

The development of
phonological awareness, phonic
decoding skills and reading
comprehension ability in children who
have Down syndrome:
Results from an intervention study

Kathy Cologon
Linda Cupples
Shirley Wyver

Macquarie University, Sydney, Australia

Research Background

- Some research has examined the phonological awareness and phonic decoding ability of children with Down syndrome, for example:
 - Cossu, Rossini and Marshall (1993)
 - Fowler, Doherty and Boynton (1995)
 - Kay-Raining Bird, Cleave and McConnell (2000)
 - Cupples and Iacono (2000; 2002; 2005)
 - Fletcher and Buckley (2002)
 - Kennedy and Flynn (2003)
 - Baylis and Snowling (2005)
 - Groen, Laws, Nation and Bishop (2006)
 - Cupples, Iacono and Law (2005)
- Some research has also examined the reading comprehension ability of children with Down syndrome, for example:
 - Boudreau (2002)
 - Morgan, Moni and Jobling (2004)
 - Groen, Laws, Nation and Bishop (2006)

Research Hypotheses

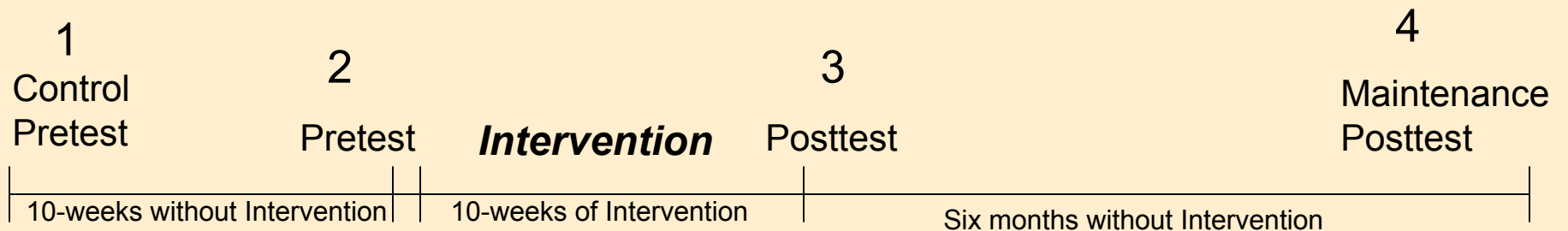
- Phonological awareness instruction would facilitate improved phonological awareness and reading ability.
- Reading comprehension instruction, provided through silent-reading tasks would facilitate improved reading comprehension and reading ability.
- Reading instruction would facilitate improved phonological output in both the phonological awareness and silent-reading intervention condition.

Research Design

- Experimental case studies
 - Two (age) by two (intervention condition) design
- Sample
 - Age Range: 2;11 to 10;8 (years;months)
 - Mean age: 6;7
- Sample Distribution
 - 7 participants were allocated to the Phonological Awareness intervention condition
 - 8 participants were allocated to the Silent-Reading intervention condition

Research Design

- Basic research design
 - Control pretest
 - Pretest
 - Intervention
 - Posttest
 - Maintenance posttest



Research Design

- Assessment tasks:
 - Phonological Awareness
 - Word blending
 - Non-word blending
 - Word segmentation
 - Non-word segmentation
 - Comprehension
 - Woodcock passage comprehension
 - Word comprehension

Research Design

Assessment tasks continued:

- Oral reading
 - Training word probe
 - Generalisation word probe
 - Woodcock word attack
 - Woodcock word identification
 - Letter-sound recognition
 - Letter-sound production

Research Design

Assessment tasks continued:

– Language and Cognitive measures

- RCPM
- PPVT
- TACL
- Digit Span
- Word Span
- South Tyneside Assessment of Phonology

Research Design

- Training and Generalisation word probes.
 - 50 training words (e.g. hat)
 - 50 generalisation words
 - 25 with the same rime as the trained words, different onsets (e.g. cat)
 - 25 with different onsets and rimes to the trained words (e.g. bin)

Phonological awareness intervention

Intervention steps:

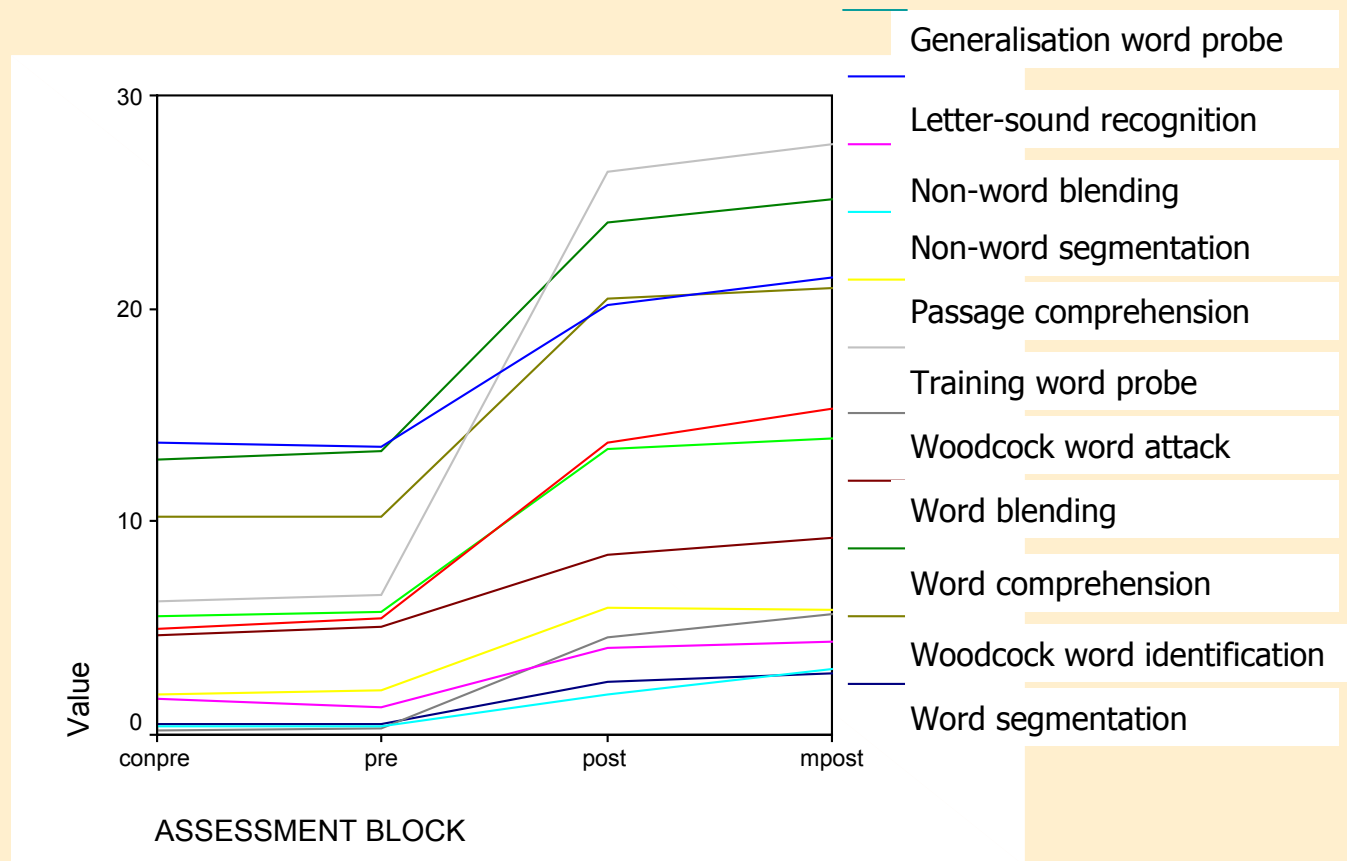
1. Oral reading of training words.
2. Oral word reading and picture match (choice of two pictures).
3. Oral blending of an onset and rime and picture match (choice of three pictures).
4. Individual phoneme blending (plastic letters) orally and visually, followed by picture match (choice of three pictures).
5. Oral blending of individual phonemes (without plastic letters), then placing the picture match in a box (Choice of three pictures).
6. Sentence completion (oral reading, three words to choose from, no picture).
7. Oral reading of training words.

Reading comprehension or 'Silent reading' intervention

Intervention steps:

1. Silent reading of training words.
2. Silent word reading and picture match (choice of two pictures).
3. Silent reading of a short sentence then picture match (choice of three pictures).
4. Action task 1: Silent reading of a target word, then placing the picture match in a box (choice of three pictures).
5. Action task 2: Silent reading of an action sentence and completion of the action (e.g. put the picture of the pan in the bag) once again with a choice of three pictures.
6. Sentence completion (silent reading, three words to choose from, no picture).
7. Oral reading of training words.

Overview of Research Results



Phonological awareness intervention

- As a group the Phonological Awareness intervention condition showed significant improvement on measures of phonological awareness, phonic decoding, letter-sound knowledge and reading comprehension at the .05 level as measured using the Wilcoxon Signed-Ranks Test
 - Word Blending, $p = .017$
 - Nonword Blending, $p = .018$
 - Nonsequential Word Segmentation, $p = .018$
 - Training Word Reading, $p = .018$
 - Generalisation Word Reading, $p = .018$
 - Word Identification, $p = .017$
 - Word Attack (nonword reading), $p = .018$
 - Letter-Sound Recognition, $p = .027$
 - Letter-Sound Production, $p = .018$
 - Word comprehension, $p = .027$
 - Passage comprehension, $p = .041$

Silent-reading intervention

- As a group the Silent-Reading intervention condition showed significant improvement on measures of reading comprehension, reading ability, phonological awareness and letter-sound knowledge at the .05 level as measured using the Wilcoxon Signed-Ranks Test
 - Word comprehension, $p = .011$
 - Passage comprehension, $p = .018$
 - Training Word Reading, $p = .012$
 - Generalisation Word Reading, $p = .017$
 - Word Identification, $p = .012$
 - Nonword Blending, $p = .010$
 - Word Segmentation, $p = .023$
 - Letter-Sound Recognition, $p = .011$
 - Letter-Sound Production, $p = .018$

Research Results for Phonological Output

- All participants showed improvements in phonological output after participating in either of the two intervention conditions.
- Improvements in phonological output from pre-test to post-test were found to be significant at the .01 level (as assessed using the McNemar Test for Significance of Change) for all participants except two of the older children who scored too close to ceiling at pretest to achieve a significant improvement.

Auditory short-term memory and reading development

- Individuals who have Down syndrome can develop phonological awareness and phonic decoding skills regardless of their auditory short-term memory.

Conclusions

- Children with Down syndrome can develop or improve phonological awareness and phonic decoding skills through participation in reading instruction, particularly instruction focused on phonological awareness.
- Individuals with Down syndrome can develop phonological awareness and phonic decoding skills regardless of their auditory short-term memory.

Conclusions

- Children with Down syndrome can develop or improve reading comprehension by engaging in reading comprehension tasks.
- Reading instruction may improve oral language development for children with Down syndrome.
- Reading instruction can be beneficial to children with Down syndrome as early and later intervention