



Queen Margaret University  
EDINBURGH

# **EPG and Down's syndrome: where are we now?**

Sara E. Wood

*Queen Margaret University, Scotland*

1999

Single case study

2005

2006

2007

2008

2009

2010

2011

2012

2013

2014

**MRC**

Assessment and Treatment of  
Impaired Speech Motor Control  
in Children with DS

**Baily Thomas**

Enhancing Speech Intelligibility in  
Children and Young People with DS

**Nuffield Foundation**

Improving the Speech Communication  
Abilities of Children with DS: a New  
Model of Service Delivery Using EPG

PhD

Joanne  
Cleland

PhD

Rebecca  
Rodgers

PhD

Claire  
Timmins

# Single case study

Gibbon, F.E., McNeill, A.M., Wood, S.E. & Watson, J.M.M. (2003). Changes in lingual palatal contact pattern during therapy for velar fronting in a 10-year old with Down's syndrome. *International Journal of Language and Communication Disorders*, 38(1), 47-64.

- Accuracy of placement for /t/ and /k/ targets
- Centre of gravity measure
- Variability index to quantify stability of contact patterns

# Findings of single case study

Pre-therapy	Post-therapy
<b>/t/ &amp; /k/ identical placement</b>	<b>87% of velars accurate</b>
<b>No difference in measure of COG between /t/ and /k/</b>	<b>Statistically significant difference in COG measure</b>
<b>Stable contact patterns for /t/ &amp; /k/</b>	<b>Stable contact patterns for /t/ &amp; /k/</b>

## CONCLUSIONS DRAWN:

- EPG has potential as an effective diagnostic and therapy procedure for articulation errors in people with DS
- A major issue still to be addressed, however, is the extent to which others will benefit from this approach to intervention.

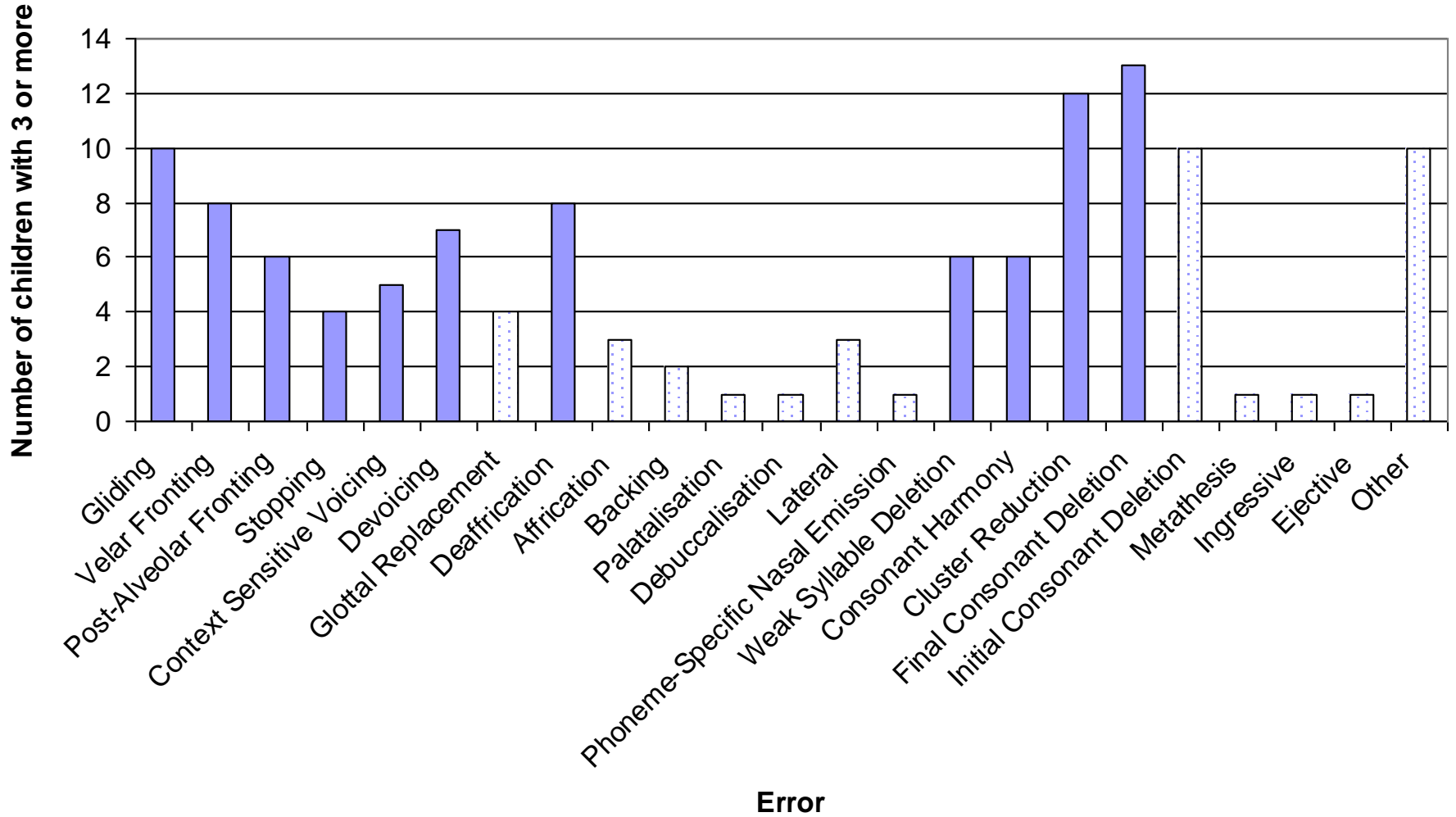
# 3 year MRC project

- 30 children with DS
- Inclusion criteria
  - Chronological age 8 -18 years
  - Mental age equivalent 3+ years
  - Hearing no greater than 40dB when aided
  - No non-correctable visual impairment
- Assessments
  - WISC cognitive profiling
  - DEAP
  - CSIM
  - EPG assessment

# Speech

- Severe speech disorders, which do not correlate with language or cognition
- PCC range from 12.93% to 87.92%

## Error Types by Number of Children



27 Children with Down's Syndrome

Speech, Language, Cognitive Assessments  
EPG recording

**Conventional  
Therapy  
(EPG assessment)**

**EPG Therapy**

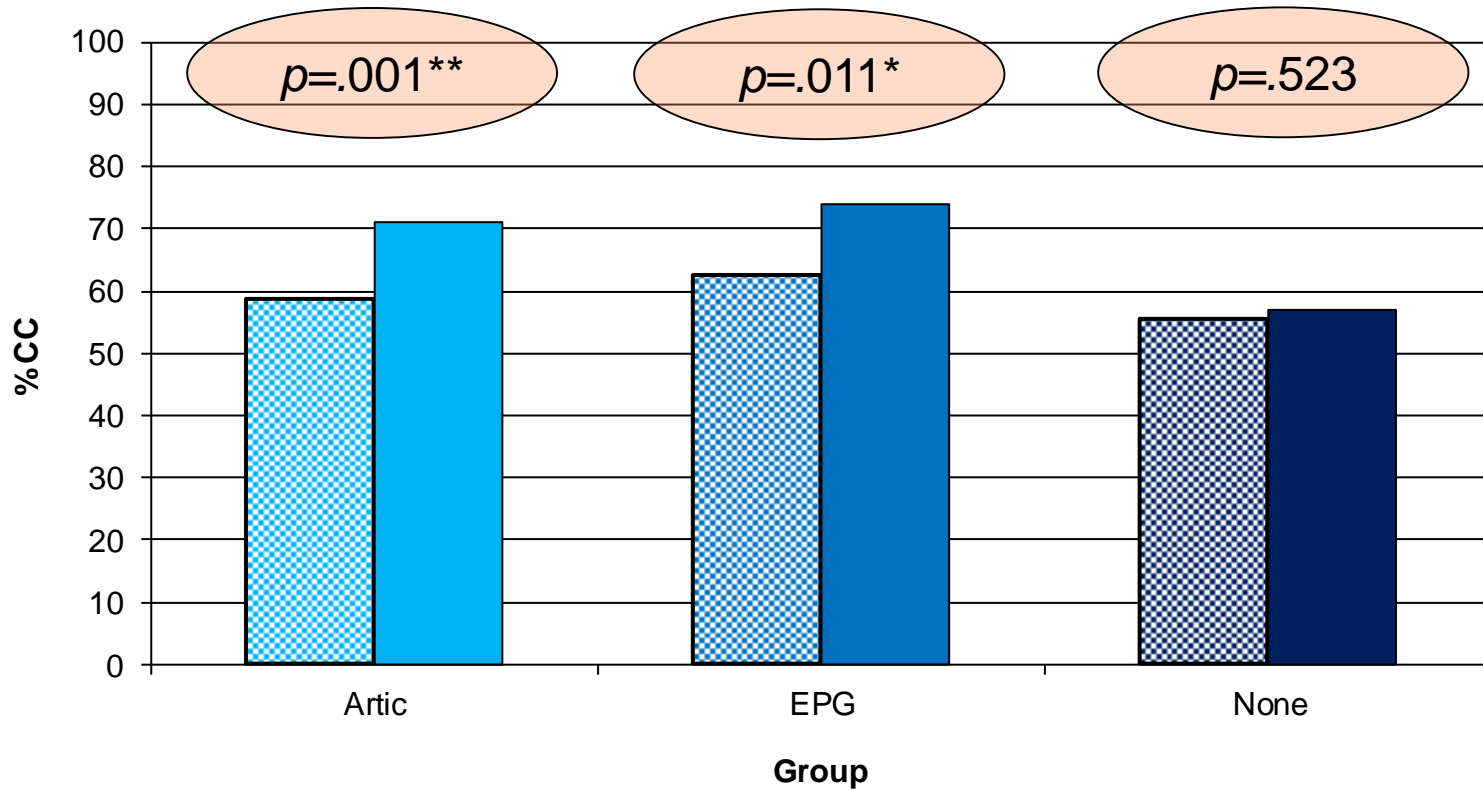
**Control  
(treatment as usual)**

Pre-treatment recordings + 0, 3 and 6 month post-treatment recordings.  
EPG (lingual-palatal contact)  
DEAP single word % phonemes correct  
Speech intelligibility measure



# PCC: All groups

Increase in PCC



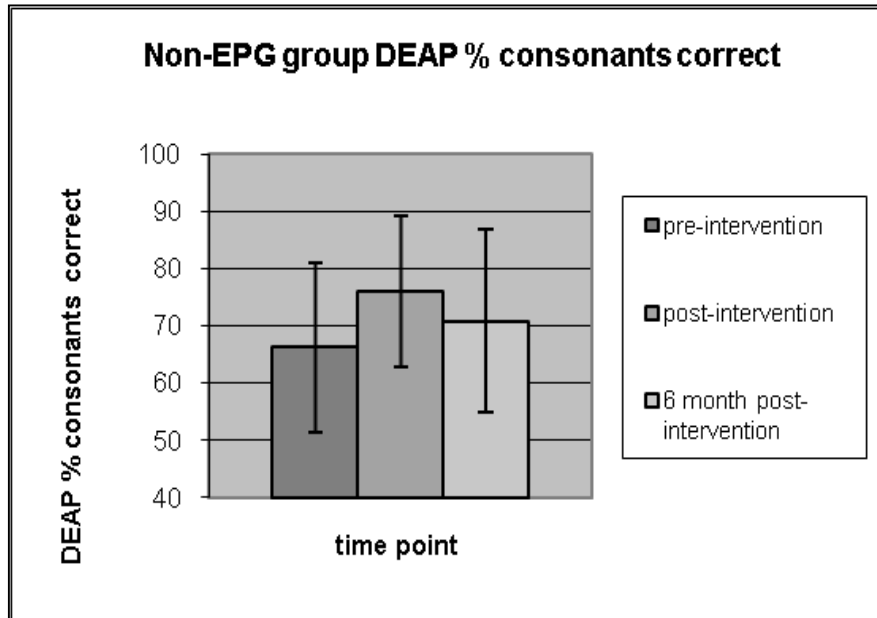
# EPG measures immediately post intervention

- The articulation group and the no therapy group show no changes in variability
- The EPG group shows a reduction in variability of /s/ post-therapy
  - 5 out of 7 children had therapy targeting sibilants
- Changes in EPG patterns post-therapy are observable but difficult to quantify, especially in children with atypical anatomy

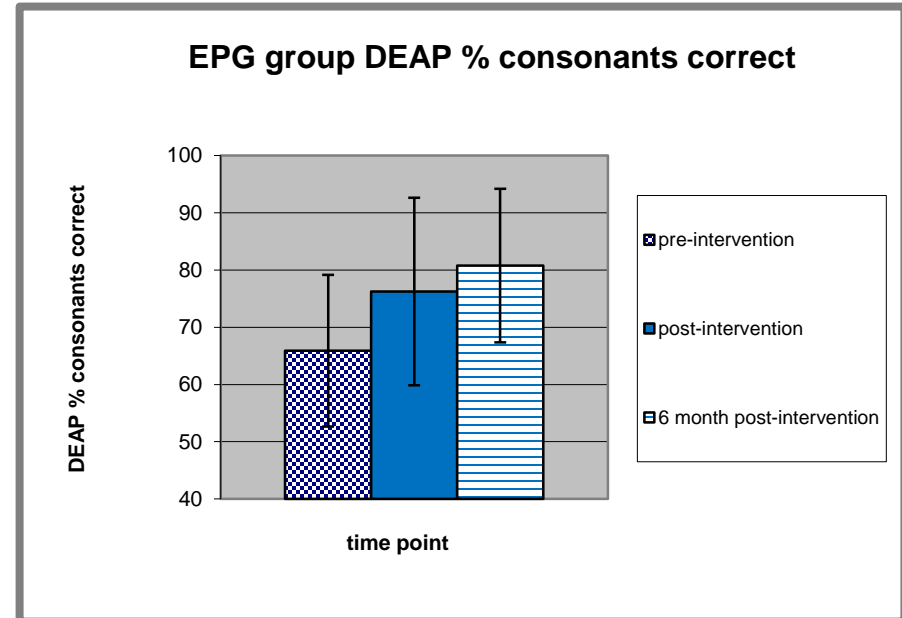
# Perceptual measures immediately post intervention

- Both of the therapy groups show improvements percentage consonants correct, suggesting that speech disorders can be improved
- EPG seemed to show no advantage over traditional therapy
  - Children were randomly assigned to groups and therefore not specially selected for suitability for EPG
  - Many children had issues which could not be addressed using EPG (e.g. ingressive fricatives)

# Treatment group outcomes at 3 time points post intervention



Mean % consonants correct increases immediately post-intervention, with partial relapse at 6 month post-intervention



Mean % consonants correct increases immediately post-intervention, with further increase at 6 month post-intervention

# PhD completions

- Joanne Cleland (PhD by publication)

*Speech & Prosody in Developmental Disorders:  
Autism & Down Syndrome*

- Rebecca Rodgers

*Voice quality of children and young people with  
Down's Syndrome and its impact on listener  
judgement*

# Current PhD

- Claire Timmins

*Acoustic and Articulatory Analysis of Fricative Production in Children with Down's syndrome*

- Detailed EPG analysis of 27 children with DS using both quantitative and qualitative analysis of articulation
- Case studies examining the relationship between motor control, dentition and palate shape on articulation of fricatives
- Detailed pattern analysis
  - Timmins, C., Hardcastle, W.J., Wood, S.E. & Cleland, J. (2011). An EPG analysis of /t/ in young people with Down's syndrome. *Clinical Linguistics and Phonetics*. 25 (11-12) 1022-1027.

# Current funded research



Improving the speech communication abilities of children with Down's syndrome: a new model of service delivery using electropalatography

- Aims are two-fold:
  - To evaluate the feasibility of a new consultative EPG-based model of intervention
  - To explore the effectiveness of EPG in improving the speech production and intelligibility of children with DS who are aged 6 to 10 years

# Current funded research



- 20 children with DS aged 6 to 10 years from mainstream and special school
- Learning Assistants (LA) receive training in speech development in DS and EPG
- Assessment of all children by research SLT and individual therapy plans devised
- Intervention carried out daily by LA
  - 10 mins for 12 weeks using PTU
  - School visits every 2 weeks from research SLT
- Reassessment immediately post intervention, 3 & 6m



# Thanks

- Medical Research Council
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- Nuffield Foundation
  
- All the participants, parents & educational staff