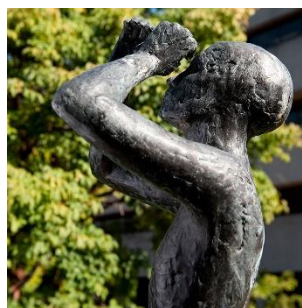Coláiste na hOllscoile Corcaigh

Data

Group with Down syndrome

Recordings of:

- Single words elicited from Goldman-Fristoe Test of Articulation-3 (GFTA-3)
- CAPE-V scores (voice assessment)

Plus:

- Rating and transcription scores of speech intelligibility from naïve and experienced listeners
- Scores from Robbins & Klee oro-motor assessment
- Perceptual rating scores for respiration, resonance and prosody (based on Darley et al. parameters)
- Hearing levels (obtained from audiological examination)
- Scores from Test for Auditory Comprehension of Language (TACL-4)

Thank You!