



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** (Willems, 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



Literature dysfluencies & Down

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% (Keane, '70) - 60% (Preus, '72)



DSM-IV

- **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 (stuttering)
- 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

Age group	n	M	SD
≤ 12;11 years	50	8,8 y.	3 y.
13 – 21;11 years	50	17;9 y.	2;6 y.
≥ 22 years	50	40;1 y.	9;1 y.



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; Willems & 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 Lickert-scale
range: 11 groups 3, 4, 5L, 5H, ... - 9



Method

- **Data collection:**

4. **Diadochokinetic task**

cf. Yaruss & Logan (2002)

trisyllabic /pətəkə/

3 trials: 10 x /pətəkə/

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

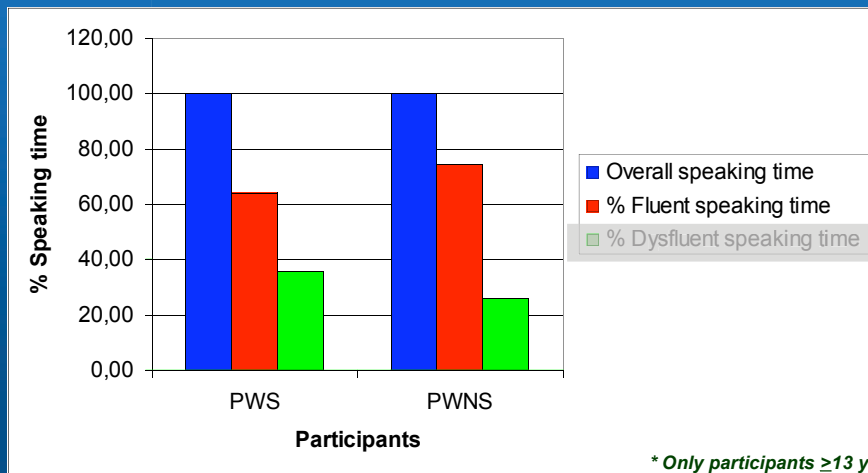
SSI-3:

% dysfluencies: Pearson r: .99

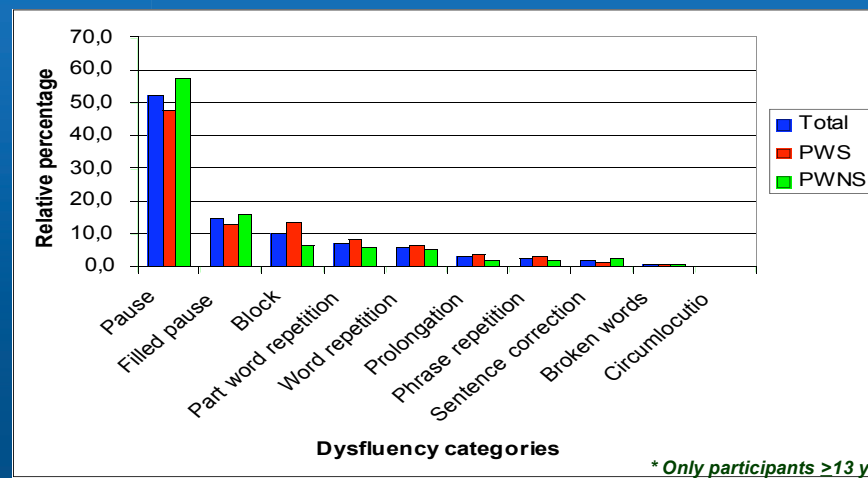


Preliminary results

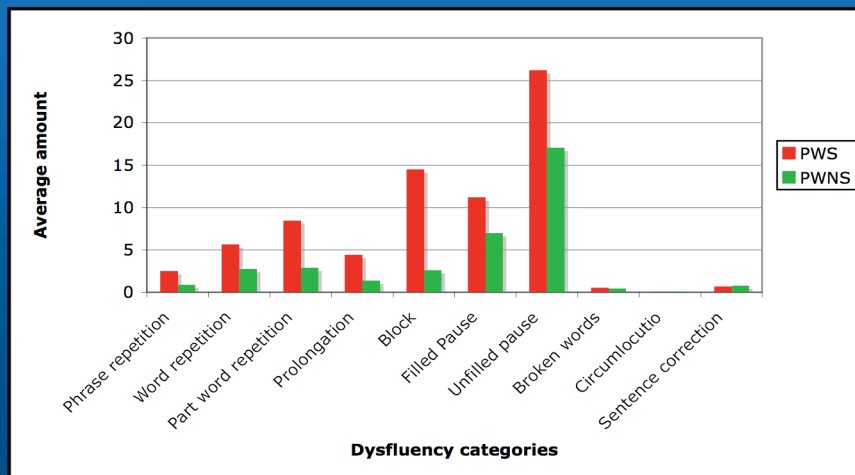
Results: 1. Analysis speech dysfluencies*



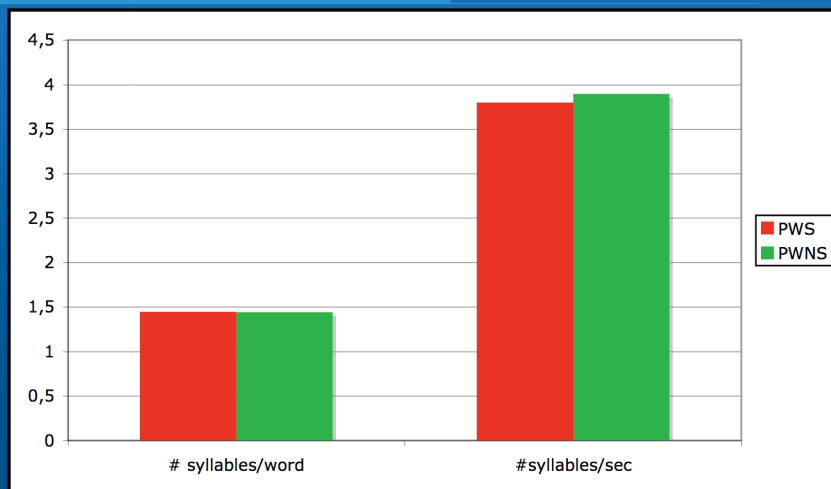
Results: 1. Analysis speech dysfluencies*



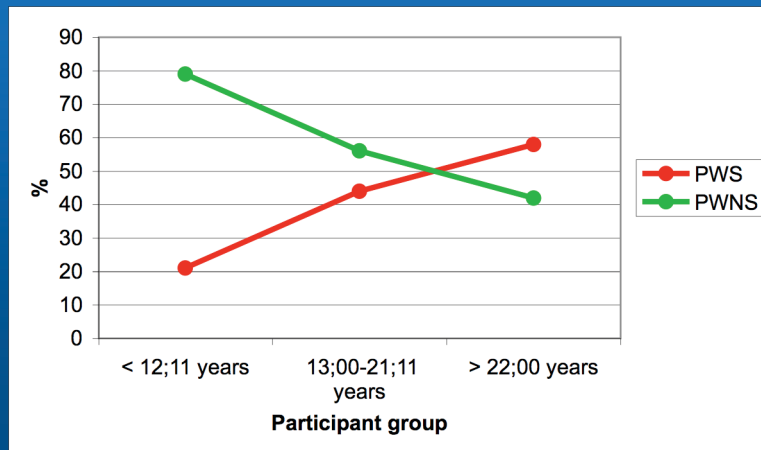
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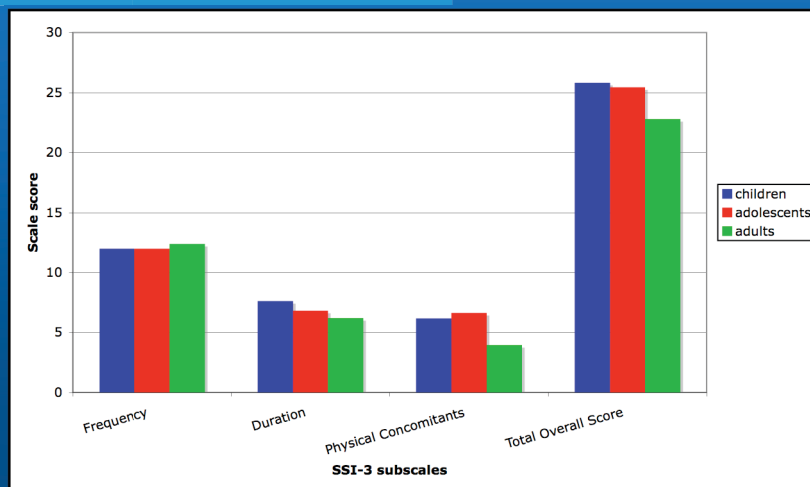
Results: 1. Articulatory speaking rate*



Results: 2. Stuttering prevalence




Results: 2. Stuttering severity





Results: 3. Language profiles

- In progress

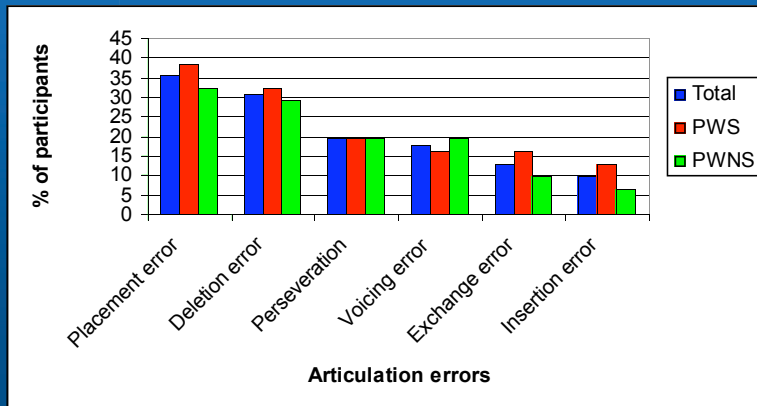


Results: 4. DDK task

- 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: $r = 0.63$; $p < 0.001$

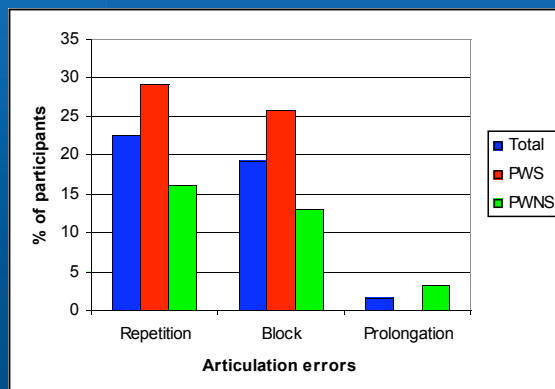
Results: 4. DDK task


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



Results: 4. DDK task

- **Dysfluencies: no correlation with age**





Results: 4. DDK task

- **PWS – PWNS:** no significant differences for DDK-rate, articulation errors, dysfluencies
- **↑ Stuttering severity:** ↑ amount of dysfluencies
($F = 3.77$; $p < 0.05$)

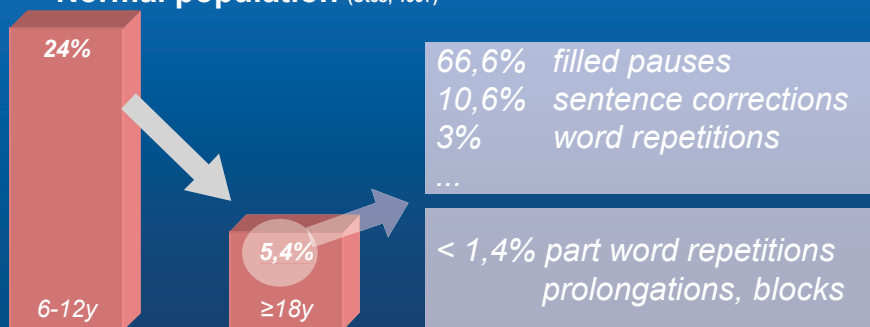


Results: 5. Differences PWS - PWNS

- **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)



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!**



Discussion

- **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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