

A REVIEW OF 100 CASES OF CHILDREN WITH READING PROBLEMS

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Since 1972 when the Newcastle research on Specific Learning Difficulties was first published, over 1,000 children have been referred by teachers to the Orthoptic Department of Sydney Eye Hospital for ocular assessment. The apparent break-through in the treatment of children who had not responded to conventional forms of educational help, led some teachers to believe that a solution to the whole reading disability problem had been found. The presenting symptoms and signs were multitudinous – general reading difficulties, reversals, poor spelling, lack of motor co-ordination – poor comprehension, untidy writing, etc. At first, children were frequently referred without a psychological assessment and without evidence of reading retardation. Quite often the parents did not know why the eye examination was requested.

During the past eighteen months, the standard of referrals has been more satisfactory. Children are being referred specifically because of a suspected visual component in the learning difficulty, or to rule out the possibility of visual processing problems.

We are well aware that a multidisciplinary approach to the investigation and treatment of learning difficulties is desirable, but this is not always easily implemented. Dunlop states that "the orthoptists' role is limited to ocular factors – she can have no part in the difficult parallel task of assessing relative intellectual potential or in the detailed analysis of writing and reading abnormalities".

As matters stand, the decision whether to treat, and how to treat, is left to us. We are expected to judge whether the ocular condition is a significant cause of failure, without the benefit of discussion with others who have studied the child.

Accordingly, the aims of this paper are

- i) to identify, in general terms, the various types of reading problems,
- ii) to review the cases of learning problems assessed and treated at Sydney Eye Hospital, and
- iii) to discuss the difficulties faced by the independent practitioner.

I. IDENTIFICATION OF READING PROBLEMS

Most authors agree that remediation of a child's learning difficulties is mainly educational, but that there is a place for orthoptists, in both assessment and treatment. We must establish what this place is, if we practise independently of a multidisciplinary team. Barbara Cassin⁶ said "Ophthalmologists and orthoptists should show interest in this type of problem (learning disability), learn how it relates to the eye, and become knowledgeable about learning disabilities as an educational handicap. Otherwise, the parents will have the child's eyes re-examined by someone more sympathetic, but not necessarily more able to give relevant help."

There appear to be many different classifications of learning disabilities. The classification of the University of Florida⁶ appears to be the most practical in terms of relating the patient's history to the various categories. The six categories are:

Category 1 – Developmental Learning Disability (specific developmental dyslexia). Primary.

The characteristics of this category are – normal birth, normal motor and intellectual development for the first five years of life. At school (kindergarten) there may be difficulty in drawing and copying. In first grade these children have letter and word reversals and great difficulty learning to read, which persists despite average to high I.Q., normal cultural stimulation, absence of brain damage, intact senses, adequate motivation and normal schooling. Additional characteristics include familial incidence and a greater incidence in males.

Category 2 – Minimal neurologic dysfunction (M.N.D.). Secondary. M.N.D. does not show on tests and the history does not always give clear evidence of brain damage, but usually includes at least two of the following: – difficulties during pregnancy, prolonged labour, difficult birth, postnatal problems. The child may have delayed developmental milestones and hyperactivity but not the type of hyperactivity due to frustration. At school he may exhibit the same difficulties as children with development dyslexia, with these added signs: very limited concentration span, clumsiness and poor motor co-ordination (e.g. difficulty with scissors). Characteristic of this group is the continuation of perceptual motor deficits into adolescence despite remedial help. The I.Q. level is often low average; there is emotional lability, defective use of language, and difficulty with abstract reasoning and comprehension.

Category 3 – Brain damaged. This category includes children with manifest brain damage. These children have a positive history of seizures, abnormal E.E.G.'s, cerebral palsy or depressed I.Q.

Category 4 – Social and Emotional Learning Disability or both. The characteristics of this group are normal birth, normal milestones, but unlike the specific developmental dyslexics, there are no problems such as difficulty with copying or reversals. These children present as under-achievers, and the cause is emotional deprivation for lack of normal parental attention. The parents do not realise that they are the primary teachers of the child in the pre-school years. The problem in these cases is that the child is emotionally ill from disturbed human relationships.

Category 5 – Cultural Educational Deprivation. Mainly children from the low socio-economic level fall into this category because of poor prenatal care, a midwife rather than gynaecological delivery, or poor nutrition in the foetal and neo-natal state. The children are deprived culturally, or educationally because the parents are not capable of stimulating the child at an early age. Because their parents are failing intellectually, motivation for the children is lacking. Although they have problems with the alphabet, reading and spelling, they do not have associated neurologic and neuropsychologic deficits.

Category 6 – Combination of at least two of the above categories.

2. REVIEW OF THE ASSESSMENT AND TREATMENT OF CHILDREN WITH LEARNING PROBLEMS

A. SELECTION OF CHILDREN FOR REMEDIAL TREATMENT

The classification of learning difficulties given above provides a framework in which to consider our own role. We are familiar now with two binocular disabilities which affect reading. One is symptomatic convergence insufficiency, a state likely to discourage serious attempts at reading. The other is crossed lateral dominance, as tested by Dunlop's reference eye test, which shows a statistically high correlation with reading difficulties associated with reversals of letters and words. There is a school of thought which contends that lack of "visual perception" is a cause of reading problems. According to Herman Goldberg, Visual perception is the intellectualising of visual images. Thus the letters *d o g* become *dog*, a four-legged animal. The letter and word reversals common to Categories 1 and 2 (above) mean that visual images are incorrect or inconsistent, making intellectualisation more difficult.

Since Dunlop found that treatment of crossed laterality reduced reversals, with an 80% rate of improved reading ability, we have used crossed lateral dominance, as determined by the reference eye test, as our prime criterion for undertaking treatment, by occlusion and exercises. Other cases showing reversals were also accepted, for exercises only, as were cases of symptomatic convergence insufficiency.

B. STUDY OF FINDINGS IN CHILDREN TREATED

Although approximately 1,000 children have been referred to the Orthoptic Department, many attended for one assessment visit only; others did not complete treatment, and many are currently undergoing treatment. In order to assess the effectiveness of treatment, it was necessary to select a random sample, not from the 1,000, but from a group who had completed treatment and who had been under treatment for not less than three months. This time limit was chosen as it was felt that any scholastic improvement, as a result of ocular treatment would not be evident under this time period. The group who fulfilled this criteria numbered approximately 350, and of these, a group of 100 was chosen randomly on the advice of the senior medical records librarian at Sydney Eye Hospital.

All had been referred because they were not reading to the expected standard for their I.Q. All of them had completed treatment and were discharged at the time of considering the results.

The information taken from the medical records included age, sex, reasons for referral, visual acuity, the state of ocular motility and binocular function; handedness, eye dominance (both sighting eye and reference eye test as described by Dunlop¹⁰), the treatment prescribed; length of treatment and follow-up; and whether remedial reading was given elsewhere during the treatment period.

Improvement as a result of visual treatment was impossible to assess scientifically because psychological tests were not available either before or after treatment. Therefore, improvement (for the purpose of this study) could only be defined as that improvement in the child's performance which, as assessed by the teacher, was a direct result of the visual treatment. Unfortunately, even on this point, information was not available in every case.

SUMMARY OF STATISTICS

The group of 100 children consisted of 81 boys and 19 girls. This finding is in line with results of other studies, indicating that reading difficulties are more common amongst boys. Bettman⁴, Cassin⁶, Goldberg and Schaffman^{1,2}, etc.

The ages ranged from 5 years to 15 years. The average age being 9.2 years.

All children had been referred, by either a teacher or school counsellor, because they were not performing to their expected level. Only 4 complained of asthenopia associated with close work. The remaining 96 were referred because of poor reading, poor spelling, reversals, or a combination of all three. Of the group, 77 were right-handers, 19 left-handers, 2 were ambidextrous and 2 were not recorded. No girls were left-handed, one was ambidextrous. In the normal population one in eight is a left-hander, so in this sample the proportion of left-handers is almost twice as high. Of the number recorded, 32% had a history of familial left-handedness or ambidexterity.

The visual acuity was measured with either the Snellens Test Type or the Sheridan Gardiner chart. 91% had normal equal visual acuity (34% 6/6; 57% 6/5). Three cases had unequal vision due to refractive error; the remaining six had only slightly unequal vision, i.e. 6/6, 6/5. Of the 9 children with unequal vision, none had laterality problems, i.e. none of them had difficulties with reversals. According to Dunlop and Dunlop¹¹, equal vision is a characteristic of children with laterality problems. The presence of a deviation was determined by the cover test, prism cover test and Maddox Wing. 78% of the children were orthophoric, or exophoric for near only, which agrees with the 1977 survey of 5 year old children⁵.

10 children had exophoria for near and distance
 9 children had esophoria for near and distance
 3 children had intermittent divergent strabismus.

Of the total number (863) of children referred for reading problems who had been assessed and recorded at our clinic, 1.5% had strabismus. In other series (Casin⁶, Bettman⁴), the proportion of strabismus was not higher than in the normal population. In our experience the percentage of strabismus is lower than in the normal population. None of those with intermittent divergent strabismus had laterality problems.

Convergence was noted according to the R.A.F. rule divisions. Convergence ability was classed as normal (0-5 cms), reduced 16-10 cms) and defective (11 cms+).

	5,000 5 yr. olds	100 (average age 9.2 yrs)
Normal (0-5 cms)	86.4%	58%
Reduced (6-10 cms)	10%	33%
Defective (11 cm+)	1.8%	9%

The convergence ability of this group is very poor, as compared with the group of 5 year olds tested in 1977. Benton et al¹ found convergence insufficiency in 20% of cases and Nicholls¹⁴ found convergence insufficiency to be significantly more frequent in children with reading problems. The latter also states that convergence is the least stable of all co-ordinated ocular movements and is easily disturbed by poor health or emotional upsets. So perhaps the convergence insufficiency in these cases is the result of the reading difficulty.

35% of children had less than full stereo acuity, measured either on the synoptophore or the Titmus Stereo test. Romano et al⁵ and Dunlop⁹ have found that the proportion of stereoacuity improves with ocular maturity. As the average age of this group was 9.2 years, it appears that, as a group, stereoacuity was significantly defective. One of the findings of Dunlop and Dunlop¹⁰ is that children with crossed lateral dominance characteristically have less than perfect stereoacuity.

Eye dominance was tested monocularly by asking the child to look through a tube, and binocularly by the Dunlop method¹¹ as stated previously.

	Sighting Eye Test	Reference Eye Test (Dunlop Test)
Same as hand	53%	10%
Crossed or mixed	39%	87%
Not known or not applicable	8%	3% (one child could not do test; 2 children had defective vision)

C. TREATMENT AND RESULTS

Treatment consisted of convergence exercises only, occlusion only or occlusion and exercises. The children were instructed to wear the occlusion for all school work and homework. The average length of occlusion was 6/12. The total percentage of improvement was 59%. 14% did not improve and unfortunately, in 27% of cases the result of treatment was not recorded.

	Results of Treatment			Total
	Occlusion	Exercises	Exercises & Occlusion	
Improved	25	9	25	59
Not improved	7	0	7	14
Not known	15	4	8	27
Total	47	13	40	100

Of the 13 who had convergence exercises only, 9 (69%) improved, and 4 (31%) are not known.

The number of children treated for laterality problems by occlusion or occlusion and exercises was 87. The percentage of improvement was 57%; 16% did not improve and in 27% of cases improvement was not known.

The majority of those who improved with occlusion, or occlusion and exercises had been given remedial reading as well. This is to be expected as remediation MUST be educational as well as medical.

Again it is important to stress that accurate diagnosis of each child's specific type of learning problem had not been made known to us. But, interestingly, there was a useful percentage of improvement combined with a change of reference eye, amongst that group whose symptoms included reversals, which may indicate that these children fall into category one or two of the classification quoted earlier. In retrospect it is probable that some children would fit into one of the other 3 categories of learning difficulties (excluding the brain damaged category). Therefore, in some cases crossed lateral dominance would not have been a causative factor.

It is also important to recognise the psychological factors which may influence the prescribed treatment. It is reasonable to suggest that in the group who improved without alteration of reference eye (25% of improved group), some children were helped because the parents' attention was focused on a tangible reason for the learning difficulty. The child may have responded to treatment, because a reason for the learning difficulty was no longer due to his lack of trying, etc., but due to a "physical problem".

The average length of time of the follow-up period was 6/12. During the follow-up period, nine children who had changed reference eye after occlusion reverted to the original reference eye. The average duration of occlusion for these nine children was less than 6/12, probably too short a period.

DIFFICULTIES FACED BY THE INDEPENDENT PRACTITIONER

It is important to recognise the various types of learning disabilities and perhaps the classification of the University of Florida will be helpful. This is not to suggest that orthoptists are capable of diagnosing learning difficulties but some understanding of the many factors involved should help to put this problem into perspective for those of us who work independently of a multi-disciplinary team.

To decide when to stop occlusion is difficult, but these figures indicate that the length of occlusion should be not less than 6/12, and perhaps better results would be obtained with occlusion of 9-12/12 (Dunlop^{1,2}). We have found that to avoid familiarity with the Dunlop reference eye test, it is advisable to see the child at intervals of not less than eight weeks, unless convergence exercises are prescribed as well. In such a case the initial visits are closer, but the Dunlop reference eye test would only be done every eight weeks. We have found the reference eye test difficult to perform accurately in a busy and noisy clinic, and therefore the decision to cease occlusion is difficult. We have found that it is easier when we combine 2 sets of the small house slides and use a pair with the same sized controls. But an objective test would be preferable.

CONCLUSION

Remediation should be mainly educational and treatment in conjunction with remedial reading appears to be the most beneficial.

Refractive or ocular motility problems do not cause learning difficulties, but strabismus, phorias, significant refractive errors and convergence insufficiency, should be treated so that the child has good symptom-free vision when learning to read.

Considering that this group of 100 children consisted of unspecified learning difficulties, 59% overall improvement is very encouraging. This study tends to show that occlusion is most beneficial when one of the symptoms is reversals, which suggests that such children may belong in the University of Florida's Category 1, and perhaps 2.

Visually evoked cortical potential electrical tests have been suggested^{1,3} as an alternative to the Dunlop reference eye test. This would be a desirable test, but it is very time consuming and would seem to be impractical at this stage.

When evaluating these results the psychological effect of treatment must not be overlooked. I do feel that while occlusion did alter the reference eye and the reversals were stopped, that in some cases the psychological value of treatment must not be discounted or underestimated.

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ACKNOWLEDGEMENTS

I wish to thank Miss Jill Horsburgh, Senior Medical Records librarian for her advice on the statistical selection of the cases, and Mr. David Rivers for his advice on how to conduct this study.