



The phonological abilities of hearing impaired children: Interim results from the LOCHI study

Presented by

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- Phonological assessment (analysis of error patterns)
- No universal agreement on precise ages or the order of suppression of error patterns (Flipsen & Parker, 2008)
- Developmental vs non-developmental (unusual) patterns



Phonological Patterns and HI children: Literature Summary

- 11 total studies
- Sample sizes <21 (Mean – 10)
- No clear criteria
- Patterns reported:



cluster reduction, final consonant deletion, voicing & devoicing, stopping, assimilation, liquidation, initial consonant deletion, gliding of liquids, velar backing, glottal replacement, systemic simplification, deaffrication, stridency deletion, weak syllable deletion, affrication, palatal fronting, velar fronting, vowel neutralization, monophthongisation, no audible release, palatisation, reduced frication, cluster error, nasalisation, elongation.

Longitudinal Outcomes of Children with Hearing Impairment - LOCHI

- Population study
- Children with hearing impairment born between 2002- 2007 in Qld, NSW and Victoria
- 460 participants



Assessment Intervals



Child & Family Factors

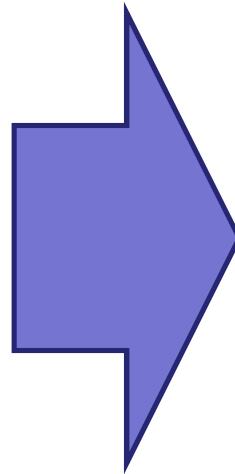
- Age of intervention
- Aetiology
- Hearing thresholds
- Maternal education
- Socioeconomic status
- Cognitive ability
- Additional needs
- Communication mode
- Gender

Device Factors

- Hearing aid prescription
- Cochlear implant parameters

Intervention Factors

- Age of enrolment
- Type and amount
- Family involvement



Child Outcomes

Speech production

Speech intelligibility

Speech perception

Receptive & expressive lang.

Receptive & expressive

Vocabulary

Phonological awareness

Reading and writing

Functional performance

Psycho-social skills

Pragmatics

Educational attainment



Method / Analysis

- Diagnostic Evaluation of Articulation & Phonology (DEAP) (Dodd, Hua, Crosbie, Holm & Ozanne, 2002)
- Phonology subtest
- Quantitative information: PCC, PVC, PPC
- Qualitative information : phonological patterns
- 50 single words
- Transcribed online & video/audio reviewed



Analysis

- Computer Assisted Speech and Language Assessment version 4.0 (CASALA) (University of Melbourne, 2007)

RESULTS

3 YEAR data



3 year old phonology participants

	3 year olds with HAs	3 year olds with CIs	3 year olds with normal hearing
n =	153	57	48
Mean age (SD) Range	38 months (1.7) 34-44	38 months (2.2) 33-45	38 months (1.7) 36-41
% Males	51%	46%	50%

Results

	3 year olds with HAs n = 153	3 year olds with CIs n = 57	3 year olds with normal hearing n = 48
Mean PCC (SD) Range	51.4% (17.6) 2-86%	55.2% (20.1) 21-95%	72.9% (11.6) 41-90%
Mean PVC	86.6% (9.9) 40-100%	86.7% (11.9) 50-100%	93.4% (4.6%) 82-100%
Mean no. of phonological patterns	5	5	3

Predictors

Predictor	Consonant <i>p</i> value	impact	Vowel <i>p</i> value	impact
Gender	0.82		0.95	
Birth-weight	0.24		0.69	
Age at first fit	0.53		0.52	
Age at switch-on	0.16		0.72	
Device (HA only to CI)	0.02	3.0	0.09	-10.2
Other disability (no to yes)	0.02	-8.0	0.03	-13.6
Early intervention mode	0.59		0.28	
Socio-economic status	0.44		0.91	
Maternal education (school to university)	0.10	6.7	0.004	16.8
Prescription	0.93		0.88	
4FA hearing loss	0.08		0.11	
Device x 4FA	0.06		0.04	
4FA, HA (43 to 85 dB HL)		-8.3		-8.5

RESULTS



5 YEAR data



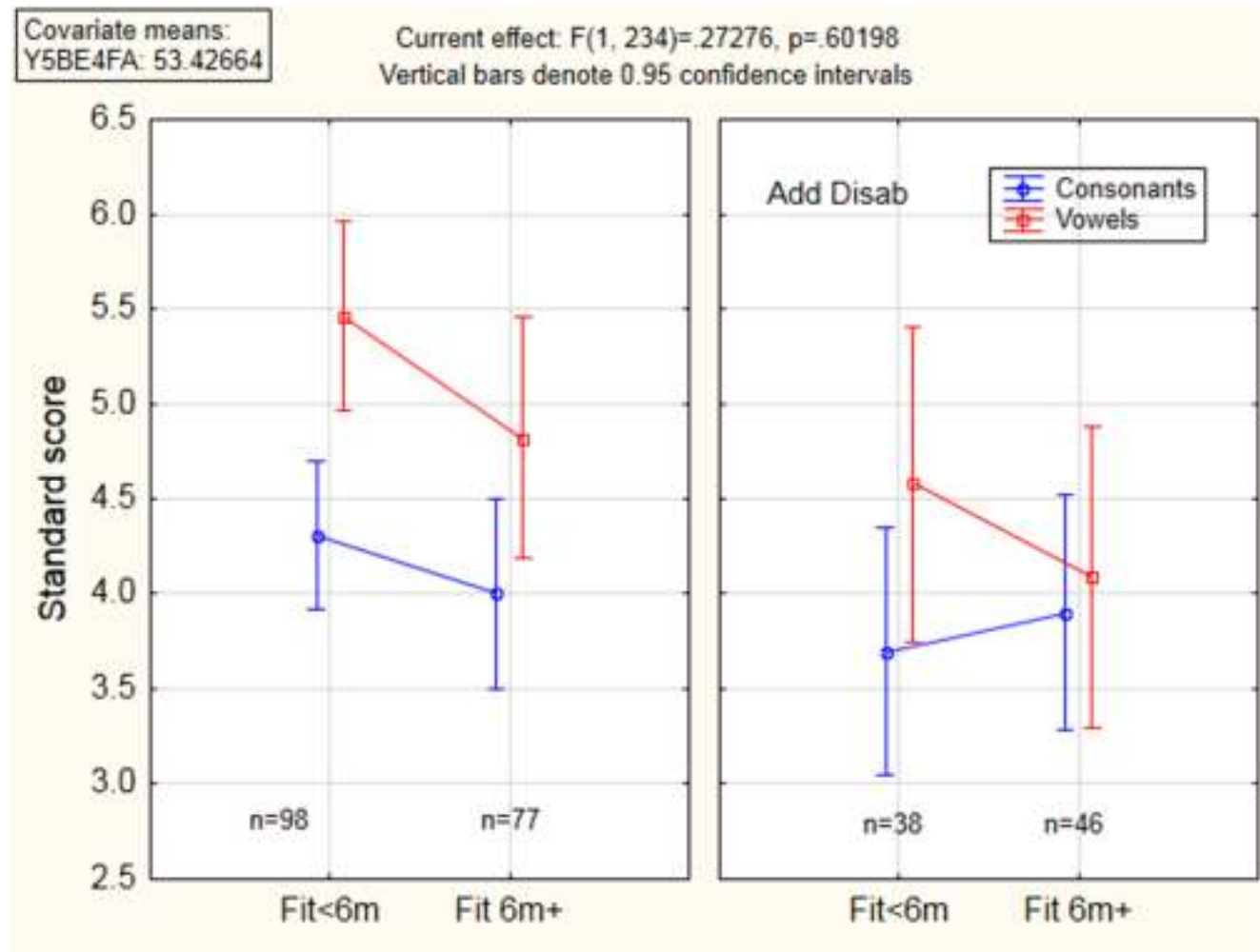
5 year old phonology participants

	5 year olds with HAs	5 year olds with CIs	5 year olds with normal hearing
n =	242	124	123
Mean age (SD) Range	62 months (2.1) 58-70	62 months (1.8) 58-67	62 months (1.6) 60-65
% Males	56%	51%	50%

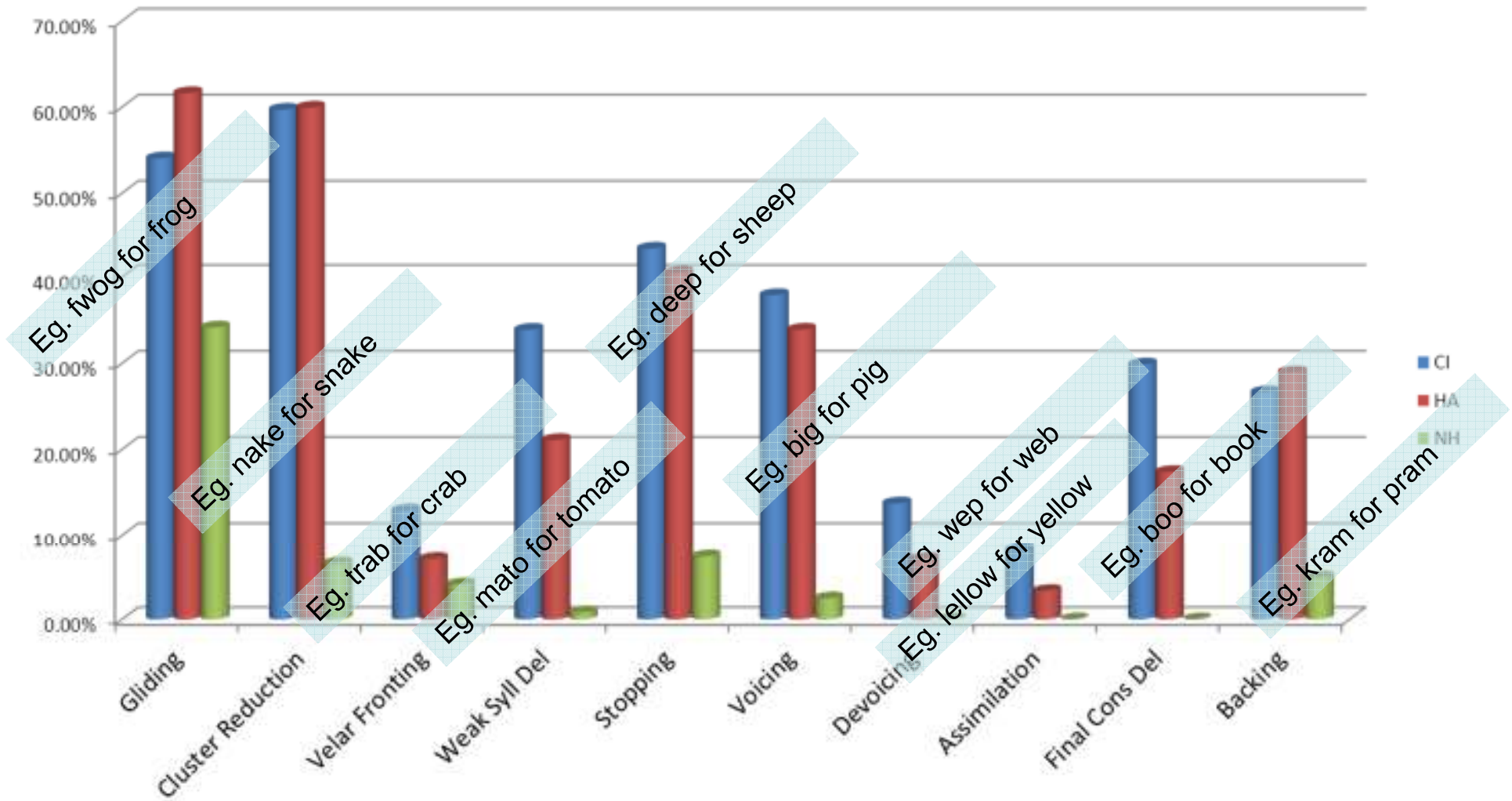
Results

	5 year olds with HAs n = 242	5 year olds with CIs n = 124	5 year olds with normal hearing n = 123
Mean PCC (SD) Range	71.8% (18) 17-99%	68.7% (21.2) 11-99%	89.9% (8.6) 45-100%
Mean PVC (SD) Range	93.4% (9.0) 27-100%	90.7% (10.7) 39-100%	98.6% (1.8) 92-100%

Presence of additional disabilities impact on speech production ($p=0.03$), but not device ($p=0.8$) or age at fitting ($p=0.25$)



Phonological patterns at 5yrs



Speech Intelligibility Rating (SIR)

(Yoshinaga-Itano & Sedey, 2000)

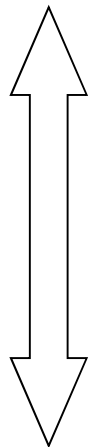
- Measures how well child is able to be understood
- 6 point rating scale
- Ratings completed by
 1. *Child's teacher*
 2. *Parent (for themselves & others)*
 3. *Researcher (during language assess)*

Speech Intelligibility Rating

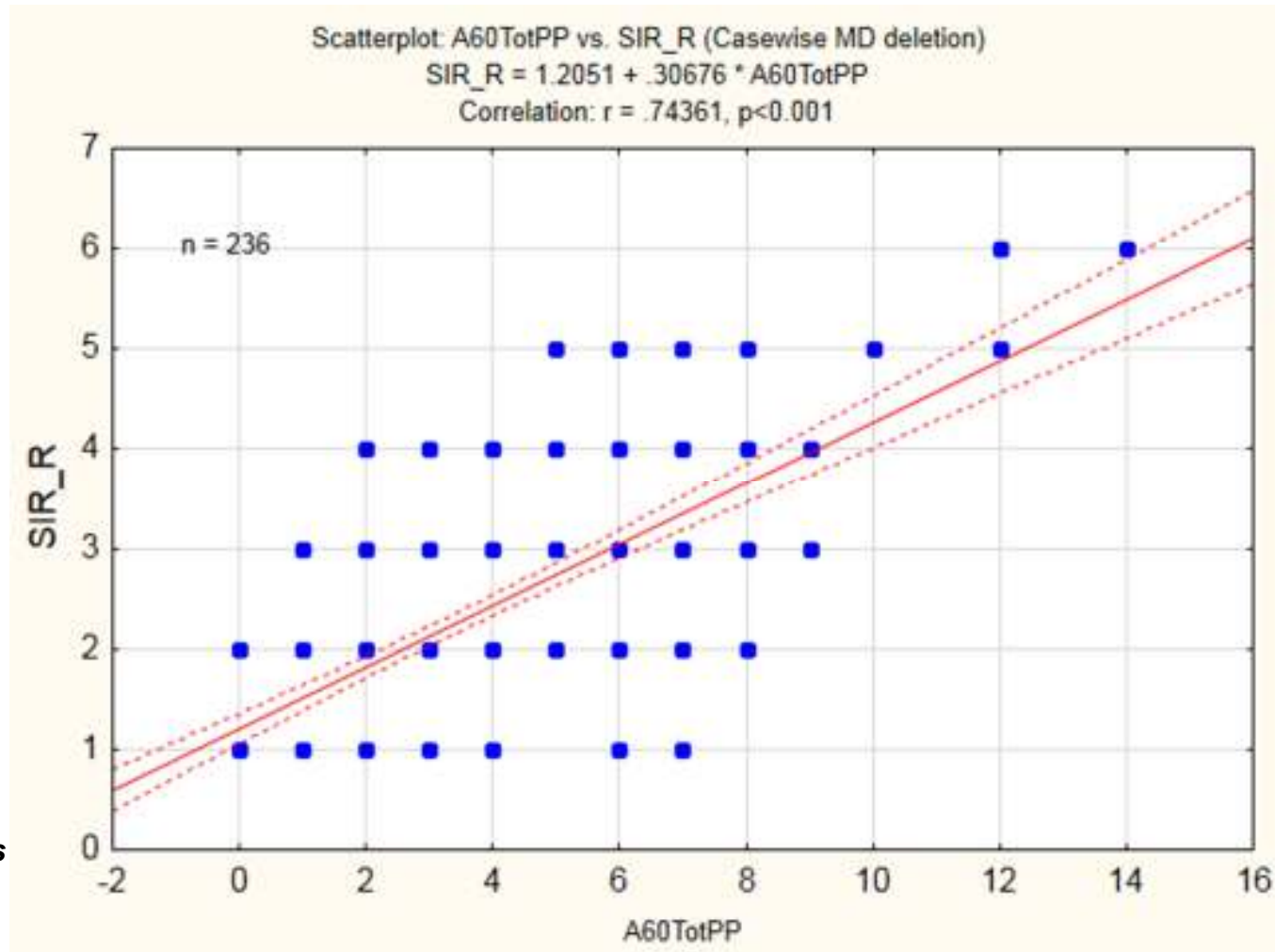
1	I always or almost always understand the child's speech with little or no effort
2	I always or almost always understand the child's speech: however I need to listen carefully
3	I typically understand about half of the child's speech
4	I typically understand about 25% of the child's speech
5	The child's speech is very hard to understand. I typically understand only occasional, isolated words and/or phrases
6	I never or almost never understand the child's speech

Number of patterns vs SIR researcher rating at 5 years

Never understands



Always understands



Number of patterns at 5 years

Summary:

- Speech production is still 1 SD below the normative mean
- Delayed phonological patterns
- 69% had SIR of 1 or 2 at 5 yrs



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