Speech dysfluencies in people with Down’s syndrome.

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Overview

- Introduction and overview
- Characteristics Down’s syndrome
- Speech dysfluencies & Down’s syndrome
- Present study: Method
- Present study: Results & implications
- Q & A
Characteristics Down’s syndrome

- Trisomy 21
- Most frequent chromosomal defect and cause of intellectual disability
- Incidence: 1:600
- Male > female
- IQ: 30 – 50 (50 % to 60 % of population)
- Specific and typical physical characteristics
- Associated with extensive neuropathology

Characteristics Down’s syndrome

- Speech-language development
- Prelinguistic phase: different mother-child interaction (Beveridge et al. 1989)
- Vocabulary: delayed & limited (Buckley & Rondal, 2003)
- Syntax: delayed, telegram style (Buckley, 1999; Rondal, 2003)
- Until 25-30 y./ ceiling effect

**Language:**
- morpho-syntactic problems
- semantics: limited content ↔ vocabulary
- pragmatics: sufficient social interaction abilities
- receptive > expressive
Characteristics Down’s syndrome

- Speech-language development
- Anatomical defects, speech motor problems, hearing loss
- Articulation: inaccurate, uncoordinated, flaccid
- Phonological simplification processes + unusual and inconsistent error patterns (Buckley & Rondal, 2003)

**Speech:**
- phonological & phonetic disorder
- dysfluent

- Delay - Difference Hypothesis (Williams, 1996)

Literature dysfluencies & Down

- **Cabanas (1954)**
  observation (n=50); age: 5-15 y.
  lack of self consciousness, no anticipation > cluttering

- **Zisk & Bailer (1967)**
  screening procedure (n=67), 7-48 y.
  59% dysfluent: 19% stut., 24% clut., 13% both

- **Preus (1973; 1990)**
  (n=47); age: 10-27 y.
  85% part-word rep., 60% prolongations
  30% secondary behaviors > stuttering & cluttering
**Literature dysfluencies & Down**

- **Willcox (1988)**
  Case studies (n=5), age: 10-15 y.
  Primarily part-word repetitions & prolongations

- **Stansfield (1990)**
  Questionnaire, screening, SSI (n=793>160>67), age: adults
  27% dysfluent
  primarily stuttering

- **Bray (2003)**
  Based on SLT questionnaire (n=27)
  Children & young adults (≤ 21 y.)
  90% of dysfluencies reported are ‘stutterlike’ dysfluencies

**Summary**

- **Stuttering or cluttering?**
  - Remains unclear
  - Agreement on core characteristics of stuttering (whole and part word repetitions, prolongations and blocks)
  - disagreement on covert & secondary features

- **Prevalence studies stuttering**
  - Intellectual disability in general:
    1% ([Sheehan et al., ’68]) - 20.3% ([Schlanger, ’53]) ↔ **Stansfield (’90): 6.3 %**
  - Higher prevalence in Down’s syndrome!
    10% ([Keanan, ’70]) - 60% ([Preus, ’72])
Diagn. criteria for cluttering (307.00):

“A disorder of speech fluency involving both the rate and the rhythm of speech resulting in impaired intelligibility. Speech is erratic and dysrhythmic, consisting of rapid and jerky spurts that usually involve faulty phrasing patterns (e.g., alternating pauses and bursts of speech that produce groups of words unrelated to the grammatical structure of the sentence).”

Essential symptoms
- Fast & irregular speech
- Frequent disfluencies (rep.) during spontaneous speech (stutt)
- Filled (incorrect) pauses
- Short attention span (distractibility)
- Difficulties concentrating
- Unconscious of the problems

Optional symptoms
- Confusing, disorganized language
- Limited narrative skills
- Limited oral/motor abilities
- Misarticulation
- Poor intelligibility
- Poor handwriting
- Auditory perceptual difficulties
- Learning difficulties
- Hyperactivity
- Social or vocational problems
- Family history of fluency disorders
- …
**Literature dysfluencies & Down**

- **Explanation high prevalence** (Willcox, 1988; Devenny et al, 1990; Starkweather, 1994; Guitar & Peters, 1999; Wingate, 2002)

  **Different hypotheses:**
  - Genetic factors
  - Delayed and/or disordered language development
  - Limited speech motor abilities
  - ...

**Method**

- **Questions:**

  1. *Qualitative and quantitative analyses of speech dysfluencies in people with Down’s syndrome.*

  2. *What is the prevalence of stuttering/cluttering in people with Down’s syndrome?*

  3. *To what extent are these dysfluencies related to language profiles, speech motor abilities, & developmental age.*
Method

- **Participants:**
  - n = 150
  - criteria: Native Flemish speakers
  - Diagnosis of Down syndrome
  - Use of spoken language

<table>
<thead>
<tr>
<th>Age group</th>
<th>n</th>
<th>M</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>≤ 12;11 years</td>
<td>50</td>
<td>8.8 y.</td>
<td>3 y.</td>
</tr>
<tr>
<td>13 – 21;11 years</td>
<td>50</td>
<td>17;9 y.</td>
<td>2;6 y.</td>
</tr>
<tr>
<td>≥ 22 years</td>
<td>50</td>
<td>40;1 y.</td>
<td>9;1 y.</td>
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Method

- **Data collection:**
  1. Spontaneous speech sample min. 30’
     at least 200 W
     standardized procedure

  * Stuttering criterion: > 3% within-word dysfl. and/or monosyllabic word repetitions
    severity at least mild on a standardized test

  * Random selection of 50 utterances: Articulatory rate
    10 dysfluency categories

(Adams, 1982; DeJoy, 1975; Johnson, 1963)
Method

- **Data collection:**
  2. Standardized language test (CPZ; Willema & Verpoorten, 1996)
     - 4 components: TREN & TREV
       - TEXN & TEXV
  3. Social self-coping scale (SRZ; Kraijer & Kema, 1995)
     - caregiver questionnaire
     - 4 scales: self-support, language, goal orientation, social orientation
     - several items on 5-point Likert-scale
     - range: 11 groups 3, 4, 5L, 5H, … - 9

Method

- **Data collection:**
     - trisyllabic /pateka/
     - 3 trials: 10 x /pateka/
     - DDK-rate: PRAAT (Boersma & Weenink, 2006)
     - Accuracy: artic. errors: 6 categories
     - Dysfluencies
  5. Standardized stuttering severity measurement (SSI-3; Riley, 1994)
  6. Levels of developmental age & hearing
Method

- Reliability measurements:
  - Spontaneous speech:
    - Dysfluency categories: Agreement/Agreement+Disagreement: .92-.95
  - DDK:
    - Duration measurement Praat: Pearson r: .95-.96
    - Analysis errors: Agreement/Agreement+Disagreement: .88-.95
  - SSI-3:
    - % dysfluencies: Pearson r: .99

Preliminary results
Results: 1. Analysis speech dysfluencies*

1. Analysis speech dysfluencies

- **Overall speaking time**
- **% Fluent speaking time**
- **% Dysfluent speaking time**

* Only participants ≥13 y.

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Results: 1. Analysis speech dysfluencies*

- **Relative percentage**

* Only participants ≥13 y.
Results: 1. Analysis speech dysfluencies*

![Graph showing dysfluency categories](image)

Results: 1. Articulatory speaking rate*

![Graph showing syllables per word and syllables per second](image)
Results: 2. Stuttering prevalence

![Graph showing stuttering prevalence by age and participant group.]

Results: 2. Stuttering severity

![Graph showing stuttering severity by age and participant group.]

SSI-3 subscales: Frequency, Duration, Physical Concomitants, Total Overall Score.
Results: 3. Language profiles

- In progress

Results: 4. DDK task

- Based on a matched subgroup (± 5 M) (n = 62)
  31 PWS  (mean age = 23;10 y., SD 12;7 y.)
  31 PWNS (mean age = 23;09 y., SD 12;7 y.)

- DDK-rate: average: 1.67 it/sec (SD .48)
  correlation with age: r = 0.63; p < 0.001
Results: 4. DDK task

- **Articulation errors**: no correlation with age

![Articulation errors chart]

- **Dysfluencies**: no correlation with age

![Dysfluencies chart]
Results: 4. DDK task

- PWS – PWNS: no significant differences for DDK-rate, articulation errors, dysfluencies

- Stuttering severity: ↑ amount of dysfluencies 
  \[(F = 3.77; p < 0.05)\]

Results: 5. Differences PWS - PWNS

- PWS – PWNS: no significant differences for
  Social self coping
  Hearing
  Developmental age/ IQ
  DDK-rate, DDK accuracy, DDKdysfluencies
  Language (needs further analysis)

- PWS – PWNS: significant differences for
  Age
  Overall fluent/ dysfluent speaking time
  Overall amount of dysfluencies
Discussion

- 36% (PWS) & 26% (PWNS) of speaking time is dysfluent
- Normal population (Stes, 1997)

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<th>Age Group</th>
<th>Dysfluency Types</th>
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<tr>
<td>6-12y</td>
<td>66.6% filled pauses, 10.6% sentence corrections, 3% word repetitions, &lt; 1% part word repetitions, prolongations, blocks</td>
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<tr>
<td>≥18y</td>
<td>5.4%</td>
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Discussion

- Type of dysfluencies
  - 60-70%: pauses & filled pauses (in both groups)
  - PWS higher proportion of all dysfluency types
  - Block & part word repetition most frequent SLD
    - ≠ Preus (1973) & Willcox (1988)

- Word length: mono - bisyll. words
  - = Buckley & Rondal (2003)
Discussion

- Stuttering/ Cluttering? type & secondary behaviors = Bray (2003), Preus (1973) ≠ others

- Results prevalence study stuttering (22%- 44%- 58%) = Cabanas (1954), Gotssleben (1955), Preus (1973), Zisk & Bailer (1967)

- Prevalence increases with age!

- DDK-rate M: 1.67 it/sec cf. 12-13y. (Fletcher, 1972)
  cf. Yaruss et al. (M: 1.24 it/sec )
  cf. Devenny et al. (M: 5 - 4 rep/sec )
  ↑ with age: ceiling effect?

- Articulatory speaking rate
  M: 3.8 syl/sec  cf. Yaruss et al. (M: 4.23 syl/sec )
  cf. Devenny et al. (M: 2.1 - 2.8 syl/sec )

- Simple - complex motor abilities
Discussion

- DDK accuracy: similar PWS & PWNS similar to normal pop. (Yaruss & Logan, 2003)

- DDK fluency: production of dysfluencies during DDK-task is NOT a good indicator for stuttering is an indicator for stutter severity (cf. Hall & Yairi, 1999)

Q & A

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