Abstracts from the Down Syndrome UK Research Forum
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Magnetic resonance spectroscopy and Alzheimer’s
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Magnetic Resonance Spectroscopy (MRS) is an in vivo technique which measures metabolite concentrations in the brain. There are indications that MRS may prove to be valuable in the early diagnosis of AD, and a team at the Institute of Psychiatry, London, are investigating the use of this technique in brain ageing in Down syndrome.

Parenting children with Down syndrome, autism and learning disabilities
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The study aimed to explore child variables such as adaptive skills and behavioural problems that may account for differences between children with Down Syndrome, Autism and Mixed Aetiologies. Twenty-three mothers of children with Autism, 26 mothers of children with Down Syndrome and 26 mothers of children with Mixed Aetiologies participated. Self assessment questionnaires were sent to mothers to address their sense of competence, child rearing practices, family satisfaction, marital satisfaction, stress, anxiety and depression. Mothers also completed the Strength and Difficulties Questionnaire (Goodman, 1999). Telephone interviews were conducted to assess maternal expressed emotion and to identify the child’s adaptive behaviour. No significant differences were found between mothers of children with Autism, Down Syndrome or Mixed Aetiologies for maternal satisfaction, restrictive parenting behaviour, anxiety, depression, marital satisfaction, family satisfaction or expressed emotion.

Firstly, children with Autism had significantly more negative impact on the family than children with Down Syndrome. Secondly, mothers of children with Autism were significantly more stressed than mothers of children with Down Syndrome. Lastly, mothers of children with Autism and mothers of children with Mixed Aetiologies had significantly higher levels of positive gain than mothers of children with Down Syndrome. After controlling for child behavioural problems and child adaptive behaviour total SDQ scores explained differences in maternal stress and the impact the child had on the family. In conclusion, the level of child behaviour problems and not the adaptive behaviour of the child are important influence on maternal stress. Future research needs to consider how parental stress may affect parental behaviour and how parental behaviours may contribute to child behaviour.

Inclusion in education: outcomes and implications for adult life
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The authors have conducted two studies of the achievements of teenagers with Down syndrome in the county of Hampshire in the UK, one in 1987 and one in 1999. In 1987 all children with Down syndrome were being educated in special schools. In 1999 some children, depending on where they lived, had been included in mainstream classes with full-time support, others were still in special education classes. This has allowed them to ask two questions:-

- Are teenagers in 1989 achieving more as a result of increased educational expectations and more positive social attitudes?
- Are teenagers who have received all their education in inclusive classrooms benefiting academically or socially, compared with teenagers being educated in special education classrooms?

They will present a summary of their key findings and their implications for the future of special educational provision.

Characterising language impairment in Down syndrome
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Research on language development in Down syndrome suggests that there is commonly a language delay, with some evidence for a specific deficit in the area of morphology and syntax, over and above the general delay. It is necessary to note, however, that there is considerable individual variation, with different cognitive/linguistic profiles occurring in different individuals, and in the same individual over time. Much of the research characterising
the language of people with Down syndrome has been
descriptive in nature, with little attempt to relate the pat-
terns observed to current syntactic theory. Recent work in
the field of Specific Language Impairment, however, has
indicated that there is a subgroup of language impaired
children who show a specific grammatical deficit, with
particular problems in dealing with structural dependent
relationships between syntactic constituents. In this pres-
äsentation we will review what is known of language develop-
ment in Down syndrome, and discuss the possible utility
of theoretically-based investigations for characterising the
linguistic knowledge of this group.

My child’s special friend: Play as a mode to
develop social skills and friendships

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In general, children of nursery-school age develop the
interests and abilities to participate in cognitive play or
fantasy games, which mostly involve peer interaction.
However, a case study of a child with Down syndrome at
Walton Lane Nursery School shows that a child with Down
syndrome is unlikely to be involved in such group activi-
ties. Most play he engaged in was not beyond the nature of
infant play discovering the perceptual properties of objects.
Therefore, this project is aimed at creating cognitive play
materials, which encourage social interaction between
Down syndrome and typically developing children within
an integrated nursery setting.

Making inclusion work for young pupils with
Down syndrome

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In this presentation I will report on the preliminary find-
ings from a research project that is focusing on the impact
of mainstream provision for eighteen primary aged pupils
with Down Syndrome. In particular our project is seeking
answers to the following questions: How is classroom sup-
port managed for pupils with Down Syndrome? To what
extent are the pupils involved in normal classroom activi-
ties? What is the role of the Teaching Assistant? How is
the curriculum differentiated? What are the attitudes of the
other pupils? What kinds of relationships do the children
with Down Syndrome have with their peers? What are
the parents’ views about the education of their child with
Down Syndrome? What are the views of the parents of non-
disabled children?

Educational issues for 16 year olds with
learning difficulties

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This paper will discuss some of the methodological issues
which have been raised during the early stages of a research
project looking at the community participation of 16 year
old pupils with learning difficulties attending mainstream
and special schools. There will be a particular focus on the
complexities of the sampling process.

Ravens error analysis in Down syndrome

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Having collected Ravens Coloured Progressive Matrices
data from a number of children with Down Syndrome and
with Moderate Learning Disabilities, as well as from typi-
cally developing children, we aimed to analyse the pattern
of errors made by these groups. Errors were classified using
categories suggested by Raven et al (1990) and groups were
matched for overall performance. The Down Syndrome
group produced a significantly different pattern of errors
compared to the other two groups. In particular, Down
Syndrome individuals produced more errors of ‘inadequate
individuation’ and fewer ‘repetitions of a figure’ compared
to typically developing children and those with moderate
learning disabilities.

Language and memory development in
children with SLI and children with Down
syndrome

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This presentation focuses upon the development of lan-
guage and working memory skills in three groups: children
identified as having Specific Language Impairment (SLI);
children with Down syndrome and a group of typically
developing children who were included as a control com-
parison (all three groups were matched for non-verbal
ability based on Leiter scores). All children were visited at
three six-month time-points and various psycholinguistic
and memory tasks were completed on each occasion. Pre-
liminary findings will be discussed, as well as possible areas
for further investigation.
Nonword repetition in Down syndrome

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A study is reported that builds on earlier work by Laws (1998) by comparing the nonword repetition performance of individuals with Down syndrome to that seen among typically developing controls. Results showed that Down syndrome individuals were impaired in nonword repetition performance, although both groups showed comparable benefits of linguistic knowledge on repetition accuracy. Among typically developing individuals, nonword repetition performance was related to an independent measure of verbal short-term memory. However, among individuals with Down syndrome, performance was related to vocabulary knowledge, and to some extent articulation skill, but not verbal short-term memory span. This result contrasts with Laws’ findings, and possible reasons for this discrepancy will be discussed.

Developing the language skills of adults with Down syndrome

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In comparison with the research that has been carried out concerning the abilities of children with Down syndrome, the number of studies which have concentrated on adults, or even older adolescents has been very limited. Of this research, only a very small proportion has evaluated the effectiveness of interventions designed to enhance the language skills of people with Down syndrome beyond early adolescence. This paper describes a two-year intervention to investigate the effectiveness of a structured language programme for adults with Down syndrome, based on studies by Buckley and colleagues indicating that reading can be an effective medium for teaching language to adolescents with Down syndrome. Implications for continued language intervention for adults with Down syndrome are also explored.

Steady-State VEP and behavioural measures of visual acuity in children with Down Syndrome; the effect of defocus.

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Children with Down syndrome (DS) have reduced visual acuity (VA) when tested using behavioural techniques. Many children with DS also show accommodative inaccuracy at the viewing distances used with behavioural tests. This study investigated optical defocus as a candidate for reduced VA in children with DS. The subject group consisted of 34 children with DS and 35 controls, aged 3 mos. - 14 yrs. VA was measured using steady-state, swept VEP with vertical sine wave gratings at 5Hz phase reversal (software provided by A.M. Norcia; Norcia and Tyler, 1985). VA was also measured using conventional behavioural techniques. Dynamic retinoscopy was used to predict defocus at the testing distances. The modulation transfer function was calculated for each defocused child using geometrical optics. The first zero of this function was to estimate the upper spatial frequency limit on VA due to defocus. VA was analysed using a subject group (DS vs. controls) × test type (behavioural vs. VEP) ANOVA with subject age as a covariate. A significant effect of subject group was observed (F(1,59)=8.632, p<0.001) and a significant interaction between subject group and test type (F(1,59)=5.169, p=0.027). The DS group showed reduced VA compared to the controls in both VEP and behavioural acuity tests, but the deficit was more pronounced with behavioural testing. Reduced VA in the DS group was still seen when the analysis was restricted to those children who accommodate accurately (F(1,26)=8.047, p=0.009). The DS group showed more defocus than controls (F(1,55)=5.978, p=0.018). VEP and behavioural VA thresholds approached the limit predicted by geometrical optics only in children whose defocus was greater than 0.3 diopters. In conclusion, optical defocus due to accommodative inaccuracy does not fully explain reduced VA in DS. Children with DS who do not have significant levels of defocus still exhibit reduced VA when compared to controls suggesting an underlying neural sensory deficit in the DS visual system. Inaccurate control of accommodation in children with DS may reflect such a deficit.

Adults with Down syndrome who may develop dementia: Issues in assessment and support

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Given the improvement in the life expectancy of people with Down Syndrome, the increasing prevalence of age-related health problems has become more apparent. Indeed, there is considerable evidence that adults who have Down...
Syndrome are at high risk for developing a dementia of the Alzheimer’s type in later life. The assessment of dementia in adults with Down Syndrome is more difficult due to the pre-existing intellectual disability and other age-related problems such as physical health and sensory difficulties, depression etc need to be considered. The assessment and diagnosis of dementia is vital in understanding changes in the individual and is important in the development of support for the individual and their caregivers. Whilst at the time of writing there is no effective treatment for dementia, it is possible to lessen the more problematic effects of the disease process by providing psychosocial interventions, increasing social and other activities and modifying the environment.

A comparison of language impairment in adolescents with Down syndrome and children with specific language impairment

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Research on language impairment in the two populations has followed separate streams, but a comparison of the literatures suggests that the language profiles of people with Down syndrome resemble the profiles of children with SLI. Are these similarities superficial, or are common underlying mechanisms implicated? This study addressed this question by comparing the language profiles of a group of adolescents with Down syndrome with those of younger children with SLI at the same levels of nonverbal cognitive ability, and by investigating whether the same processes and capacities that underpin normal development are deficient in SLI and in DS.


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There is a controversy in the literature concerning imitative abilities in Down syndrome children. Some arguing that DS children have an extraordinary capacity for imitation (e.g. Lone & Stratham, 1986) or are at least well capable of imitation (e.g. Swann, 1983) and other finding that they cannot imitate in an interactive situation (e.g. Biederman, Fairhall, Rowen & Davey, 2002). The present study was designed to test spontaneous imitation between matched DS and non-DS children mental age 3-4 years (20 children, eight boys, and twelve girls). During a creative block task children were asked first to construct anything coming to their mind and second they were asked to work together to construct a figure from a sample given to them. The preliminary results indicated that in the first condition DS and matched non-DS children suggested different constructs (such as boat, house, and car) and neither child imitated the other. In the second condition, however, when the experimenter suggested that the children should share the pieces and work together 50% of the ND children imitated a construct of the matched DS child, usually a tower. These results will be discussed in the light of the debate of the role of imitation in DS and non-DS children’s learning.

Number development in children with Down syndrome

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This longitudinal study investigates how count word vocabulary, object counting and understanding of cardinality develop over two years in a group of children with Down syndrome, and a group of typically developing children (matched for non-verbal mental age - Leiter). Counting tasks include counting sets of toys (procedural counting) and giving requested set sizes (understanding of cardinality). The typically developing children were found to have significantly larger count word vocabularies and longer count word sequences, than the Down syndrome group, at all 3 test points. Despite this disadvantage for the children with Down syndrome, when counting or giving sets there were no significant differences between the groups, indicating that their understanding of number was as good as that of the typically developing children.

Knowledge of syntax in Down syndrome: The case of binding

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In a study on binding phenomena in the language of four adolescent girls with Down syndrome (DS), distinct patterns of comprehension of reflexives as opposed to pronouns are reported. Subjects had specific difficulties in comprehension of reflexives, constrained by Principle A of standard Binding Theory (Chomsky, 1985), but showed near perfect performance on pronouns, governed by Principle B. This pattern seems to be exactly the reverse from that found in typical language development, contrary to the traditional ‘delayed but non-deviant’ characterisation of language development in DS. It is argued that the knowledge of binding relations in DS is intact but the behaviour shown is due to a deficit in establishing the syntactic relation between the reflexive element and its antecedent.
Social understanding in children with Down syndrome

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Children with Down syndrome are often thought to have superior social abilities compared to their cognitive abilities. However, evidence will be presented to show that, in comparison to groups of children with non-specific learning difficulties and to typically developing children, those with Down syndrome show a lesser ability to recognise facial expressions of emotion. This is not due to a cognitive deficit in face processing, as when the task is made harder (by turning faces upside down) their performance is not relatively worse. Furthermore, the deficit is specific to recognising the expressions of fear and surprise. It has been found previously that such specific decrements may arise from damage to areas within the limbic system (Calder et al., 1996), and neurological studies on children with Down syndrome suggests a reduced volume of the temporal limbic cortex and also in the frontal lobes (Jernigan et al., 1993). This frontal reduction fits with the pattern of behaviour in children with Down syndrome, who seem to be less aware of the responses of others in interaction, and the social behaviours produced may be repetitive and dysfunctional in a problem-solving context (Pitcairn & Wishart, 1994).

Case study of a child with dual diagnosis of autism and Down syndrome

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The planned presentation will look at the interactive problems of having a dual diagnosis, focussing mainly on communication and related difficulties. The presentation will look at speech and language interventions, the use of TEACCH and PECS, and the child's involvement in the Sunfield Colour Impact Project; a piece of research dedicated to exploring the impact of colour light environments on the communication of children with severe ASD.

The influence of accommodation on development of refractive error and binocularity in children with Down syndrome

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Research has shown that children with Down syndrome are at greater risk of developing refractive error (long or short sight) and strabismus (eye turn) than their typically developing peers (Woodhouse et al., 1997b). In order to investigate the influence of accommodation accuracy on the high prevalence of refractive error and strabismus, this study compared the above parameters in children with Down syndrome who accommodated accurately with those who did not. 2 analysis showed that a significantly greater number of children in the under accommodating group had significant hypermetropia (long sight) (p = 0.003) and strabismus (Fisher’s Exact Test, p = 0.008).

The Cardiff Bifocal Study for Children with Down Syndrome: Visual & cognitive update

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Research has shown that up to 80% children with Down syndrome consistently underaccommodate at near (Woodhouse et al., 1993). Therefore, the majority of children will have blurred vision for near work, which has repercussions on academic work and progress. In order to address this issue, a bifocal spectacle study is currently in progress (n = 34; Bifocal group = 17, Control group = 17). We are monitoring both visual and cognitive aspects of each child in response to their new glasses. Although final data collection is scheduled for July 2002, we will report on data collected so far and discuss issues regarding this type of study.

Recognition of facial expressions of emotion and peer collaboration in children with Down syndrome and children with non-specific learning difficulties

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The two studies to be reported are investigating aspects of social cognition in children with Down syndrome and children with learning difficulties of unknown aetiology. These studies are currently midway through the data collection phase. The first builds on previous work by Wishart and Pitcairn (2000), using a photo-matching task to examine recognition of facial expressions of emotion. The second is based on the work of Garton and Pratt (2001), and uses a furniture-sorting collaborative paradigm to see whether peer collaboration in problem solving influences subsequent individual problem solving. In both studies a number of descriptive measures of cognitive ability, language, and adaptive behaviour are also being taken, in order to see how these relate to the social cognition skills being examined in individual children.