

# Teaching reading to develop literacy, spoken language and memory skills - a Summary

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## **Introduction**

We have been studying the reading abilities of children with Down syndrome since 1980. For the first ten years we collected case study data on a number of children and we have published this information on a number of occasions (e.g. Buckley 1985, Buckley & Bird 1993, Buckley 1995, Buckley, Bird & Byrne 1996). My interest in reading was the result of a letter from a father, Leslie Duffen, describing the progress of his daughter, Sarah. Leslie informed me that Sarah had been able to begin to learn to read from the age of 3 years and that she had achieved a high level of functional literacy. He also thought that her reading ability had led to her having better speech and language skills than most children with Down syndrome of her age.

Leslie felt sure that other children with Down syndrome might benefit in the same ways from early reading instruction and was hoping to interest me in starting some research. He succeeded and our case study data has confirmed his hypotheses. We have worked with many children who have the ability to learn sight vocabularies from as early as two years and four months of age. Most have proceeded to achieve functional levels of reading and writing abilities i.e. above eight year reading ages for reading, and spelling abilities with good comprehension provided that they continue to receive appropriate instruction. Teachers need to be able to adapt the teaching of reading to take account of the child's level of language comprehension and then to use reading ability to teach grammar and vocabulary. Like Sarah, our reading children have better language and they usually have clearer speech.

Not all children will be early readers. We try teaching a sight vocabulary once a child has a comprehension vocabulary of 40 to 50 words and can play matching, selecting and naming games with pictures e.g. picture lotto. We then introduce family names by playing the same matching, selecting and naming games with words. At the same time we make individual books for the child using family photographs, so that the words being learned can be used in meaningful context as we proceed. If the child learns to read the names, we then teach some verbs, nouns and adjectives so that we can begin to build two and three word phrases such as 'mummy sleeping', 'daddy gone', 'big bus', 'Jenny eat cake', 'big black dog' and so on. The sentence structures will start at the level of the child's comprehension and then build from there to teach grammar as well as vocabulary.

If the child is not interested in reading, at the fifty word vocabulary comprehension stage, we continue with all the usual language teaching activities and we would try picture symbol systems as visual supports for words and sentence building. We would continue to make and read simple books and play word lottos as most children will be able to learn a sight vocabulary by five years of age. It is essential to keep the activities meaningful and fun for the child. By making individual books about the child's own family, friends and experiences we make comprehension easy and

ensure we are teaching language that the child will be able to use to talk about his everyday world at home and at school.

Once a child is confidently reading some fifty words and can read simple sentences with comprehension, then we begin to teach phonics starting with initial consonants in words the child can already read. We find that many children are able to learn letter sounds using the same activities as the other children in their mainstream classes. However, it takes several years of reading instruction to be able to decode a new word in a sentence by 'sounding' it out letter by letter and to be able to spell by thinking how the word sounds to find the letters. When they can do this they have become 'alphabetic' readers and while they are still relying on visual memory for reading and spelling they are 'logographic' readers. These stages have been documented in all beginning readers (see Gathercole & Baddeley 1993 for an overview of reading acquisition in typically developing children).

### **Longitudinal studies**

While many children with Down syndrome were in special schools it was difficult for us to study reading, as it was not a priority on the curriculum if indeed it was taught at all. As we have succeeded in increasing the number of children being educated in mainstream schools over the past ten years, we are now able to study the literacy development of representative samples of children over time and have had one such study ongoing since 1994. We have 24 children with Down syndrome in this study and we are comparing their reading progress with that of a group of their mainstream peers matched for reading age and a group of average readers. We are charting their reading progress, language and memory skills over time.

Over the first two years the children with Down syndrome made as much progress as the reading matched group on reading, so are within the range of readers in their school. They are relying more on visual, logographic strategies to keep up this reading progress and becoming alphabetic more slowly. However, those with reading ages over seven years are slowly mastering the use of phonics for reading and spelling and becoming alphabetic, just like other children, despite their hearing and auditory processing difficulties (Byrne, MacDonald, & Buckley, 1999). We are currently exploring the links between their alphabetic skills and their phonological awareness (Fletcher, MacDonald, Byrne & Buckley in preparation). We are not yet able to see any clear pattern of causal relationships between reading, language and memory development as suggested by some of our earlier data (see below) but continue to monitor progress each year (Byrne, Buckley, MacDonald & Bird in preparation).

### **Short-term memory, reading and language**

Our attention was drawn to the limited auditory short-term memory spans of children and teenagers with Down syndrome by the work of MacKenzie & Hulme in 1987. In 1990 we began to plan an intervention study to see if we could teach children with Down syndrome to improve their memory function. We evaluated two strategies, rehearsal and organisation, which we know are effective memory strategies that typically developing children are able to use in their early school years. In the rehearsal training, children were taught to learn lists of items by rehearsing them aloud and in order. Using picture materials children named and then recalled

pictures, starting with one item, then two and so on until they reached their limit. In the organisation training the children were taught to group items into categories to help to remember them.

The children were able to use both strategies and training significantly improved both visual and auditory short-term spans (Broadley, MacDonald & Buckley 1994). The trained children also showed a significant gain in comprehension of grammar in the year compared to children who did not take part in the memory training.

However, as we followed the children over time, the improvement in memory function did not appear to be sustained when we looked at the group data. By three years after training, the children's memory spans appeared to be no better than those of a comparison group who had not done the training (Laws, MacDonald, Buckley & Broadley 1995). However, closer inspection of the data revealed a different story.

If the children were divided into those who were able to score on a reading test and those who could not, then the data showed that the readers had continued to build on the improved memory span gained by training but the non-readers had lost the improvement over time. We then looked back at all the assessment data collected on these children at the start of the study four years earlier .

There were no significant differences between the two groups in 1991 on non-verbal mental ability (Raven's Coloured Matrices), vocabulary comprehension (British Picture Vocabulary), grammar comprehension (Test for Reception of Grammar), or on auditory or visual short-term span. In 1995, both groups of children had made the similar progress on the non-verbal mental ability task and both groups made the same progress with memory spans after the training. However, by 1995 the reading group is significantly ahead on the vocabulary, grammar and memory measures. The readers in the comparison group who did not do the memory training also had better auditory and visual short-term memory spans suggesting that the effect in the trained group is due to reading (Laws, Buckley, Bird, MacDonald, & Broadley 1995).

Finally , we were aware that in the trained group, the readers were all in mainstream schools and the non-readers in special schools so we looked at data on a similar age group of children from all those in special schools assessed in 1991 and divided them into readers and non-readers. We see the same pattern of advantage to the readers. Taken together all this data is pointing to the significant effect that reading will have on the other cognitive skills for children with Down syndrome. As the same beneficial effects of progress with reading on speech, language and memory skills are reported in typically developing children (see longitudinal studies reported in Gathercole & Baddeley 1993), it seems that these cognitive skills are building and supporting one another in the same way in children with Down syndrome.

## **Conclusions**

I have presented evidence to support the proposal that reading instruction will not only lead to useful levels of functional literacy for a majority of children, but also improve speech, language and short-term memory skills.

For a full version of the arguments presented in this Summary see Buckley, S.J. (1999). Promoting the cognitive development of children with Down syndrome: The practical implications of recent research. In Rondal, J.A., Perera, J. and Nadel, L. (Eds.), *Down's Syndrome: A Review of Current Knowledge*. London, England: Whurr .

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## **Some practical references to speech, language and reading**

Bird, G. and Buckley, S.J. (1994). *Meeting the educational needs of children with Down's syndrome: A handbook for teachers*. Portsmouth, England: University of Portsmouth. [Also Online] URL:  
<[http://www.downsnet.org/library/books/meeting\\_needs/](http://www.downsnet.org/library/books/meeting_needs/)>

Buckley, S.J., Emslie, M., Haslegrave, G., Le Prevost, P. and Bird, G. (1993). *The development of language and reading skills in children with Down's syndrome*. (2nd edition). Portsmouth, England: University of Portsmouth.

Also available - video tapes on language and reading and simple early language games.

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### **For more information and books/ videos/ resources contact:**

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