

Editorial

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The papers in this issue pursue two topics relevant to the understanding of learning and cognitive development in Down syndrome, firstly, mastery motivation, self-regulation and learning styles and secondly, number development. Four of the papers are from the *3rd International Conference on Language and Cognition in Down syndrome*.

In the first paper, entitled *Motivation and learning styles in young children with Down syndrome*, Jennifer Wishart of the University of Edinburgh, Scotland, provides an overview of the possible implications of a number of research studies carried out by herself and her colleagues. Wishart suggests that there may be a specific learning profile associated with Down syndrome which could be detrimental to their progress over time. Based on evidence from a number of her studies she describes this profile as characterised by 'an increasing use of avoidance strategies when faced with learning new skills, a growing reluctance to take the initiative in learning contexts and an over-dependence on or misuse of social skills in cognitive contexts'. Wishart suggests that the slower learning of children with Down syndrome puts them at risk of experiencing more failures than successes in learning in their early years and this may partially explain the above profile.

More research is needed to establish how common a profile of this sort is, given the wide range of individual differences in ability and personality that there are among children with Down syndrome. It would also be interesting to see how common such a profile is among other children with intellectual impairments or specific learning difficulties i.e. is this a specific characteristic of individuals with Down syndrome or is it common among children with learning difficulties, with or without general cognitive delays? Secondly, further research is needed to explore the effects of styles of support for children's learning on this profile. Would this profile still be evident if children received sensitive scaffolding and positive social mediation of their learning?

Wishart also questions the widely held view that social understanding is a strength for children with Down syndrome as, in a recent study, she and a colleague found that the children were less able to identify some emotions (surprise and fear) from photographs of faces showing these emotions, though able to identify others (happiness, sadness, anger and disgust) as well as children matched for

non-verbal mental age. This study is difficult to interpret as the language abilities of the two groups of children may have varied and the understanding of specific verbal labels and static facial expressions may not be the same as the intuitive non-verbal understanding of emotional states in real contexts when there are many more clues to people's feelings available to children. More research is needed which explores the social behaviours and social understanding of children with Down syndrome in the real life contexts of home and school.

The next paper, *Mastery motivation in children with Down syndrome*, reports a longitudinal study which addresses some of the issues raised in the first paper specifically in pre-school children. The paper, presented by Sheila Glenn, Beverley Dayus, Cliff Cunningham and Maureen Horgan of John Moores University, Liverpool UK, explores mastery motivation in children with Down syndrome and typically developing children at the mental ages of 6, 12, 18 and 24 months and the role that caregivers' styles of interaction may have in influencing mastery motivation. The paper also provides a review of the prior research in this area. Children with Down syndrome were recruited to the study at 3 mental age points, 6, 12 and 18 months, and then each group was followed for 6 months, providing both cross-sectional and longitudinal data. At the mental ages of 6 and 12 months, the children with Down syndrome were significantly different from the typically developing children on the mastery motivation measures, but there were no differences between the two groups of children at 18 and 24 months. The typically developing infants made significant gains in their mastery motivation scores only between 6 and 12 months, while the children with Down syndrome made significant gains only between 12 and 18 months, leading the authors to propose that this seems to be a pattern of delay relative to mental age. However, the children's caregivers did rate the children with Down syndrome as lower on mastery motivation and this leads the authors to identify the need for studies of motivation and persistence to be designed that rate these behaviours during daily activities in the children's usual environments. Caregivers of children with Down syndrome were more directive but links between parental style and mastery motivation were not easy to interpret, although positive support for autonomy and encouragement seem to have positive effects.

This study suggests that if there is a tendency for children with Down syndrome to show a specific motivational profile as suggested by Wishart, then it may develop as a result of experiences during the school ages, rather than during preschool. Longitudinal studies, looking at motivation in different contexts and in relation to different types of tasks, would be useful in exploring this issue. As Glenn and colleagues point out, negative effects of failure may not become salient until children are of school age.

The third paper on self control and motivational issues looks at self regulation in young adults with Down syndrome. In a paper entitled *Delay of gratification in young adults with Down syndrome*, Monica Cuskelly, Maria Einam and Anne Jobling from the University of Queensland, Australia review the literature on the development of self-regulation and report the findings of a study of self-imposed delay of gratification. The young people chose a reward and were told that they could have it when the experimenter returned (after 15 minutes) or when they rang the bell. They were then left alone with the reward visible to them. The young people took part in a similar experiment on a second occasion. One third of the young people were able to wait 15 minutes on the first occasion and almost half on the second occasion. Half the young people were not able to wait more than 3 minutes on either occasion.

The research team explored the links between the ability to delay gratification and language abilities, temperament, self-control in daily situations and parenting styles. The only measure which discriminated those able to wait from those not able to wait was expressive language ability, suggesting that the self-regulating function of language is significant. The lack of a relationship of behaviour in the experimental situation with parent's report of self-control for their young people suggests that it would be important to investigate behaviour in these kinds of situations in real life.

These three papers make an important contribution to the literature on motivational issues. The ability to be self-motivated in learning in the classroom, particularly in mainstream environments, and the ability to self-regulate behaviour in daily life are skills that will greatly enhance the lives of individuals with Down syndrome. One pointer to improving these skills is to improve the speech and language skills of children, the main theme of the conference. However, the use of language for self regulation and instruction is an area which should be targeted for further research as we know little about this area of development in children with Down syndrome or in typically developing children.

The remaining two papers in this issue are on number and language. The first, entitled *Counting and cardinal understanding in children with Down syndrome and typically developing children*, by Joanna Nye, Michael Fluck and Sue Buckley of the University of Portsmouth, UK, presents data from the first phase of a longitudinal study which is part of the PhD work of the first author. There is very little research into the development of number understanding for

individuals with Down syndrome. This study is charting the first stages of this development, learning the number words, learning to count and understanding cardinality. It is also exploring the effect of styles of parent support on the children's progress over a two year period. The children are in the non-verbal mental age range of 2.5 to 4 years (CA 3.5 - 7 years) and their progress is compared with that of a group of typically developing children of the same mental age.

The initial assessment data demonstrates that the children with Down syndrome are learning the number word sequence and beginning to count but that they have smaller number word sequences and count smaller sets accurately when compared with the typically developing children. However, there is no difference between the two groups on early understanding of cardinality and both groups show the same levels of improved performance when their parents are scaffolding their performance. This data could suggest that the understanding of counting and number is progressing at an appropriate level for the mental age of the children with Down syndrome but that their verbal short-term memory difficulties are holding back the length of the number sequence that they can handle.

The longitudinal data from this study will be available shortly and it should yield valuable information on this vital early stage of number development. Language comprehension data will be available for the children so that it will be possible to explore the links between number understanding and verbal as well as non-verbal abilities. It will also be possible to explore individual differences.

The final paper, entitled *Language and number in Down syndrome: the complex trajectory from infancy to adulthood*, is presented by Sarah Paterson of the Institute of Child Health, London. This paper, like others presented at the Conference, compares the language and number skills of individuals with Down syndrome with those with Williams syndrome, another genetic syndrome causing intellectual disabilities.

There is evidence that infants show an innate awareness of small quantities, and tasks which measured preferential looking in infants were used to assess their early awareness of number and their early understanding of words. As babies, the infants with Down syndrome and with Williams syndrome showed similar abilities on the receptive language tasks, but the babies with Down syndrome were less successful on the number tasks. However, when these same skill areas were assessed by Paterson in adults with Down syndrome, the language skills of the adults with Williams skills were better than those of the adults with Down syndrome but the reverse was the case for number skills.

This data raises issues about the ability of early infant measures to predict progress in either number or language abilities and suggests that longitudinal studies will be important in furthering our understanding of the development of these complex skills and the ways in which they are influenced by environment and instruction.

The information available at present tends to suggest that number is a more difficult area for children with Down syndrome than literacy, with significantly better progress recorded for literacy in both child and adult studies. However, a basic level of numerical understanding is important in daily life and in enhancing independence and quality of life, so that more research in this area could make an important contribution.

The abstracts in volume 7 provide readers with an overview of the presentations on medical, genetic and biochemical issues in Down syndrome from the *II International Conference on Chromosome 21 and Medical Research on Down Syndrome* in Barcelona (April 2001), reprinted with the permission of the conference sponsors Fundació Catalana Síndrome De Down.

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