

Longitudinal Evaluation of the Speech & Literacy Profile of Children with Inconsistent Speech Errors

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Language Brain & Behaviour

Disclosures

- Brigid McNeill and Gail Gillon
 - University of Canterbury paid staff members.
 - This study was funded by a ‘fast start’ research grant from the Royal Society of New Zealand.
 - I have no other financial or non-financial relationships with any materials described or used in this presentation.



Outline

- Rationale
 - Children with inconsistent speech errors
- Methodology
- Speech development over time
- Literacy development over time
- Association between speech and literacy performance
- Spelling
- Conclusions



CAS Differential Diagnostic Features

Inconsistent

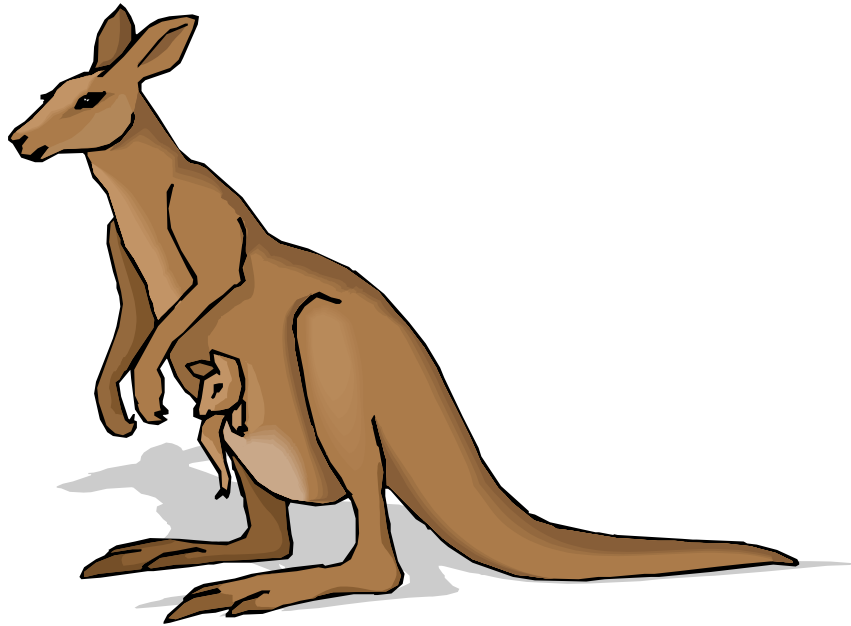
- Token-token
- Not other forms of variability

Coarticulatory transition

- Prolonged sounds
- Prolonged pauses between sounds

Prosody

- Phrasal
- Sentential

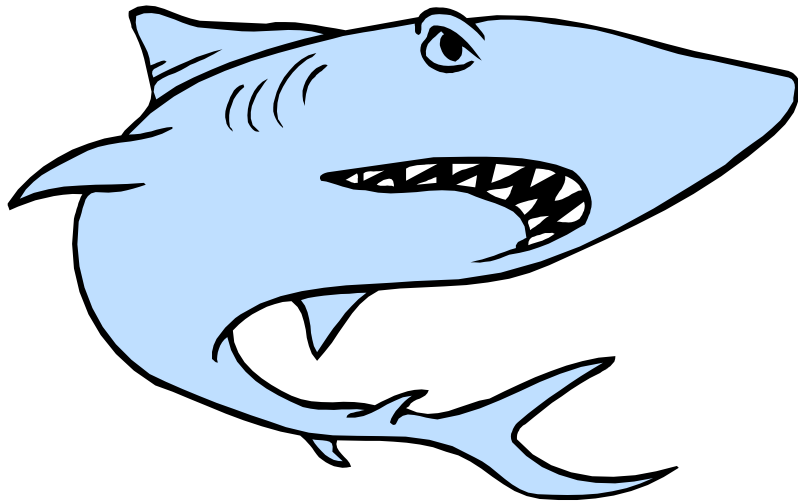


/kæŋgəru/

/tæsu/

/kæŋgəru/

Male, aged 7;6, McNeill & Gillon, in process



/gʌk/

/dʌ/

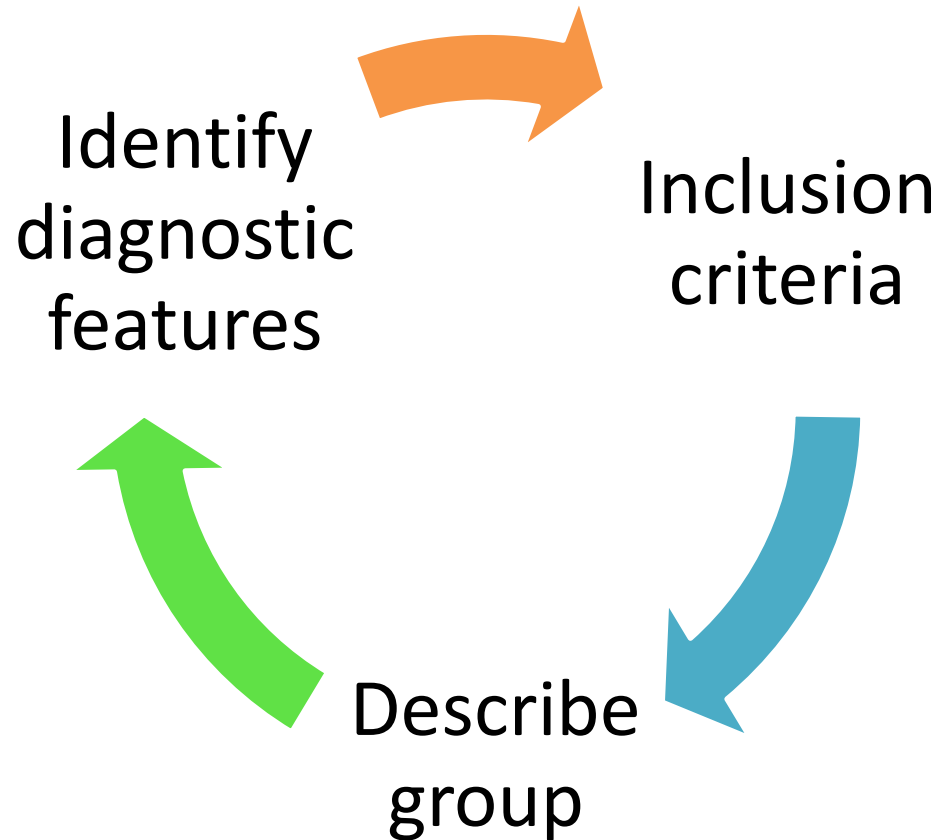
/gak/

Male, aged 7;6; McNeill & Gillon, in process

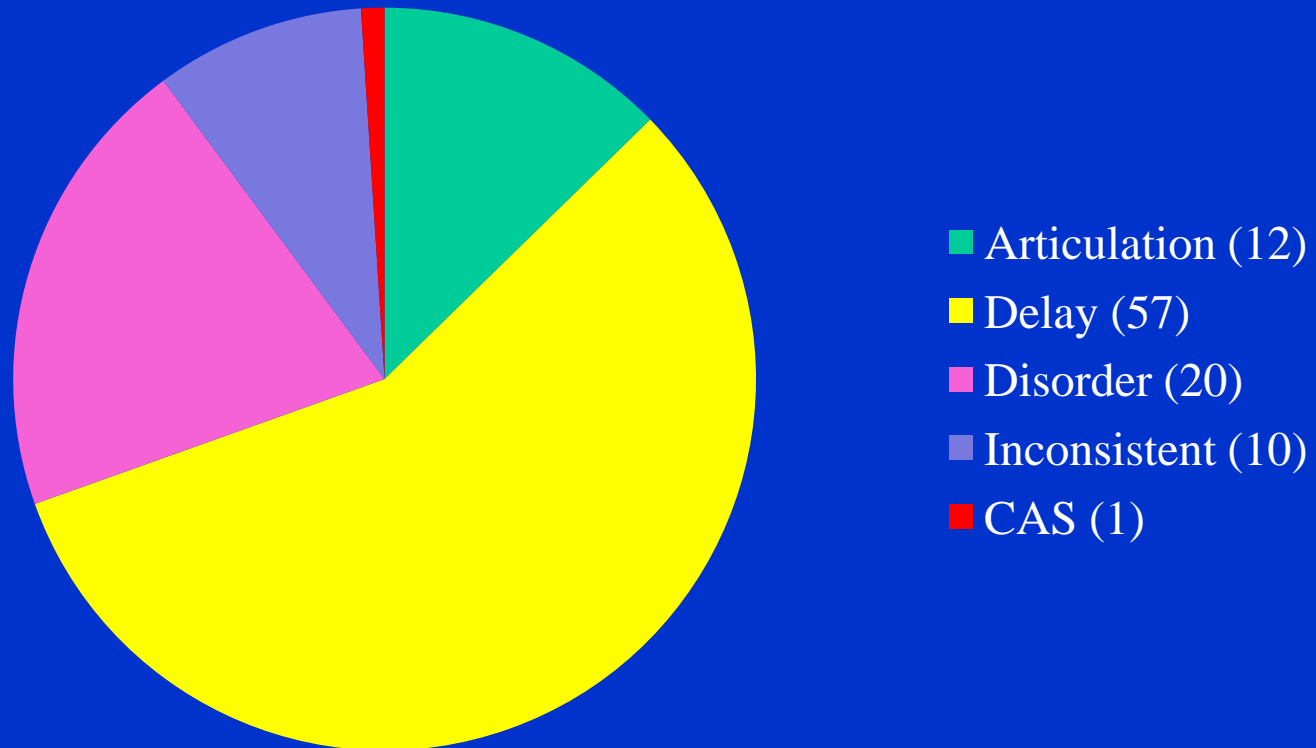
Inconsistency as a potential diagnostic feature

- Lack of validation of inconsistency, particularly over time.
- Standardized Assessment
 - Diagnostic Evaluation of Articulation and Phonology (Dodd et al.)
 - 40% inconsistent
- Token to token inconsistency also present in children with other forms of SSD

Childhood Apraxia of Speech



Dodd's Differential Diagnosis

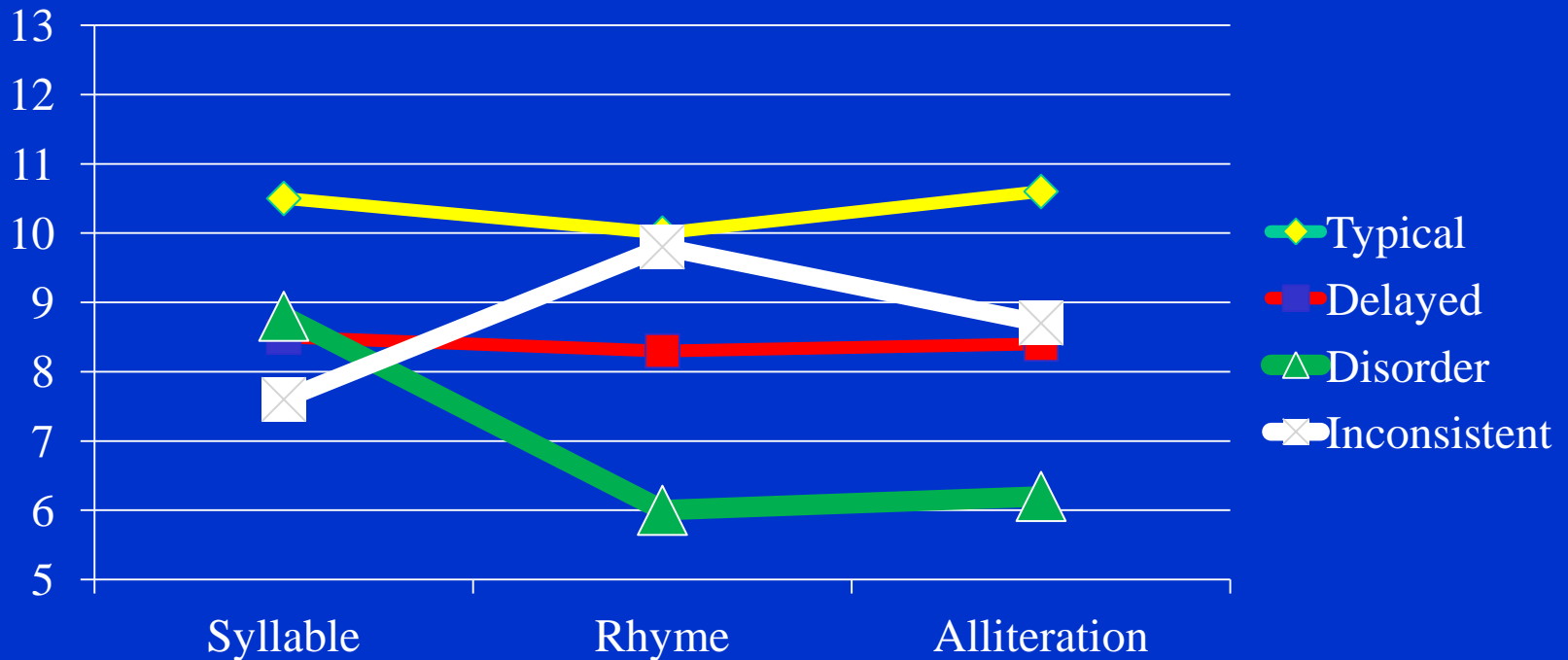


Broomfield & Dodd, 2004 (n = 320)

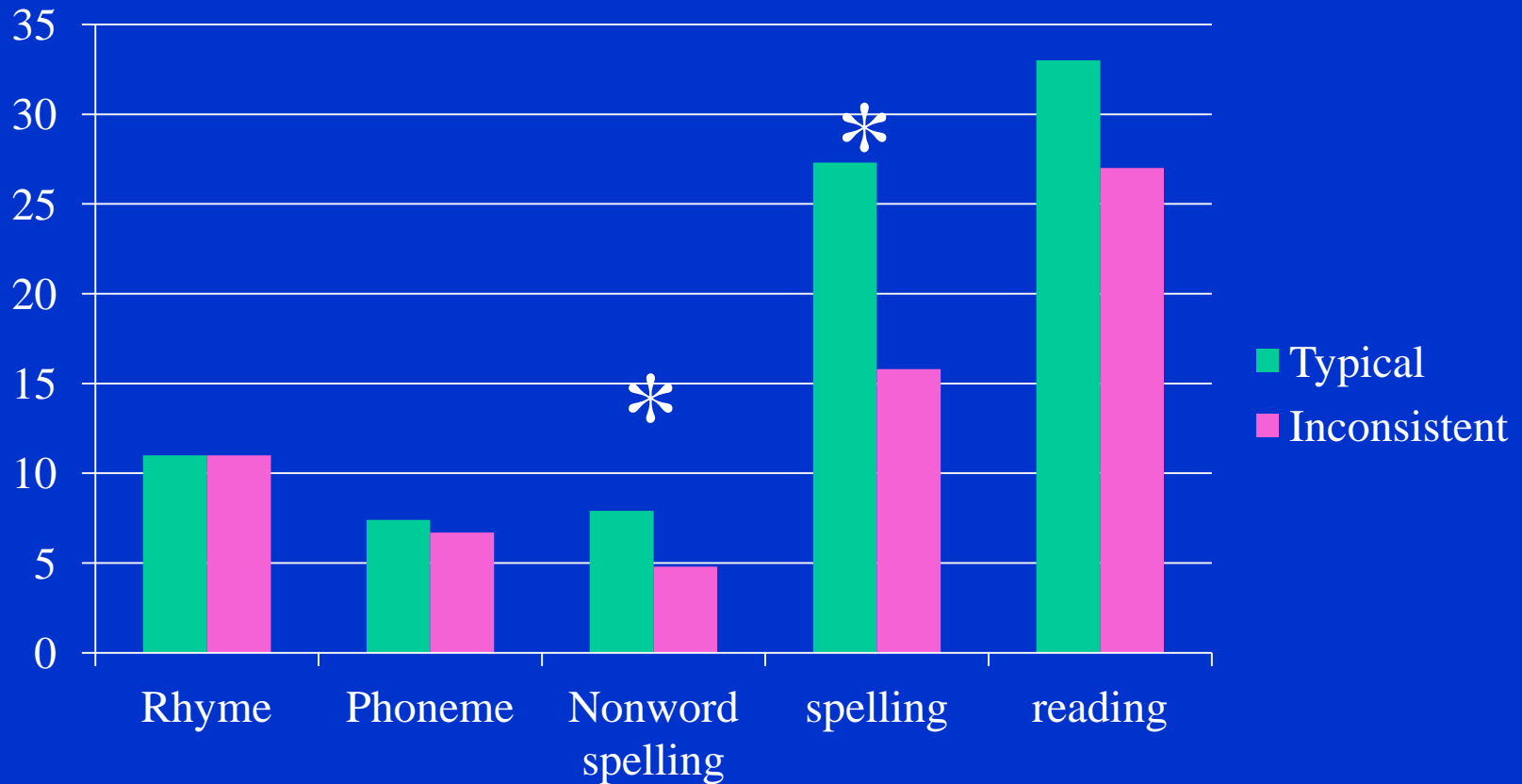
Inconsistency: Implications for Literacy

- Children with speech disorder are more likely to experience literacy difficulties (e.g., Anthony et al., 2013)
- Across the literature
 - 30-80% of children with speech disorder have concomitant literacy difficulty
 - Language factors
- No correlation between speech severity and literacy outcome (e.g., McNeill et al., 2009; Rvachew et al., 2005)
- Association between use of atypical speech errors and literacy outcomes (e.g., Preston et al., 2013; Dodd's work)

Phonological Awareness: Standard Scores

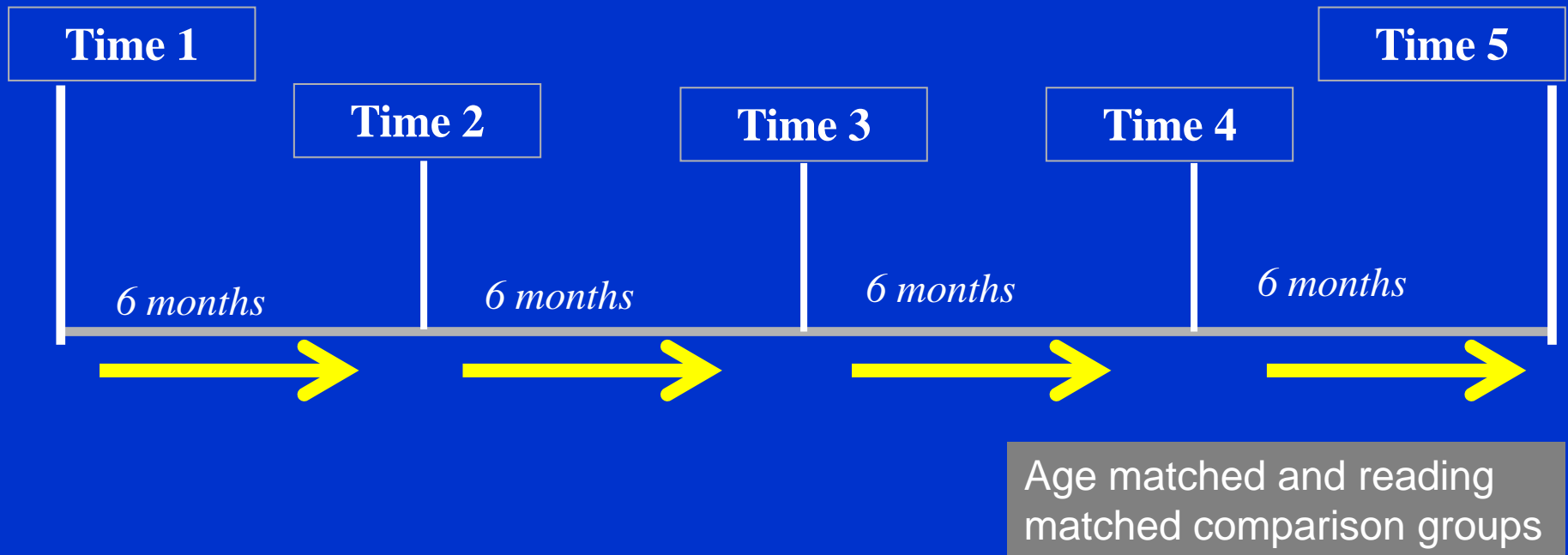


Literacy: Inconsistent Speech Disorder



Methodology

- Track the speech and literacy development of children with inconsistent speech errors over time



Participant Selection Process

SLPs refer children aged 4;6 to 7 years



55 children with SSD assessed



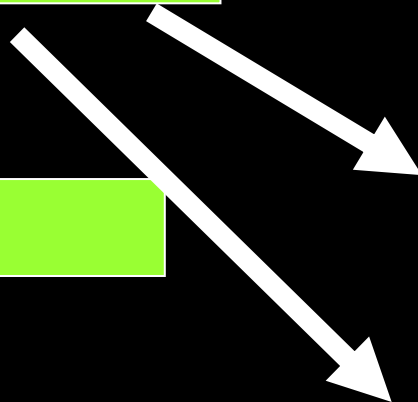
45 children with inconsistent speech



10 children with consistent speech errors



N = 39



Profiles not suitable to grouping (n=4)

Attrition (n=2)

Participants: Time 1

	Inconsistent SD (n = 39)
	Mean (sd)
Age (months)	67.6 (10.8)
Sex	31 boys, 8 girls
Nonverbal IQ	100.9 (9.2)
Receptive Vocabulary	95.3 (11.5)
PCC	57.5 (20.4)
PVC	89.5 (17.6)
Inconsistency %	57.3 (11.8)

Measures

- Intervention intensity and type tracked across the study
- Non-verbal IQ
 - PTONI
- Speech
 - DEAP (Dodd et al., 2002)
 - PCC, PVC, Inconsistency
 - Connected speech (Westerveld & Gillon)
 - Oro-motor (VMPAC)
- Language
 - Receptive Vocabulary (PPVT)
 - Sentence structure (CELF-4)
 - Personal narrative

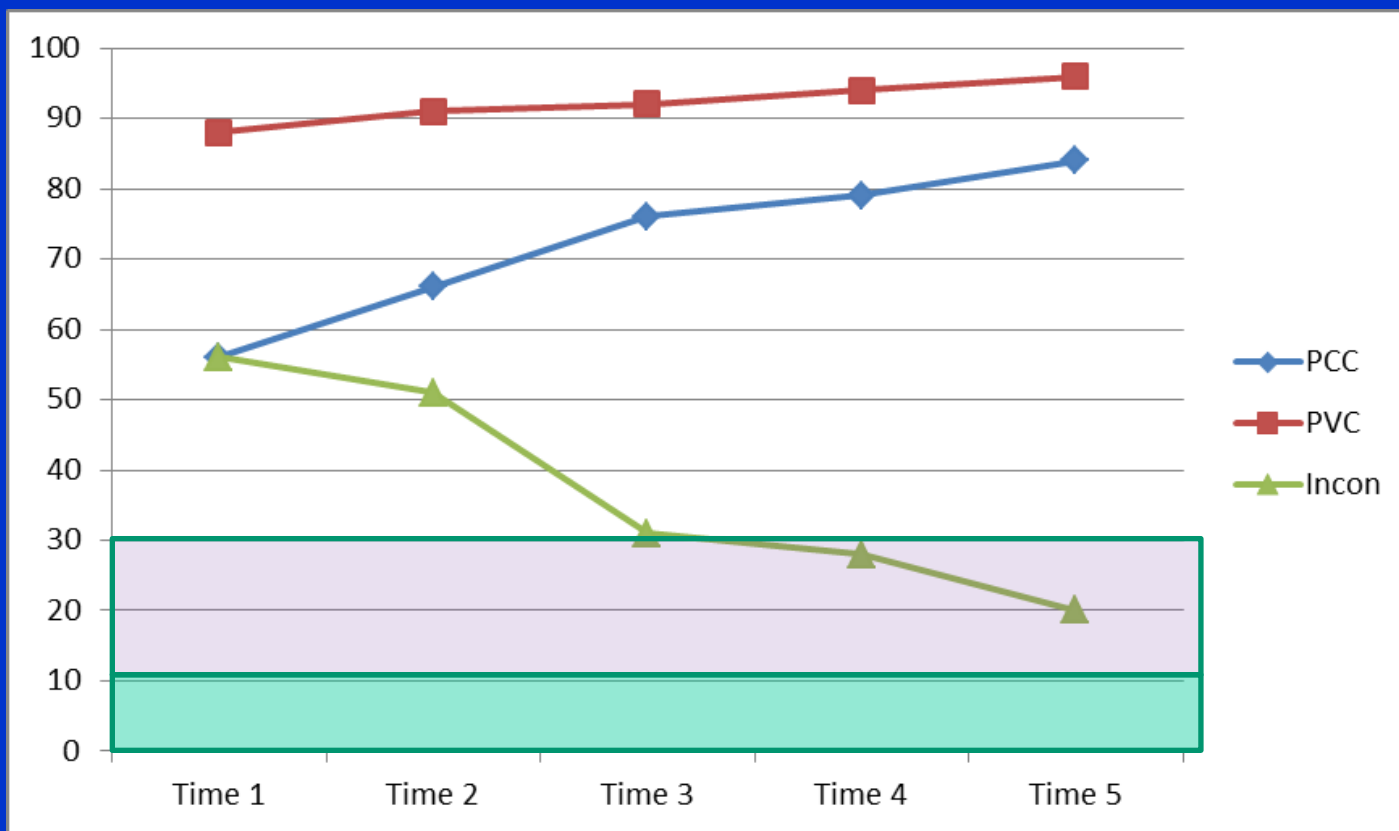
Measures

- Phonological awareness
 - Test of Phonological Awareness (Torgesen & Bryant, 2004)
- Reading
 - Woodcock-Johnson
 - Letter ID, Word Attack, Passage Comprehension
- Spelling
 - Test of Written Spelling
 - Experimental tasks

Speech and Literacy Performance Over Time

RESULTS

Speech Over Time



Mean Age
(years;months)

5;7

6;1

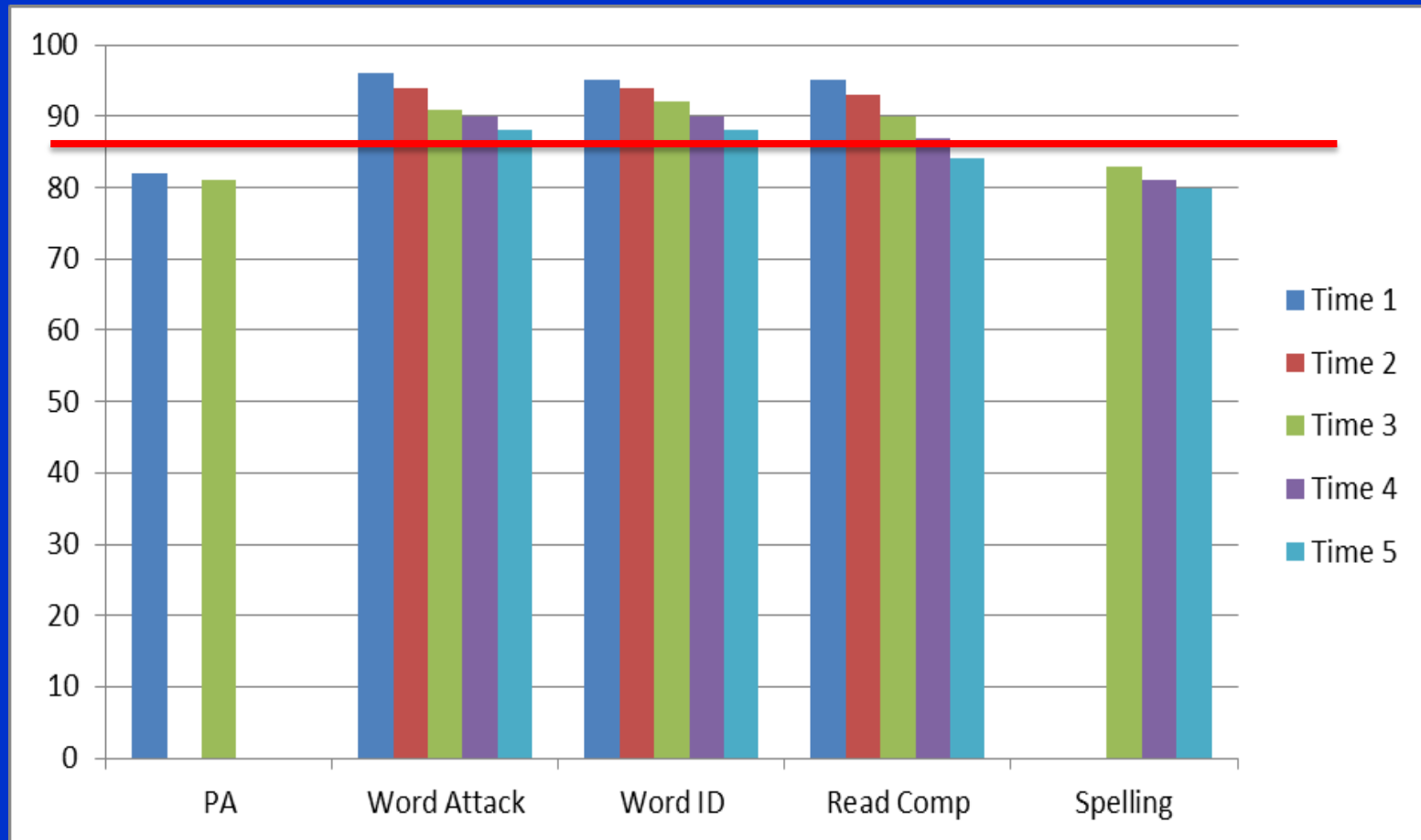
6;7

7;1

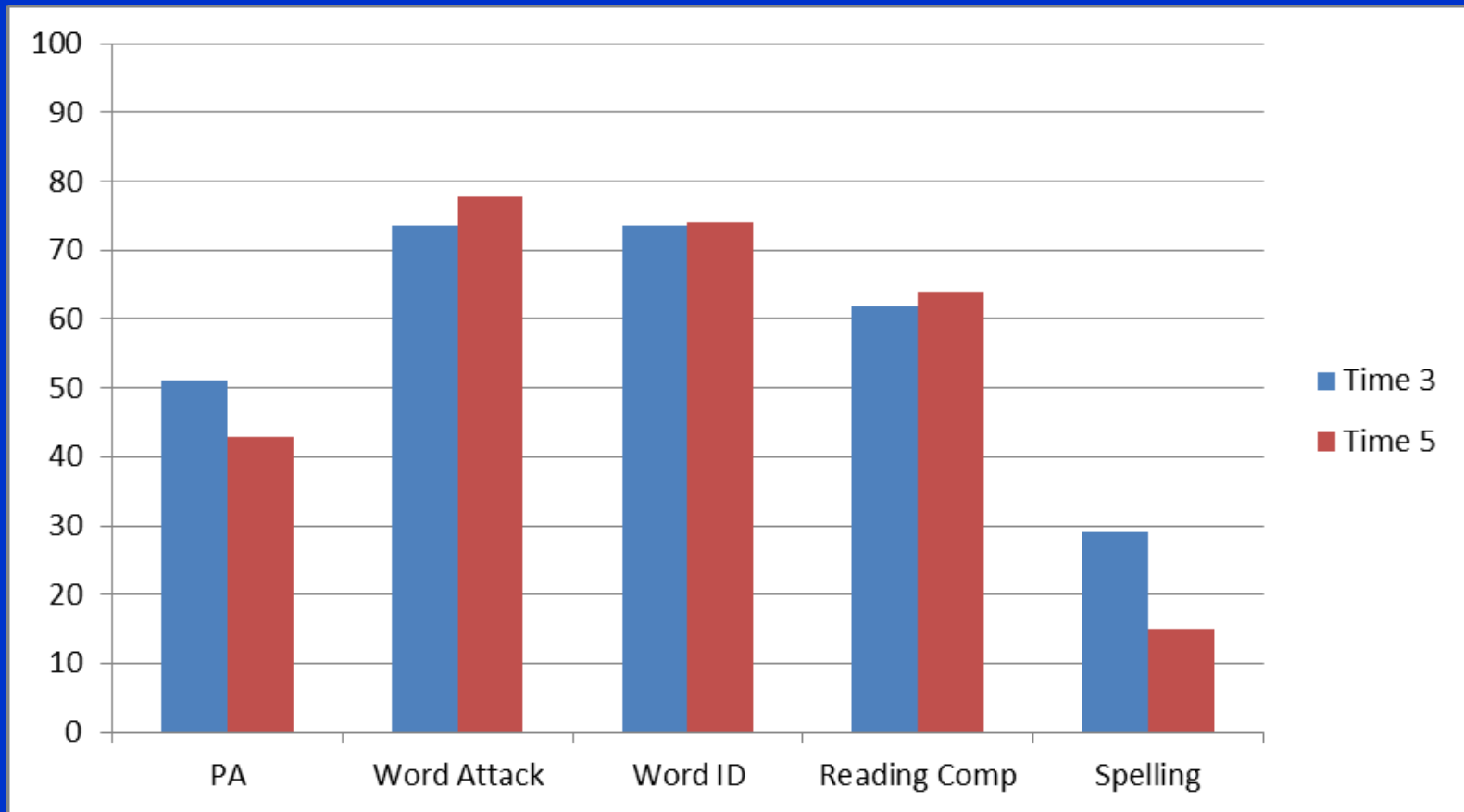
7;9

Inconsistency data for typical and SSD aged 3;0 – 6;11 taken from Holm et al. (2007) & Dodd (2005)

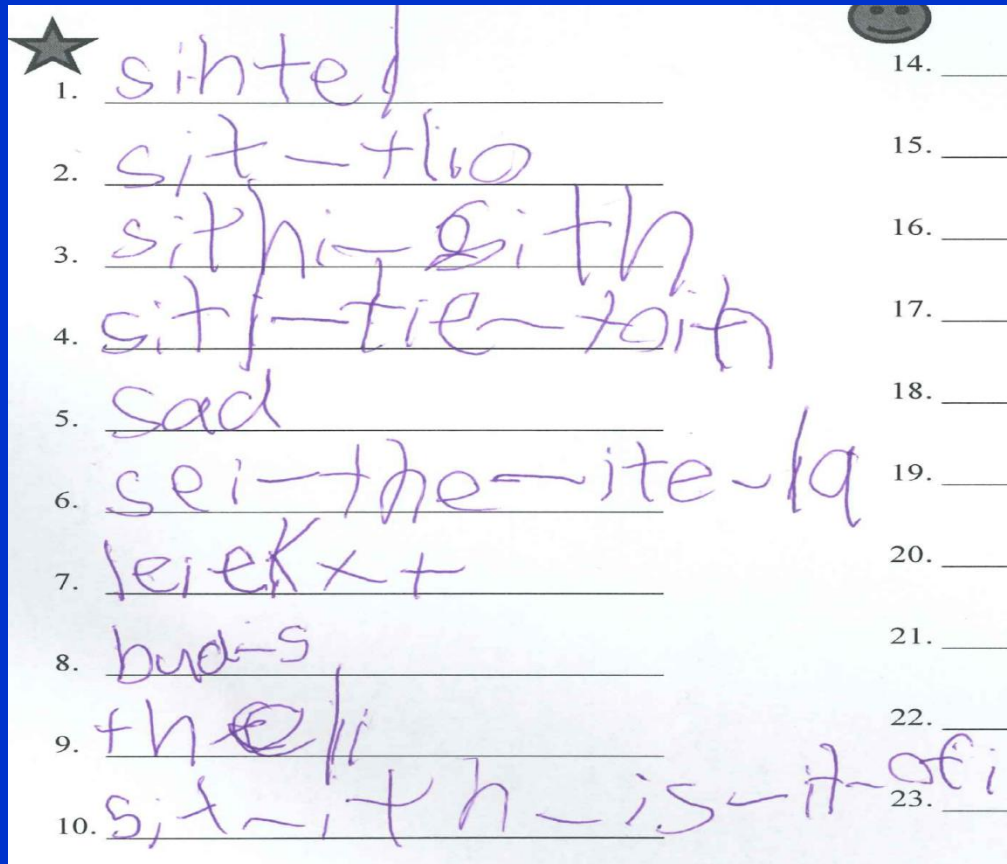
Literacy Over Time (standard scores)



Literacy over time (% within expected range)



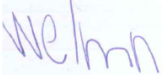
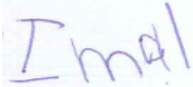



Lachlan (Time 5; 7 years, 9 months)



A handwritten spelling task on lined paper. The paper has a star in the top left corner and a smiley face in the top right corner. The task consists of 23 numbered items, each with a handwritten word or phrase. The words are: 1. sintered, 2. sit-tlio, 3. sit-hi-gith, 4. sit-tie-toith, 5. sad, 6. sei-the-ite-la, 7. leiekx+, 8. buds, 9. th@li, 10. sit-it-h-is-it-afi. The numbers 14 through 23 are listed on the right side of the paper, corresponding to the lines.

1. Dresses
2. Softness
3. Sweater
4. Teller
5. Sadly
6. Uneasy
7. Thinker
8. Boats
9. Discontent
10. Brightly

Arthur; 8 years 8 months

Item	Spoken attempt	Written attempt
Kangaroo	/dæŋəru/	 (welmn)
Girl	/dal/	 (lmal)
Shark	/zak/	 (amkl)
Bridge	/wedʒ/	 (wltmo)
Cake	/deɪk/	 (kmko)

* Spelling items from the inconsistency subtest of the DEAP (Dodd et al., 2002)

Association between Speech and Literacy Performance

RESULTS

Partial correlation between PCC and literacy (controlling for age)

Item	PPVT	TONI	PA	Word ID	Read Comp	Spelling
PCC1	0.39*	0.34	0.17	0.51*	0.48*	0.51*
PCC2	0.51*	0.25	0.34	0.48*	0.36*	0.39*
PCC3	0.48*	0.43*	0.36*	0.55*	0.50*	0.36*
PCC4	0.41*	0.28	0.41*	0.50*	0.42*	0.33
PCC5	0.47*	0.40	0.44*	0.58**	0.50*	0.44*

* Significant at the .05 level, ** significant at the .001 level

Partial correlation between PVC and literacy (controlling for age)

Item	PPVT	TONI	PA	Word ID	Read Comp	Spelling
PVC1	0.35	0.17	0.14	0.26	0.23	0.24
PVC2	0.33	0.30	0.26	0.35	0.28	0.32
PVC3	0.45*	0.33	0.31	0.45*	0.24	0.26
PVC4	0.46*	0.23	0.53*	0.47*	0.35*	0.31
PVC5	0.58**	0.35*	0.64**	0.64**	0.47*	0.41*

* Significant at the .05 level, ** significant at the .001 level

Partial correlation between Inconsistency and literacy (controlling for age)

Item	PPVT	TONI	PA	Word ID	Read Comp	Spelling
Incon1	-0.56**	-0.23	-0.37*	-0.34	-0.27	-0.30
Incon2	-0.52*	-0.26	-0.19	-0.38*	-0.24	-0.42*
Incon3	-0.60**	-0.50*	-0.25	-0.41*	-0.27	-0.31
Incon4	-0.59**	-0.28	-0.53*	-0.58**	-0.38*	-0.39*
Incon5	-0.58**	-0.43*	-0.48*	-0.56**	-0.42*	-0.40*

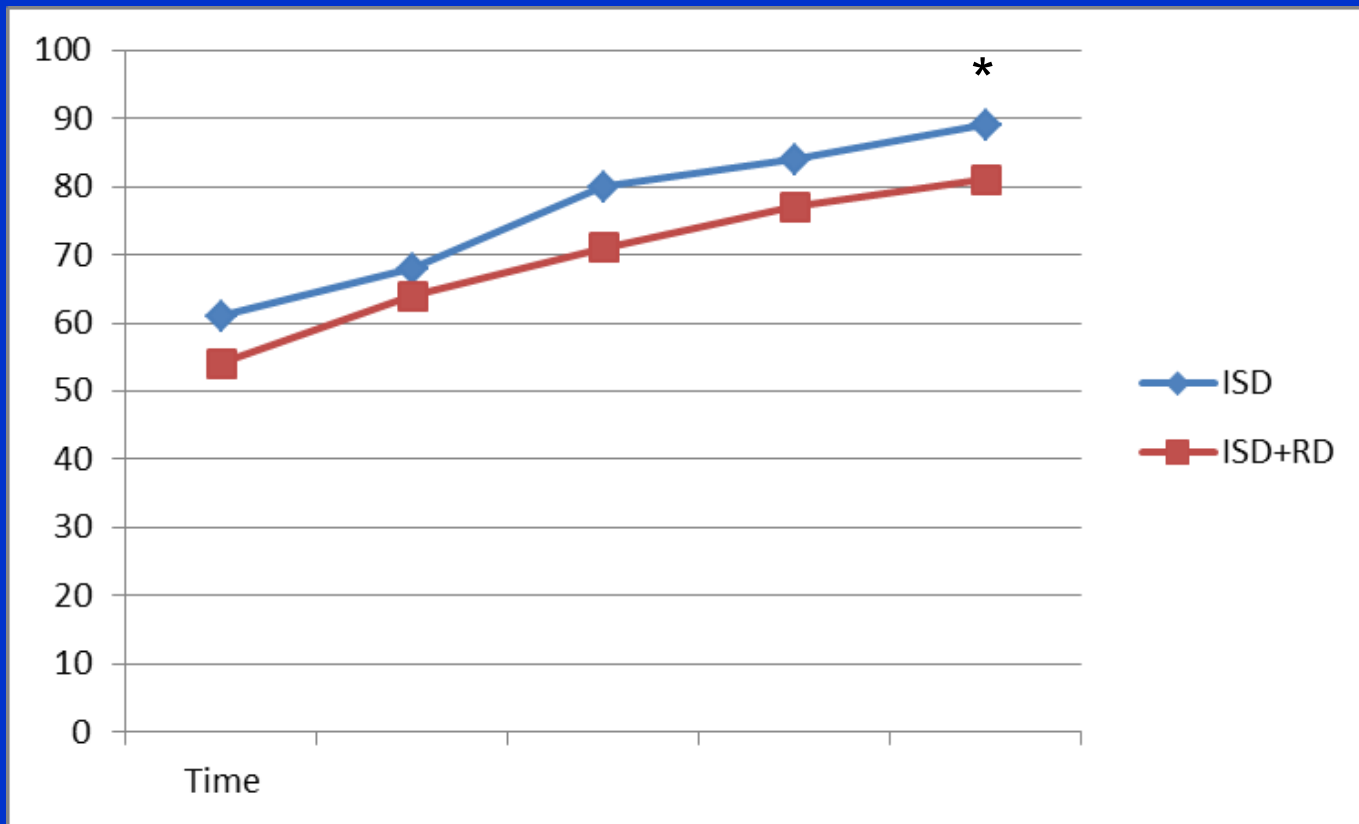
* Significant at the .05 level, ** significant at the .001 level

Participants with and without word level reading difficulty

	Word reading difficulties (n=14)	Typical reading (n=20)
Age	71.4 (9.3)	67.8 (7.2)
PPVT	93.9 (14.1)	97.0 (10.7)
Nonverbal IQ*	96.0 (8.5)	104.5 (8.6)
Sentence Structure	7.7 (2.7)	9.3 (2.9)
Oro-motor	5.3 (2.1)	6.1 (3.0)
PA*	78.2 (8.8)	84.1 (10.8)

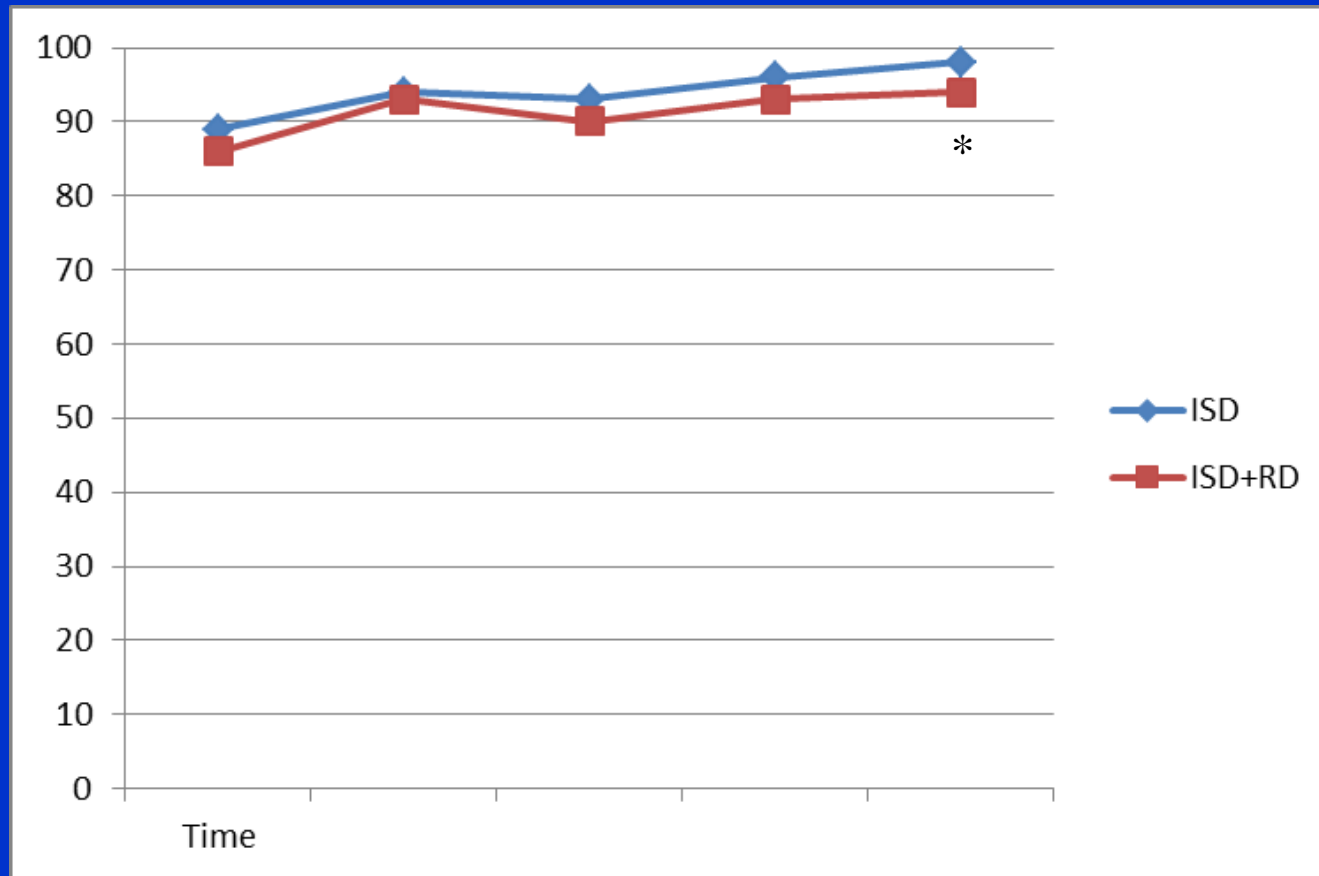
* Significant at the .05 level, ** significant at the .001 level

Inconsistent vs Inconsistent + RD PCC



* Significant at the .05 level

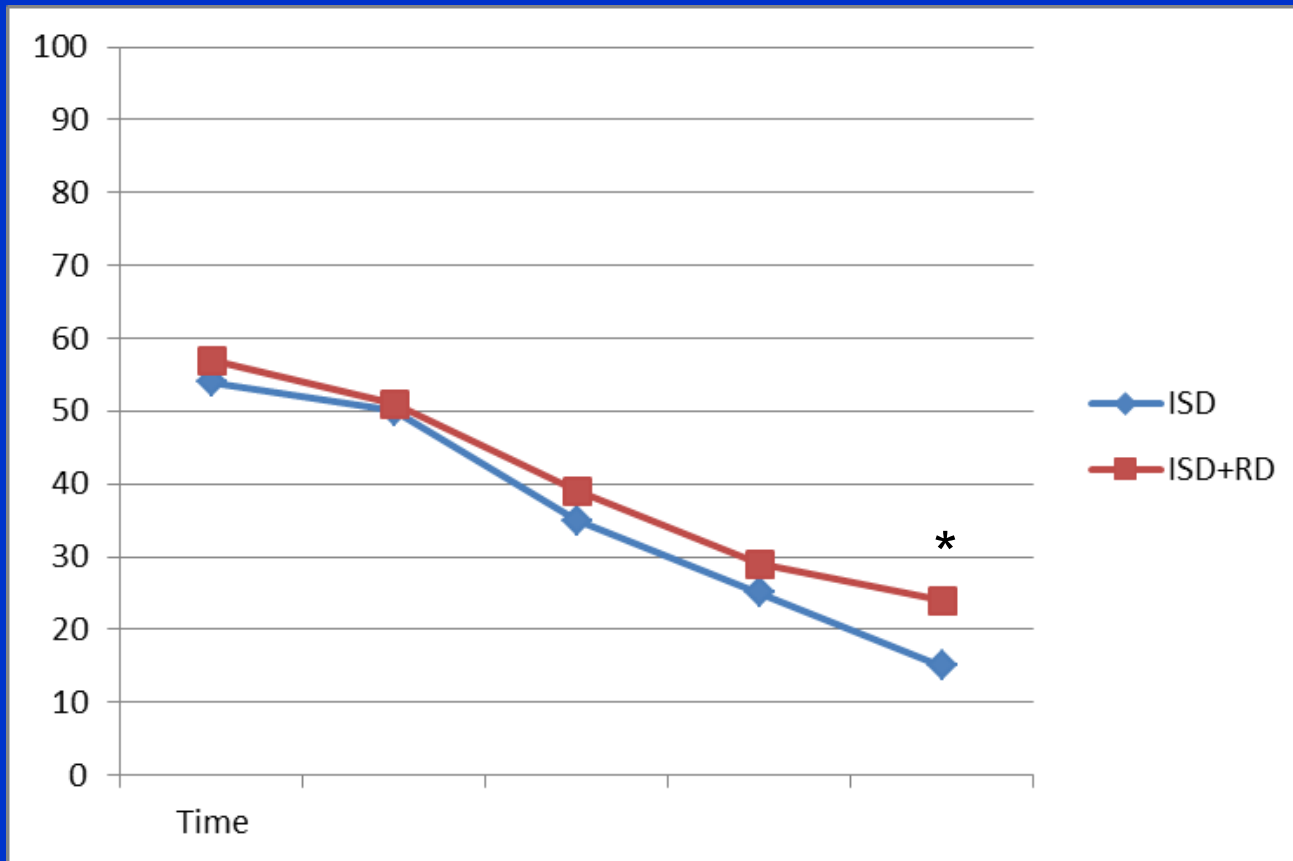
Inconsistent vs Inconsistent + RD PVC



* Significant at the .05 level

Inconsistent vs Inconsistent + RD

Inconsistency %



* Significant at the .05 level

Comparison of Spelling Performance of Age-Matched and Reading-Matched Comparison Groups

RESULTS

Spelling Study (Time 5)

- Aim
 - To examine metalinguistic abilities underlying spelling in children using inconsistent speech errors and age-matched and word-reading matched comparison groups.

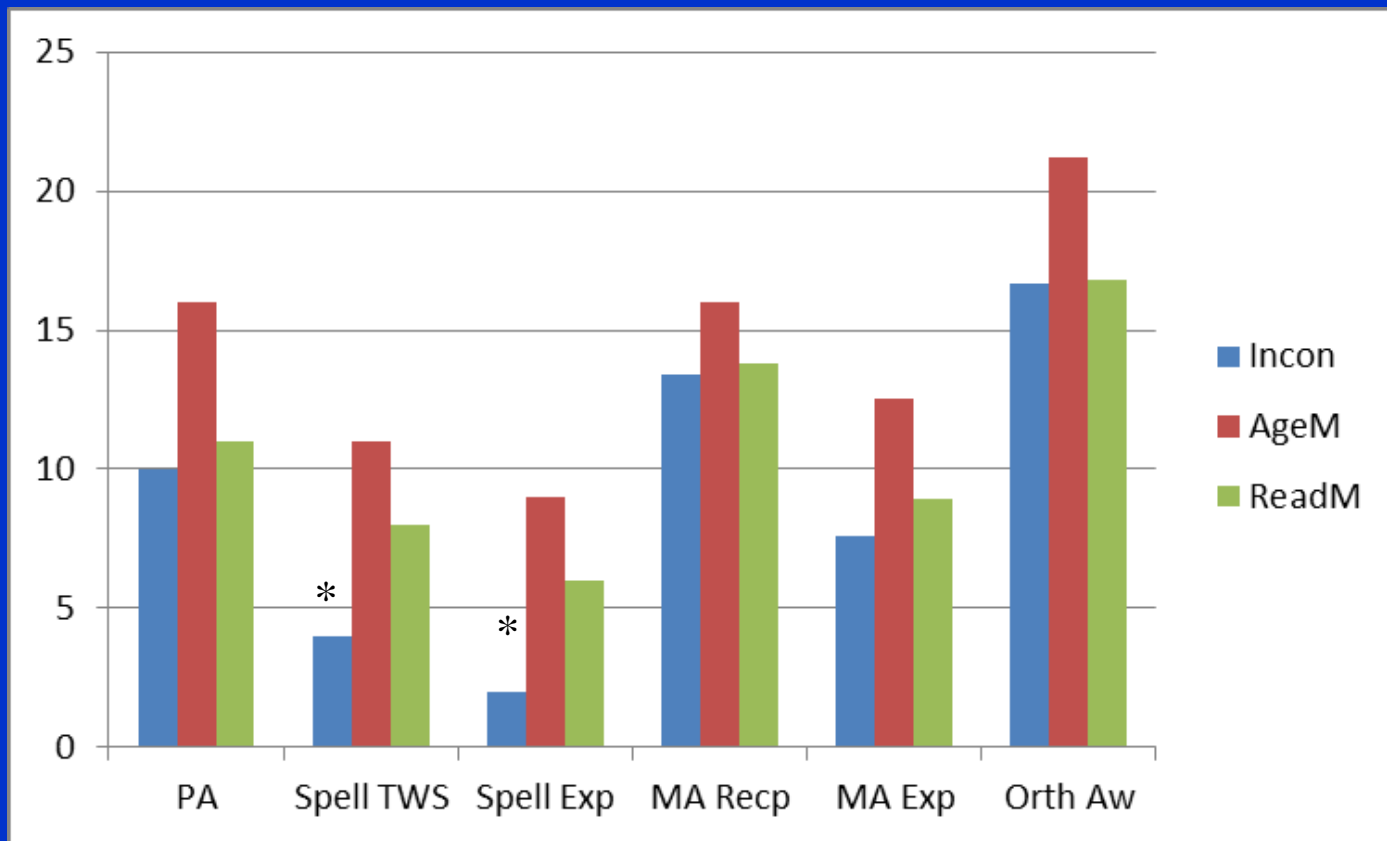
Spelling Participants (Time 5)

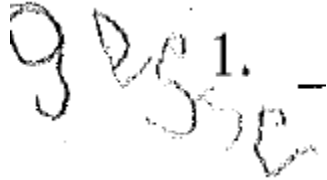
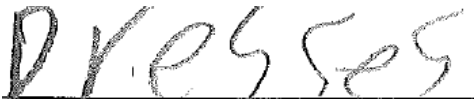

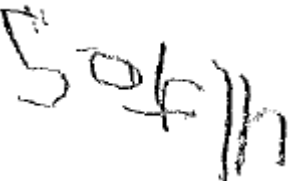
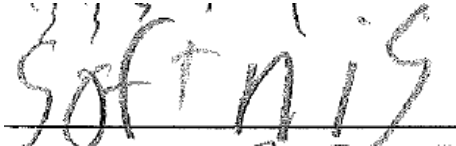


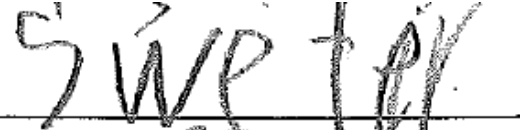
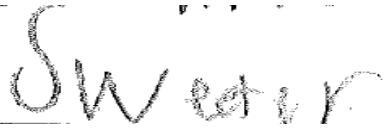






	Inconsistent speech errors (n=31)	Age-matched (n=31)	Word reading-matched (n=31)
	7 girls, 31 boys	7 girls, 31 boys	7 girls, 31 boys
Age	89.2 (9.7)	89.2 (9.3)	77.9 (9.4)**
PPVT	97.5 (11.2)	102.6 (8.4)	101.2 (9.3)
Word Reading	32.3 (10.5)	42.1 (9.4)**	32.9 (9.2)

Measures

- Phonological awareness (TOPA)
- Morphological awareness (Wolter et al.)
 - Receptive
 - E.g., ‘know-knowledge’
 - Expressive
 - E.g., ‘Science’: Laura talked to the _____
- Orthographic awareness (Apel et al.)
 - E.g., blif, blith, bliff
- Spelling
 - Test of Written spelling
 - Experimental (Apel et al.)

Comparison (Raw Scores)



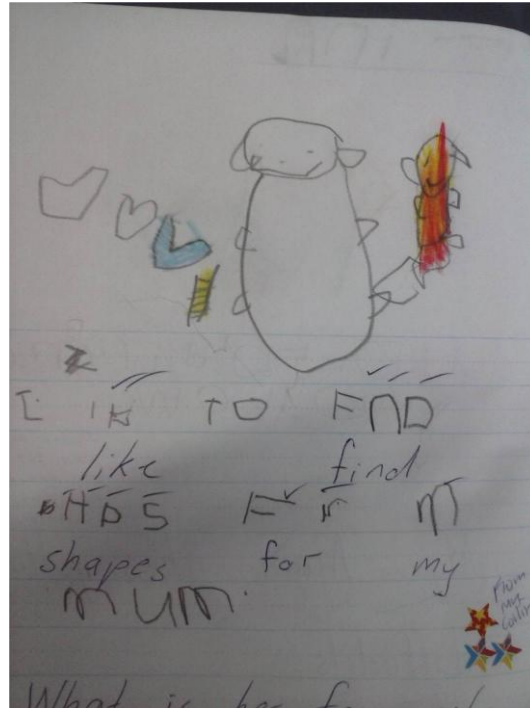
Spelling Item	Max 7;0	Finn (Age-Match)	Sam (Read-Match)
dresses			
softness			
sweater			
teller			
sadly			

Summary and Conclusions



- Inconsistent speech errors are relatively stable over time
- Children using such errors are vulnerable to phonological awareness, reading and spelling difficulties
- Children with a history of using such errors should be monitored for spelling development
- Further research required to examine utility of integrated speech-spelling intervention for this group
 - E.g., core vocabulary

Thank you and time for questions!



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