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TRANSACTIONS OF

30TH & 31ST ANNUAL SCIENTIFIC MEETINGS

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** Awarded the Emmie Russell Prize*

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EDITORIAL

Dr. Archie Anderson, our eldest honorary member died on the 4th of November, 1974. A small man, quiet in manner, he was a great man in the hearts of those who knew him, his Christianity, his courtesy, his wit, wisdom, and generosity. He was a senior honorary surgeon of the Victorian Eye and Ear Hospital, where among many benefactions, he fostered the establishment of the orthoptic clinic during the nineteen thirties, and its further development, aided by Dr. Frederick Fenton, during the difficult nineteen forties. He set an unforgettable example of selflessness.

An address from Dr. Ronald Lowe opens this journal. It was gratifying to Australian orthoptists, and appropriate, that he should be our patron in 1973, while President of the Australian College of Ophthalmologists, and at a congress having strabismus as a main topic. Among his wide services to ophthalmology as member or leader, on boards and institutions of all sorts, scientific and administrative, he has been active on the Orthoptic Board of Australia, and for eighteen years chaired the successive bodies responsible for orthoptic education in Victoria. Characteristically, his paper directs us to tackle a piece of investigation. Himself a wide reader, tireless in clinical work, writer of over 50 journal articles, he has always endeavoured to keep orthoptists on their toes to meet new challenges.

Dr. Lowe has now relinquished the responsibilities which implied honorary membership of our Association ex-officio. We are glad to say he has accepted continuing membership honoris causa.

Patricia Lance in her review of the Past, Present and Future has failed to mention that she is herself a foundation member of this Association, has been in charge of the New South Wales Orthoptic School for some thirty years, and has made scholarly contributions to our transactions. As first Head of the new Orthoptic School, she has the responsibility of defining and planning the pattern of orthoptic education for years to come. In this she has the full support and confidence of our Association. Miss Valerie Spooner, her assistant, who has put her knowledge and enthusiasm to the service of us all, is a welcome contributor to this journal.

Diana Craig

Patron's Address, 1973

ORTHOPTISTS AND THE YOUNG CHILD

Dr. *Ronald F. Lowe*
President, The Australian College of Ophthalmologists

I wish to thank the Council of the Orthoptic Association of Australia for continuing to ask the President of the Australian College of Ophthalmologists to be their Patron when the congresses of these two bodies are held concurrently. Both officially and personally I am honoured to attend your Annual Scientific Meeting.

One might say that orthoptists have been the handmaidens of ophthalmologists, the destiny of their practice barely within their determination; but this year, a new era has begun for Australian orthoptics by the commencement of an autonomous course of training within the N.S.W. College of Paramedical Studies. Now an orthoptist carries the major responsibilities for decisions about the course, its implementation and its future developments. We all congratulate your President, Miss Patricia Lance, in being appointed the first Head of this Orthoptic School, and the ophthalmologists look forward to continuing close relationships with ready offers of any help they can give.

Autonomy always brings a little nostalgia and sadness. As ophthalmologists carried so much responsibility for the training and employment of orthoptists, ophthalmologists usually regarded orthoptists as very special assistants and tended to treat them with considerable indulgence. I think that autonomy will loosen some of these bonds and later orthoptists will tend to merge into the wider body of paramedical assistants.

Once, at a lecture, I heard Dr. J. Ringland Anderson say that one of the big uses of orthoptics was to help make children tractable for examination. He said that children were difficult to handle, were usually frightened and tended to be unco-operative, but orthoptists converted them to young humans rather than young animals in the doctor's rooms.

Times and children have changed. Only rarely does one have to deal with a wild unco-operative child. Then he is usually from the country and possibly used to seeing mutilating operations done on domestic animals and thinks that it is perhaps now his turn. Nowadays most children have much medical experience. Beginning as babies they are subject to repeated examinations, inoculations, and handling by nurses and doctors. My senior colleagues used to bribe children with sweets harmful for the teeth, but that is no longer necessary.

Not only have young children become more easily managed by doctors but they have learnt to co-operate with tests at younger and younger ages. Television and kindergartens have had much to do with this. From infancy, children become used to seeing images on screens, to watching many strangers talk to them and show them things that command their attention, while they are being involved in abstract learning at a much earlier age.

I find that many children now have a grasp of the alphabet before they begin school, whereas not many years ago one had to wait until the child was nearly six years old before it had enough alphabet-sense for vision testing. I used to find that very few children could interpret a line of E's before aged four years, but now, many children can do this test several months earlier. The appreciation of shapes seems to be learnt much earlier and children can complete simple jig-saw patterns before aged three. Other toys for matching shapes are available for two year olds.

This early learning by children becomes available for the assessment of visual acuity at early ages, but here, clinical practice is generally underdeveloped. In 1965

Ffookes described a symbol test for visual acuity. From a chart, the child had to recognise only a square, a circle, or a triangle and pick up an object of the same shape (contour matching). This is a simple test that can readily include parent involvement for teaching the child.

Orthoptists should seize these new learning possibilities and develop them. They now have an encouragement to pursue earlier and earlier testing. They should watch the commercial games and toys and see if they can be adapted to their advantage.

The main bugbear of squint treatment is that before it can be given on the sensory side, children have ingrained binocular perversions or adaptations that cannot be removed because they are too deeply established before the child can benefit from formal instruction. Orthoptists need to watch the more sophisticated early learning of children and take any advantage of it in their work.

Many children now receive very early surgery that gives cosmetically good-looking eyes, but leaves many of these eyes without good binocular function. In these infants there is a grave risk of amblyopia in one eye. Ideally, one should be able to measure the visual acuity of each eye soon after the operation and continue to check it.

After a few visits without definite measurements of vision, some parents think that nothing is being achieved by repeated examinations, and as there seems to be nothing wrong with the eyes they fail to bring the child for further supervision. Unfortunately in these cases, the first accurate test is delayed until the School Medical Examination at perhaps age six years. Amblyopia which is then discovered may not respond to treatment. These are tragedies.

We need earlier and earlier testing, not necessarily as refined as later, but of sufficient accuracy to show any significant difference in the vision between the two eyes. We need repeated assessment of learning ability of young children for procedures that may be useful for the training of vision.

With those challenges I have much pleasure in declaring open this Annual Scientific Meeting.

REFERENCE:
Ffookes, O. (1965) *Vision Test for Children.* Brit. J. Ophthal., 49:312.

Presidential Address

ORTHOPTICS: PAST, PRESENT, AND FUTURE

Patricia Lance

Part I. *Presented in Canberra, April, 1973*

In welcoming you all to our Annual Congress I feel I can safely predict that this meeting in Canberra will be a memorable one. First and foremost it is a wonderful occasion because it has brought together 74 orthoptists in one place - by far the largest gathering of orthoptists ever held in Australia, and I hope the forerunner of many such meetings. It is also important because it is the first time that strabismus has been a central topic in a scientific meeting of the Australian College of Ophthalmologists. We are privileged once more to be able to attend these meetings, and are pleased that some of our members have been invited to read papers.

This meeting is important too because the future of orthoptics in Australia depends on decisions now being made. The imminent removal of the New South Wales School of Orthoptics from the guidance of the Orthoptic Board of Australia, and its forthcoming inclusion in a College of Advanced Education, make this a time to take stock, to take a short look back into the past and to ponder for a moment on our possible future.

About 20 years ago, in a moment of youthful enthusiasm, I attempted to trace for you the history of strabismus and its treatment from the earliest historical records up to 1950. I am not so foolish as to repeat that today, but I do think it is important to keep our history up to date, and to remind some of our newer members of our own early days.

Australian orthoptics has developed from, and is still closely connected with orthoptics as prescribed by the British Orthoptic Board, and reciprocity between graduates of the British schools and the two Australian schools is a much valued privilege. Orthoptic treatment probably began in France with such famous men as Cantonnet, Remy, and Javal. However, long before Javal treated his sister's squint with stereoscopic exercises, Kreche, an optical physicist from Utrecht, was using prisms to treat squint; so present day prism therapy is not such a new idea. Emils Donders, also of Utrecht, demonstrated the relationship between accommodation and convergence and was the first to treat convergent squint by correcting the hypermetropia. Many more examples could be given, but in spite of the great men from other countries who contributed to the understanding of strabismus and its treatment, modern orthoptics still looks to England; here it was that the first non-medical women commenced to work with ophthalmologists and became known as orthoptists.

Thanks to some of the early work in England by such men as Priestly-Smith and Claud Worth, Ernest Maddox decided to train his daughter Mary to work with him in the treatment of squint. Miss Maddox started orthoptic work in London in 1919, and was the first orthoptist appointed to a hospital. She founded the orthoptic clinic at the Royal Westminster Ophthalmic Hospital in 1930, and was followed there a year later by two of her pupils, Miss Sylvia Jackson and Miss Irvine.

In 1934 the British Orthoptic Board was formed, the first syllabus for training orthoptists was devised, and training schools developed in various parts of Great Britain. In 1936 the first orthoptic examinations were held in England and in 1937 more than 50 orthoptists met in London to form the British Orthoptic Society.

Australia was well to the fore in this new venture. Just one year after Miss Maddox started work at the Royal Westminster Hospital the first orthoptic clinic was opened in Melbourne (in 1931) as the Sight Saving Clinic at the Alfred Hospital. Dr. J. Ringland Anderson brought the first synoptophore to Australia and Mrs. Alan Southey was the first orthoptist to practice in Melbourne. Others followed, entering private practice, and the Victorian Eye and Ear Hospital soon opened its orthoptic clinic.

In 1932 Miss Emmie Russell travelled from Sydney to train with the four orthoptists working in Melbourne, and was joined by Miss Gilchrist and Miss Willoughby. These last two together with Miss Fox then went to England and obtained the diploma of the British Orthoptic Board. On their return Miss Fox resumed her practice in Melbourne, Miss Gilchrist set up practice in Hobart, and Miss Willoughby (now Mrs. Retallic and happily at this meeting today) commenced orthoptics in Adelaide. Miss Russell returned to Sydney and entered private practice in 1933; six months later she started the first orthoptic clinic in Sydney at the Royal Alexandra Hospital for Children. Orthoptic clinics were soon opened at Royal Prince Alfred Hospital, Sydney Hospital, and the Medical Eye Service of New South Wales.

In March 1938 the first meeting of the Orthoptic Council of New South Wales (a sub-committee of the Ophthalmological Society of New South Wales) was held, with Dr. Granville Waddy in the chair. This committee examined for registration the five orthoptists already working in Sydney, and required that future applicants for registration, unless holding the diploma of the British Orthoptic Board, should undergo a twelve months course of instruction followed by an examination. Two such courses were held in 1939 and 1941 before training of students was suspended until after the conclusion of World War II. During the war orthoptists were employed as civilians in the Royal Australian Air Force, at first testing candidates for air crew and later giving treatment, especially of paralytic

squints and heterophorias.

Following the inauguration of the Ophtalmological Society of Australia in 1938, an Orthoptic Board of Australia was formed with ophthalmologists representing each State. Dr. Norman Gregg (later Sir Norman) of Sydney was the first chairman and Dr. F. Fenton of Melbourne the Honorary Secretary.. This Board was at first responsible for the training and examining of students in Victoria and granted registration to the successful examinees as well as to diploma holders of the Orthoptic Council of New South Wales or of the British Orthoptic Board. In 1947 reciprocity was granted by the British Orthoptic Board and there has been an exchange of orthoptists between the United Kingdom and Australia ever since.

After the war an increasing number of orthoptists were trained in both Sydney and Melbourne. Annual training courses commenced in Sydney in 1953 and in 1956 the course was extended to two years. Graduates of the two schools set up clinics in all State capitals and many country centres.

In 1942 Miss Diana Mann of Melbourne (now Mrs. Craig, and also here today) was invited by Miss Emmie Russell to Sydney to join in planning the formation of an association of orthoptists. As a result of this meeting the Orthoptic Association of Australia was officially inaugurated in 1943 with the late Sir Norman Gregg as its first president. The Association has met annually since that time to hold formal business meetings and scientific programmes. On these occasions we have had many distinguished guest speakers, and interesting papers have been read by our own members.

The proceedings of the early meetings were duplicated and sent out as typed notes to members and interested ophthalmologists. Later a more ambitious bound publication was the Annual Report of these meetings, and in 1966 the first printed journal was published. The Australian Orthoptic Journal has now become a suitable medium for the publication of articles by our members, with a much wider distribution. For the sake of their historical value, Miss Jane Russell of Sydney has collected, indexed, and photocopied all numbers of the early transactions. Three full sets have been bound, each into two volumes. One pair of these is in the library of the New South Wales branch, and one in the library of the Paramedical College. I now have the honour to present to this Association a copy which I dedicate to the memory of my late father Dr. Arnold Lance, an ophthalmologist who from the early days was a good friend to this Association. It has been suggested that the National Library in Canberra would be a suitable place for these two volumes to be housed.

Turning again to the history of our Association, 1964 stands out as an important year. That year saw the twenty-first birthday celebrations of the Orthoptic Association of Australia; the first joint examinations were conducted by the Orthoptic Board of Australia for students from both the orthoptic schools, and for the first time orthoptists were represented on the Orthoptic Board. The next major milestone may well prove to be 1973.

This year sees our membership increased to 120, of whom 96 are ordinary members. While the greatest number still come from New South Wales and Victoria, it is very pleasing to see the increase in numbers in the other States. All States are now represented in our Association and the two training schools are increasing their intake of students to supply this demand. There is a tendency now for orthoptists to practice in more peripheral areas of the big cities and in the larger country towns, in fact wherever there is an ophthalmologist practicing. More are working in so-called sponsored practices with individual or group practice ophthalmologists, most on a part time basis. There is a growing trend for some ophthalmologists to use orthoptists as ophthalmic assistants or technicians, so one matter which our Association is now called upon to consider is the exact role of an orthoptist.

Should orthoptists continue in the strictly conventional role of testing and treating cases of ocular muscle and binocular vision defects? How far should they undertake work as ophthalmic assistants? Can these two functions be combined? Fears have been expressed that routine work as ophthalmic assistants will lower the status of an orthoptist and some employing authorities already assert this. However, many orthoptists report great satisfaction from their additional roles in working as part of the eye care team. Certainly these appear to give more employment prospects. I ask all members to ponder these matters carefully.

In 1970 the Minister of Education in New South Wales decided to include orthoptics in the New South Wales College of Paramedical Studies to join the schools of physiotherapy, occupational therapy, speech therapy and advanced nursing. Thus orthoptics has entered the field of government subsidised advanced tertiary education. In 1971 an interim council was formed to organise the Paramedical College and Dr. M. Sterling-Levis and myself were appointed to this council. On Dr. Sterling-Levis' retirement due to an extended visit abroad, his place was taken by Dr. Bruce Goodwin Hill and last month on my appointment as Head of the Orthoptic School, Miss Helen Hawkeswood was appointed to take my place. The council has worked extremely hard to plan for the development of the College and to co-ordinate the education of the paramedical professions. At present the schools are scattered around Sydney, but it is hoped to build a central campus as soon as possible.

The decision of the orthoptic school to enter this College was not taken lightly. The New South Wales branch of the Orthoptic Board of Australia has had to decide how far its members could relinquish their role as teachers and examiners; the Orthoptic Board of Australia has had to decide whether it will register orthoptic diplomates of the College; and the New South Wales branch of our Association has had to consider its position in the light of these developments. Not all of these matters have been decided at the time of speaking to you.

My appointment is too recent for me to pass on any constructive ideas to you but as the Orthoptic School does not officially come under the jurisdiction of the College until July 1st this year, there will be few if any changes at present.

Next year I hope I will be able to be more informative. Meanwhile you may rest assured that this appointment has not in any way changed my attitude to orthoptics. The school will be part of an independent tertiary institution, but I am first and foremost an orthoptist. As a founder member of this Association who is honoured to be your president and proud to be an Honorary Member, I can assure you that I will continue to be loyal to the Orthoptic Association and will have your interests always at heart. My aim will be still to train orthoptists whom we can be proud to welcome in the future as colleagues.

Part II: *presented in Adelaide, April, 1974*

When the New South Wales College of Paramedical Education was established to supply an increasing need, recognised by Federal and State Governments, for more qualified practitioners in the health professions, it assumed responsibility for the teaching hitherto provided by the New South Wales College of Nursing, the New South Wales School of Orthoptics, the New South Wales College of Occupational Therapy, the New South Wales School of Physiotherapy, and the New South Wales Speech Therapy Training School.

The main college is to be built on a forty acre site at Lidcombe to provide for about 1800 students. Until a move to Lidcombe is feasible, the College will continue to operate in five separate places in Sydney. Over 750 students are enrolled for 1974. The Orthoptic School has joined the School of Physiotherapy in Salisbury Road, Camperdown.

The Interim Council "has sought to provide an academic structure which recognises the academic autonomy of each school, involves the academic staff in policy making and course development, and provides machinery whereby the College can develop as a unified tertiary institution."

The governing body of the College is the Council. It is advised by the Principal, who presides over an Academic Council, made up of the permanent teaching staff. Nine Standing Committees of the Academic Council deal respectively with admissions, clinical education, education, examinations and progressions, resources, research, student affairs, and time tables and calendar. These committees report to the Executive Board, which is composed of senior members of staff and conducts the daily affairs of the College.

Teaching, research, supervision and examination of subjects related to any one profession are the responsibility of the Head of the relevant School. Two Departments, one of Behavioural and one of Biological Science, provide undergraduate courses for all Schools, offer elective strands in the undergraduate programme, and course units in the post-graduate programmes.

Each head of a school or department is chairman of a Board of Studies made up of all permanent teaching staff in the same body, which considers curriculum proposals and passes them on to the Academic Council and appropriate Committee. A proposal for any significant change must be referred to an External Advisory Committee, which is chaired by a member of the Council, appointed by the Council, and includes members of the profession concerned.

With the new college assuming responsibility for the Orthoptic School on July 1st, 1973, it was agreed that students already in training should continue with the curriculum that they had commenced and should be examined by the Orthoptic Board of Australia as usual at the end of 1973. The eight Second Year students all passed their final examinations and were registered by the Orthoptic Board of Australia.

The eight First Year students were also examined by the Orthoptic Board of Australia in November, 1973 in anatomy, physiology and optics and in addition were given an orthoptics paper by the School. These students commenced their second year in January this year with their curriculum substantially the same in content as before. The only addition has been the inclusion of a short course of ten lectures in introductory psychology being given by a member of the Behavioural Studies staff of the College.

A few weeks ago at the beginning of March, fourteen students were admitted to the College to commence a two-year programme in Orthoptics. There has been too little time to make any real change in the curriculum so the syllabus of the Orthoptic Board of Australia has been used as the basis of this course. These students are however taking the Psychology I strand with the students of the other Schools of the College. General anatomy, general phsyiology and the physics of light and lenses are being taught by members of the department of Biological Sciences of the College. The same ophthalmologist lecturers as last year are teaching ocular anatomy and physiology and physiological optics.

The Orthoptic School is fortunate to have obtained the services of Miss V. Spooner, D.B.O. (T) as visiting lecturer for twelve months* and she is giving most of the orthoptic lectures and tutorials. Miss Spooner graduated from Moorfields Eye Hospital, London, in 1951 and gained wide clinical experience in England and Scotland. In 1957 she went to Canada where she was involved in training orthoptic students until 1961. During this period she obtained the American Certification of Orthoptics. During 1962 and 1963 she was on the teaching staff of Moorfields and obtained her teacher's certificate in London. In 1964 she opened the first Orthoptic School in Wales at the University Hospital of Wales in Cardiff.

* Now extended to eighteen months

Throughout this year continual assessments will be made of the students' standards in all subjects. As well, term examinations will be given by the lecturers in each subject.

The Orthoptic School is preparing a submission for the Advanced Education Board for recognition of a three year course in Orthoptics to be conducted by the College. At the moment this submission is being closely examined by the school's External Advisory Committee comprised of ophtalmologists and orthoptists. If the submission is successful a three year course should be commenced in 1975. The syllabus being considered is the same as that of the Orthoptic Board of Australia with the addition of some behavioural studies. In recent years however, it has become increasingly clear that the student needs to study certain areas of Orthoptics in greater depth and to have a general background in both the behavioural and biological sciences. The need to develop a three year Orthoptics Course in this College has become apparent. More specifically the development of this course has become necessary due to the need to give the student a better understanding of ocular anatomy, ocular physiology and optics by providing a more thorough basis in general anatomy, physiology and physics; the need for the student to have a more comprehensive understanding of the behavioural sciences; the need to give each student time for elective study of special aspects of orthoptics; the need to fit the required number of clinical hours into the expanded academic programme; and the need for the course, which already extends over 94 weeks, to be accommodated within the organizational format of the New South Wales College of Paramedical Studies as a whole.

NEW BINOCULAR FACTORS IN READING DISABILITY

Patricia Dunlop D.B.O. & Enid M. Banks M.A.

ABSTRACT.

An orthoptic survey of a group of reading disabled high school pupils matched with an equal number of normal pupils is discussed. A new orthoptic test for reference eye in central binocular vision is introduced, which will be of value in differentiating the visual type of dyslexia.

Introduction

A study in 1971 on primary school children with reading disability revealed interesting new results in the analysis of binocular vision and laterality. Visual tests employed in the study included a new orthoptic test for reference eye in central binocular vision.

For many years, hand-eye dominance has been investigated, discussed and reviewed in relation to cases of learning disability (Walls 1951, Lederer 1961, Critchley 1970, Brod & Hamilton 1971, Gronwall and Sampson 1971). Various methods have been used to decide on the dominant eye, from the early sighting eye tests which were obviously monocular, to the controlling eye test used by Berner and Berner in 1953 and more recently by Bettman et al (1967), Norn et al (1969), Helveston et al (1970), and Hurtt (1971).

Reading normally involves the use of both eyes so that it is not surprising that investigations using monocular tests have yielded inconsistent results. Attempts to introduce a binocular element into the investigations by the use of controlling eye tests or tests based on retinal rivalry (Raynor-Smith 1970) similarly produced non-significant results. In retinal rivalry the two images are too dissimilar to allow normal fusion, and in the controlling eye test one image has been suppressed at the point of decision.

Helveston (1968) remarked that "of the 15 eye functions he listed, only binocular eye control behaviour and phorias were considered to be even possibly significant."

The significance of the newly discovered central overlap of binocular fields is

discussed in the Australian Orthoptic Journal (Dunlop, D.B.,1972). This paper elucidates the bilateral representation of central binocular vision in the retina, the lateral geniculate body, and the cortex, and shows a possible reason for reversals and confusion where normal consistent lateralised preference of neural functions is not present.

In 1962 Ogle noted that the phenomenon of directional difference of fused disparate images within Panum's area was a possible basis for tests of ocular dominance. It is on fixation disparity within Panum's area that the reference eye test, used in this survey, is based. It was felt worth while to conduct another study, this time with a group of high school children with reading disability, using the reference eye test as in the previous study.

Experimental Subjects

For the purpose of this study it was required that all experimental subjects should have a long history of reading difficulties with continuous reading retardation. They should have no uncorrected sensory defects and no history of prolonged absence from school, and should be of average or above average general ability. Fourteen boys and one girl were selected from the case studies of a Newcastle remedial teacher.

As a check for possible sensory defects all subjects underwent visual and audiometric testing. All had passed the School Medical tests for hearing and sight. Any obvious visual defect such as a manifest deviation or the necessity for corrective lenses was already ruled out. It is agreed that a primary visual defect is insufficient to create a reading problem (Naidoo 1970), (Robb 1970), (Goldberg & Schiffman, 1972) therefore such defects are not relevant to this study.

The assessed I.Q. as noted on the pupil record card could not be taken as a valid indication of the subject's general ability, since this had been measured by group tests requiring reading, which would have deflated the results. Accordingly all subjects were given an individual I.Q. test (ACER)* which did not involve reading. The mean I.Q. of the experimental group is 113, with a range from 91 to 130.

Control Subjects

All subjects were volunteers from local high schools. All underwent the same visual and audiometric testing for screening out sensory defects and were given the same individual I.Q. test as the experimental group. The mean I.Q. of the control group is 118, with a range from 96 to 129. The control subjects were individually matched with the experimental subjects on the basis of sex and grade, but it was not possible to match individually for I.Q. and age because of limitations of availability of subjects and testing time. Nevertheless the mean I.Q. of both groups is very similar, and above average (Table I).

TABLE I

Mean Age, I.Q., and Reading Grades of Experimental and Control Subjects

	EXPERIMENTAL	CONTROL
Mean Chronological Age	14 : 1	13 : 6
Mean I.Q.	113	118
Mean Grade, Reading for Meaning	5 : 2	8 : 0
Mean Grade, Speed of Reading	4 : 5	7 : 7

By high school age it can readily be expected that all subjects of average or above average ability should be reading at grade level. For the purpose of this study, therefore any variation in I.Q. is not seen as a pertinent variable.

* Australian Council for Educational Research (Melbourne)

It can be noted from Table I that the mean age of the experimental group is seven months older than the control group, though the subjects were matched for grade. This can be accounted for by the fact that many of the experimental subjects had repeated a grade in their earlier schooling as a result of their learning difficulties.

Reading Assessment

Reading was assessed by the ACER Reading Tests Form C. Two subtests were used, the Reading for Meaning as a measure of reading comprehension, and Speed of Reading as a measure of reading fluency. In these tests the norms are measured in terms of grade level. A standard criterion of at least 2 years retardation in one or both subtests is accepted as indicative of present reading disability. The mean reading grade level for the two groups is set out in Table I.

While all subjects in the experimental group evidenced reading retardation on the Reading for Meaning subtest, this was not viewed as being the result of inability to comprehend, but rather as the result of slowness in the reading process. All subjects in the experimental group showed marked retardation on the Speed of Reading subtest, the measure of fluency. The mean chronological age of the experimental group is 14:1 years, and the mean reading grade level for fluency is 4.5, equivalent to an age level of 9:11 years and so indicating an average of more than 4 years retardation for the group.

The results of reading and I.Q. tests and group membership of the subjects were not made known to the researcher at the time of the orthoptic testing.

Orthoptic Assessment

The orthoptic examination followed the usual lines:- visual acuity, muscle balance, and level of binocular function, but with particular attention to convergence ability, stereopsis and the reference eye in central binocular vision (the new synoptophore test). In addition the sighting eye (a monocular test) and the preferred hand were also noted.

For the reference eye test a pair of fusion slides, macular size or smaller, with central indicators ("controls") such as the "House with two trees" or "Weather house with man and woman" slides (Clement Clarke F9 & 10;F69 & 70; F93 & 94) are used in the standard synoptophore. The slides are fused at the angle of fusion and disjunctive movements are carried out. The subject watches the centre of the picture carefully, but must be alert for any movement of either indicator ("control"). The eye seeing the steady indicator is the reference eye in central binocular vision. The movement of an indicator is more easily observed by the subject in diverging slowly than in converging, where accommodation can be confusing. Only answers taken before fusion breaks are valid. If suppression of an indicator occurs and no movement is observed, there is no significant binocular vision. That is, such a case would have insufficient central binocular function to act as a basis for the typical visual perceptual confusions found in ocular types of learning difficulty (dyslexia). It is possible that the suppressing eye can be the reference eye, in which case the subject observes the moving indicator before suppression occurs.

Orthoptic Examination Data

In this investigation unequal visual acuity is only of the order of ½ to 1 line difference between the two eyes on the Snellen distance chart at the level of 6/5 -6/6.

Convergence deficiency has been noted in other studies (Guthrie and Bermingham 1971),and is evident here in an inability to maintain convergence to 6 or 8 cm. without undue effort. Difficulty in maintaining good convergence tends to leave the subject uncomfortable at normal reading distance after a time. Losing the place and the tendency to skip words are also problems with inadequate convergence.

TABLE II

ORTHOPTIC EXAMINATION DATA SUMMARY

Number of Subjects Demonstrating Ocular Conditions

OCULAR CONDITIONS	GROUPS	
	CONTROL: N=15	EXPERIMENTAL: N=1
Unequal Visual Acuity	2	2
Convergence Deficiency	4	10
Defective Stereopsis	4	13
Crossed Correspondence*	3	13
Crossed Dominance**	5	3
Esophoria	7	13
Exophoria	1	1
Orthophoria	7	1
Esophoria with Defective Stereopsis and Crossed Correspondence	0	9

* *Crossed Correspondence refers to preferred hand being opposite to reference eye in central binocular vision*

** *Crossed Dominance refers to preferred hand being opposite to sighting eye for monocular viewing.*

Children with specific learning difficulty often have problems with spatial relationships, yet stereo-acuity as tested with the Titmus rings is usually good, with 8 or 9 items correct. However, stereo-perceptions tests where many objects at varying distances are presented without clues to their distance often yield poorer results. Many of the experimental subjects were unable to discriminate between the relative distances of the eight stimulus objects in the Christmas tree test slides (Clement Clarke No. D53 and 54) until visual stimulation by rapid movement was given.

Crossed correspondence (reference eye opposite preferred hand) is found in 13 of the experimental subjects and in only 3 of the control subjects. Crossed dominance (monocular sighting eye opposite to preferred hand) occurs in 3 experimental and in 5 of the control subjects.

The presence of crossed correspondence has also been observed in a high percentage of the 325 unselected cases of learning difficulty seen in this area during the past few years (Dunlop, P. 1972)

Esophoria was frequently noted in the previous primary school study (Dunlop, Dunlop & Fenelon, 1973) and it occurs again in 13 of the present experimental subjects but only in 1 of the control group. It is interesting to note that the esophoria in most cases (12) is of the Group IV type (Mayou 1968) where there is a small esophoria for distance with an exophoria for near.

In the analysis of reading disability, single predictors such as convergence deficiency, esophoria, defective stereopsis and crossed correspondence are evident but can be unreliable on their own, as single indicators.

Taking the triple combination of esophoria, defective stereopsis and crossed correspondence, which was proved highly significant in an earlier study, (Dunlop, Dunlop & Fenelon 1973), no subject in the control group is singled out but 9 of the 15 (60%) of

the experimental group are identified.

Conclusion

In conclusion it would seem advisable to check binocular vision and in particular reference eye, even in the presence of normal findings in the usual ocular examination, in children who show a tendency to reading disability. This should be done in the early stages of reading difficulty as binocular reflexes can be altered more easily in younger children.

Summary

An experimental group of 15 retarded readers of high school age together with an equal number of normal children were studied with particular attention to the analysis of binocular vision and laterality. The mean I.Q. level, usingintelligence tests not involving reading, was above average in both groups. A new orthoptic test is described which is binocular in concept, to ascertain the reference eye in central binocular vision. Certain orthoptic conditions were prominent in the experimental group although routine school medical testing had recorded normal ocular findings. A combination of esophoria, defective stereopsis and crossed correspondence (reference eye opposite to preferred hand) identified 9 (60%) of the retarded readers; it was found in no normally reading child.

Acknowledgment

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DIFFERENTIAL DIAGNOSIS AND AN OUTLINE OF THE MANAGEMENT OF SENSORY ADAPTATIONS IN STRABISMUS

Valerie Spooner

Presented in Adelaide, April, 1974

Sensory adaptations occur very readily in the child under seven years who has a constant manifest strabismus. A better understanding of these adaptations aids the making of a prognosis and therefore will affect the management of the condition. Much has been written on this subject by ophthalmologists and orthoptists from all over the world. A few of the theories and the methods of management appear to conflict. However, when studying this subject in depth the greatest area of disagreement seems to be in terminology.

The aim of this paper is to collate the facts so that the student, who is embarking on the study of strabismus, can make a differential diagnosis, assess the prognosis and have some guide to the management of these cases. The inspiration to write such a paper came from the Symposium on Strabismus held in Cambridge, U.K. in September, 1973 where two authorities on sensory adaption in squint, von Noorden and Lang, agreed in their terminology and classification of microstrabismus.

The British definition of abnormal retinal correspondence is "a binocular condition in which there is a change in the visual direction of the retina, such that the fovea of the fixing eye has a common visual direction with an area other than the fovea of the deviating eye. **The condition may occur which ever eye is used for fixation.**" This implies that each eye is capable of using the fovea for fixation. The fixing fovea would have therefore the principal visual direction, while the spatial values of the deviating eye have all shifted (nasally in convergent and temporally in divergent strabismus.)

Abnormal retinal correspondence can be classified as follows:

1. Microstrabismus without identity. Always unilateral - a small angled esotropia of less than 5°. Small amount of amblyopia present.
2. Convergent squint of 5° to 10°. Usually unilateral. Small amount of amblyopia present.
   a. Harmonious A.R.C. with anomalous fusion and gross stereopsis. Usually claims four Worth's lights and a diagonal cross with the striate glasses. Cosmetically acceptable.
   b. Unharmonious. Squint has an associated phoria. Often suppression on binocular tests.
3. Convergent squint of more than 10°, with early onset and often alternating, but can have varying amount of amblyopia. Vision in the deviating eye can be as little as 6/60, though this is rare as by definition each fovea is capable of fixing and this amount of amblyopia is usually associated with inability to fix centrally.
   a. Harmonious - rare.
   b. Unharmonious. Often has suppression on binocular tests.
   c. Lack of N.R.C. but patient claims that slides cross at a less convergent angle compared with the objective measurement, that is, showing a tendency to A.R.C.
4. Small angled divergent squint. This is rare. Usually cosmetically acceptable.

Orthoptic Investigation of Arc

When investigating a patient with A.R.C. the case history, cover test and visual acuity provide some indication of the condition. A well established A.R.C. is often associated with a unilateral convergent strabismus of under 12° where the onset occurred around the age of 2½ years. (The significance of this is that the patient has already been used to some binocular single vision.) The visual acuity of the deviating eye is normal 6/18 or better.

Using the visuscope there is central (foveal) fixation of either eye. When the star is superimposed objectively on the fovea of the one eye and with **both eyes open**, the patient will claim the star appears to the side of the fixation object (red light seen through mirror by the other eye).

On the synoptophore using simultaneous macular perception slides the objective and subject angles are compared. The subjective angle is always less than the objective angle. The difference between these measurements is known as the angle of anomaly. The angle of anomaly can be only 2 degrees or as much as 10 degrees. If the subjective angle is at 0° the angle of anomaly equals the angle of squint: this is known as **Harmonious A.R.C.** Usually these cases have a squint of 10° or less with more or less equal visual acuity. The smaller the angle of anomaly the more likelihood of the patient being able to do binocular tests. Therefore, in spite of not fixing the fusion slides bifoveally, the patient experiences a type of fusion with a range whilst seeing both controls. He experiences depth perception with the simple stereoscopic slides and also when viewing the fly on the stereotest. He will see 4 Worth's lights, a true cross with the striate glasses and he may claim physiological diplopia and be able to bar read.

In other words, complete adaptation has occurred to the squinting condition. The patient looks cosmetically satisfactory with good visual acuity and with binocular functions (though abnormal).

However, more frequently on the synoptophore, the angle of anomaly is less than the angle of squint. This is known as **Unharmonious A.R.C.** These cases sometimes have anomalous fusion but suppression can be a barrier. The patient may claim five Worth's lights and homonymous diplopia with red and green glasses and a spot light. However, when a correcting prism is used there is heteronymous diplopia (paradoxical diplopia). When asked to join the diplopia with prisms, a prism less strong than the correcting prism is chosen. (C.F. the synoptophore).

With the striate glasses usually two lights are seen with the streaks crossing above or below. The response in the after image test in cases of manifest squint with normal retinal correspondence is a true cross because both foveae are stimulated in turn. However, the response with A.R.C. is a T on its side, because the spatial value of one fovea has changed. (**NOTE**: The patient must be able to fix the centre of each bright light with the fovea for this test to be valid.)

Orthoptic Management of A.R.C.

Occlusion is given to all types if under the age of eight years in order to obtain the maximum visual acuity.

Type 1: Microstrabismus. No treatment. Kept under observation until 9 years, then discharged. Cosmetically excellent.

Type 2: Small convergent squint. No treatment. Might need intermittent occlusion. Kept under observation until 9 years then discharged. Cosmetically acceptable.

Type 3: Moderate to marked convergent squint. Probably not cosmetically acceptable, therefore, surgery advised.

a. If harmonious A.R.C. present no pre-operative treatment is given. The position is assessed after surgery.

b. If unharmonious A.R.C. present and the child is under seven and the visual acuity is equal, pre-operative treatment can be given to try to re-establish bifoveal fixation post-operatively.

c. If only signs of attempting A.R.C. and the child is under seven and the visual acuity is equal, pre-operative treatment should be given to try to re-establish bifoveal post-operatively..

After surgery the situation is assessed. Several of these cases develop into a microstrabismus. The advantage of having a well developed A.R.C. is that consecutive divergence is unlikely to occur. Amblyopia is unlikely to recur if the patient has been supervised until 9 years old.

Some work is being carried out, particularly on the continent of Europe using prisms with these cases. One method is to over correct the angle so that the patient is artificially divergent. The theory is that the abnormal projection will not, therefore be used. Often very strong prisms are required.

Type 4: Small divergent squint. No treatment. Kept under observation until 9 yecrs, (noting if there is any increase in divergence). Cosmetically acceptable.

Orthoptic Investigation of Eccentric Fixation

The British definition of eccentric fixation is "a uniocular condition in which there is fixation of an object by a point other than the fovea. This point adopts the principal visual direction." That is to say the spatial values have changed in the amblyopic eye only. This change is present even if the non-amblyopic eye is occluded.. In the investigation of patients with eccentric fixation, it will be found that the visual acuity is never equal, but can be as good as 6/9, i.e. where the fixation is parafoveal. Diagnosis is made using the visuscope. The fixation can be i) loss of central, that is wandering, ii) unsteady eccentric, iii) steady eccentric. The last has the poorest prognosis for the re-establishment of foveal fixation. Binocular visuscopy will show the degree of adaptation, that is to say the strength of abnormal binocular function.

Because the amblyopic eye cannot fix with the fovea the angle of squint is measured by the prism reflection test or by using corneal reflections on the synoptophore. Abnormal binocular function can also be assessed using the latter instrument. The nearer the fixation is to the fovea, the better the vision, which results in a stronger binocular link between the two eyes. If an instrument with Haidinger's brushes is available it can be used diagnostically to see if the patient can recognise the brushes with the amblyopic eye. Recognition is a good prognostic feature. There has been much discussion on the method of treatment of eccentric fixation especially the significance of occluding the amblyopic eye (inverse occlusion). The treatment generally accepted in Britain today is to occlude the fixing eye for one week and then to reassess the fixation of the amblyopic eye. If it is now foveal, or unsteady foveal, or wandering over the foveal area then this type of occlusion is continued until alternation occurs or there is no improvement in visual acuity over a period of six weeks. If however, there is not this type of fixation then inverse occlusion is advised for children under the age of seven. This is worn until the fixation becomes foveal. It is unusual to use inverse occlusion for longer than six months. If after this time, the fixation is not foveal, then occlusion of the fixing eye is given to eliminate as much of the amblyopia as possible.

Many orthoptists like using inverse occlusion as it helps the patient initially to cope with the psychological distress of wearing an occluder without also having to adjust to having poor vision.

To encourage foveal fixation red filter treatment can be given for twenty minutes two to three times a day. In the orthoptic department pleoptics can be given if the instruments are available and the child will cooperate. Quite young children can be taught to look for Haidinger's brushes even if they are unable to localize them. This helps to eliminate foveal suppression.

Orthoptic Investigation of Microstrabismus

The definition of microstrabismus is of a small angled estropia less than $10^{\Delta}(5^{\circ})$ usually with abnormal retinal correspondence and amblyopia of varying degrees in one eye. Bifoveal fixation is always absent.

Its etiology should be considered before the classification can be understood.

Primary

1. Idiopathic
2. Pathological lesion at fovea
3. Pathological lesion in media of eye
4. Pathological rejection of bifoveal fusion (Parks)

Secondary

1. Decompensated primary microstrabismus
2. After surgical correction of larger squint
3. After orthoptic treatment, particularly the accommodative squint of the convergence excess type
4. Optical - mainly anisometropia or premature reduction in hypermetropic correction or failure to prescribe full correction

The classification of both primary and secondary microstrabismus can be divided into three:

a. With normal retinal correspondence and a small central suppression scotoma of less than 4^{Δ}

b. With abnormal retinal correspondence, each eye fixing with the fovea under monocular conditions. Micro-strabismus without identity.

c. With eccentric fixation and changed spatial values in the amblyopic eye where the "angle of anomaly" equals the angle of eccentricity. Microstrabismus with identity.

All types can have an associated heterophoria although it is more likely to occur with secondary microstrabismus.

In the investigation of microstrabismus the history will give an indication of the differential diagnosis between primary and secondary. The visual acuity will never be equal. The results of the visuscope examination will provide the differential diagnosis between a, b, and c above. In cases of N.R.C. and true A.R.C. the cover/uncover test will reveal a very small convergent squint.

In cases of eccentric fixation where the angle of eccentricity equals the angle of squint there will be no movement.

In doing the alternate cover test (on all three types) any underlying latent component will be revealed. Thus, in some cases the very small manifest squint increases on dissociation. But once the cover is removed and abnormal binocular function can be resumed the eyes revert back to the very small angle. This gives an indication of how well established the abnormal sensory condition is.

The four dioptre prism test can aid the diagnosis. When bifoveal fixation is present (normal B.S.V.), if a 4^{Δ} prism base out is placed in front of either eye, that eye will move inwards very slightly. This B.S.V. will be regained.

When a microstrabismus is present, if the 4^{Δ} base out prism is placed in front of the eye with the better vision, this eye will move inwards. However, the other eye will move outwards (Hering's law); there is a shift of both eyes in the same direction. Bifoveal fixation is not taking place. When the prism is placed in front of the amblyopic eye there will be no movement of either eye as the image still falls within the small central suppression scotoma.

The synoptophore is used to aid the differentiation of cases of N.R.C. from those with A.R.C. This instrument is not helpful if eccentric fixation is present.

The patient may complain of separation difficulties when reading. These are similar to the crowding phenomenon which often occurs when the visual acuity of an amblyopic eye is tested. If the first part of a word appears to blur, run together or disappear, there is left microstrabismus. If the end of a word is affected then right microstrabismus is present (if the middle of a word is affected then foveal suppression is occurring).

With the striate glasses, the response in B.S.V. with bifoveal fixation is a diagonal cross, intersecting at the spotlight. In microstrabismus the diagonal line seen by the amblyopic eye is not complete. It has a central gap on each side of the spotlight. Unfortunately this defective cross is difficult for a child to recognise or to describe. The more accurate way of diagnosing this phenomenon is to allow him to keep looking through the striate glasses at the light whilst he draws exactly what he sees.

In spite of having subdivisions in microstrabismus, the management is the same for each type. As patients are cosmetically very satisfactory all the orthoptist can do is to try to obtain and maintain the best possible vision in both eyes. Total occlusion of the fixing eye in all cases under the age of 9 years is given. The occlusion is stopped once there has been no improvement whatsoever for four weeks. Care has to be taken that the patient does not get diplopia. This occasionally happens when the suppression associated with the amblyopia is reduced.

If the patient has symptoms due to an associated convergence insufficiency or decompensated heterophoria, orthoptic treatment can be given along orthodox lines. Similarly, if a convergent squint is noticeable on removal of the hypermetropic correction these patients can be taught to relax accommodation and to straighten the eyes.

Summary

The investigation and brief outline of the management of cases with A.R.C. or eccentric fixation have been considered, with particular reference to microstrabismus.

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USE OF CONCAVE LENSES IN THE MANAGEMENT OF INTERMITTENT DIVERGENT SQUINT

Frances Merrick

Presented in Adelaide, April 1974

On the final day of the 1973 Conference, Dr. Goodwin Breinan remarked that ophthalmologists "fiddle" with plus lenses to help control convergent deviations; why not, he asked, use minus lenses to help control divergent deviations? From the multitude of papers delivered at that time, this question remained with me.

When, in September 1973, I first tentatively suggested the use of minus lenses to an honorary consultant at Sydney Eye Hospital, his interest encouraged me to use them in the treatment of three children as described in this paper. Concave lenses, by stimulating accommodation, seemed to present a more active form of management than the use of prisms, which can indeed produce a desired effect, but which correct nothing. It was hoped that these lenses might, indirectly, stimulate lazy medial rectus muscles to stronger performance.

These three children were selected for three main reasons:

1. all had symptoms of headaches and/or sore eyes and blurred vision,
2. their parents were opposed to surgery at this time for various personal reasons,
3. summer was rapidly approaching; in each case, the intermittent divergent squint, previously of the "divergence excess" type, was becoming almost constantly manifest for near.

In no case was the use of concave lenses regarded as a cure: the parents were informed it was a measure to circumvent operation temporarily, and to help the children control their intermittent divergent squints during the summer months.

In ordering the lenses, the honorary medical officer took into consideration, in each case

1. the result of refraction under cycloplegia,
2. the severity of symptoms,
3. the angle of deviation,
4. a cautious estimate of the desired strength by the orthoptist.

Details of the individual cases are as follows:

C., aged 9, complained of occasional headaches and blurred vision.
He wore glasses $\frac{+0.75}{-1.50} \times 180^{o}$ each eye.
There was no previous surgery
Vision : 6/9 + 3 letters, N5, each eye
Convergence to near point 6cm. with great effort & marked fatigue
Synoptophore angles: fixing right eye -13^{o}, L/R 3 $^{\Delta}$
fixing left eye -15^{o}, 0/0
New glasses $\frac{-0.50}{-1.50} \times 180$ each eye, were ordered

Two weeks later, his mother reported that she thought his eyes looked "much better". He showed no desire to take these glasses off as had been the case with the previous pair, and there had been no mention of the usual headaches. His vision has improved to 6/6, N5 each eye.

A., a girl aged 6, had occasional headaches and sore eyes
Surgery : bilateral rectus recession, 5mm. at 4 years
No glasses. Atropine refraction +1.00 sph. each eye
Vision : 6/6, N5 each eye.
Convergence near point 6cm. when concentrating.
Synoptophore angles: fixing right eye −6° o/o
fixing left eye −5° o/o

She was ordered −1.25 sph. each eye
Her parents reported an immediate improvement in her appearance.
The school teacher had even rung to tell them of this, and of improved school work and concentration. A. herself remarked that her eyes were not sore as before.

L., aged 12 had constant headaches and used an analgesic daily for some relief. She complained also of sore eyes.
Operations: left lateral rectus recession 7mm. at 8 years
right lateral rectus recession 6mm. at 9 years
left medial rectus resection and excision of prolapsed Tenon's capsule at 10 years
No glasses. Atropine refraction 4 years earlier + 2.50 sphere.
Vision 6/6, N5 each eye
Convergence near point 8 cm. on accommodative target.
Synoptophore angles : fixing right eye − 10°, L/R 7$^{\Delta}$
fixing left eye −8°, L/R 5$^{\Delta}$

Glasses ordered were −2.00 sphere, each eye.
L. experienced immediate relief from her headaches. Also, her mother was delighted with her increasing social engagements; whereas, before,, L had been loathe to join in outdoor activities, now that she felt her eyes were straighter she was mixing freely with her friends.

Over the last six months the children and parents have remained satisfied with the glasses. The incidence of headaches has been negligible. The basic angles remain unchanged but all the children now show a good recovery on cover test for near vision; before this treatment their divergence became manifest for near on moderate dissociation.

All parents were convinced that the improved cosmesis was genuine; it was not merely that the frames were disguising the divergence. They also noticed that when the glasses were removed, the eyes rolled outwards as before.

Moreover, fate intervened during this six months. A. contracted a severe dose of chicken pox and was unable to wear her glasses for two weeks because of her numerous scabs and sores. L. unfortunately sat on her glasses at a swimming party during the New Year holiday and was without them for one week.

During these short periods without glasses, both girls experienced a rapid recurrence of symptoms. A's parents were distressed by her frequent divergence and complaints of sore eyes, and L. complained bitterly. of severe daily headaches. These symptoms miraculously disappeared once the glasses were resumed.

Concave lenses were also ordered for a fourth rather different case of divergence excess seen in this clinic.

M., a boy aged 3, had no symptoms
cover test at 6 metres and over : large right divergent squint, unable to retain right fixation
cover test at 1/3 metre : large exophoria with slow recovery.
He was prescribed −3.00 sphere each eye for constant wear, and returned six weeks later,with
cover test at 6 metres : large exophoria/right divergent squint
cover test at 1/3 metre : small right convergent squint, not maintaining right fixation.
His ophthalmologist reduced the lenses to −1.25 spheres, and the result is awaited with more than usual interest.

This last case perhaps presents a lesson in selecting cases for concave lens

treatment. Here there was a strong preference for the right eye, and no evidence of equal visual acuity. Moreover, although his parents were distressed by his appearance, M. had no symptoms. It was the symptoms which prompted use of the lenses in the other three cases, surgery being disallowed.

At this stage the use of concave lenses must be approached with caution. It would appear that surprisingly weak lenses may relieve symptoms, and it is the relief of symptoms that justifies their use. Like prisms, they can serve merely as a temporary measure to maintain or strengthen binocularity until an operation is possible.

Although reactions in the first three cases are encouraging, six months is but a short time. Perhaps next year I shall be able to tell you more about the indications for or against this type of therapy.

THE HESS-WEISS
MEASUREMENT OF OCULO-MOTOR DEVIATIONS
BY A METHOD OF FORMS OF CHOICE

Patricia Dunlop, D.B.O.

Introduction

Orthoptists have long charted oculo-motor deviation using one of the adaptions of the Hess technique, that is with the eyes fully dissociated by means of complimentary colour filters or a plane mirror. They are also aware that oculo-motor deviation can be heavily influenced by fusion and by accommodation. Hitherto, the standard techniques for recording this modified deviation have not produced the neat and graphical presentation of the Hess.

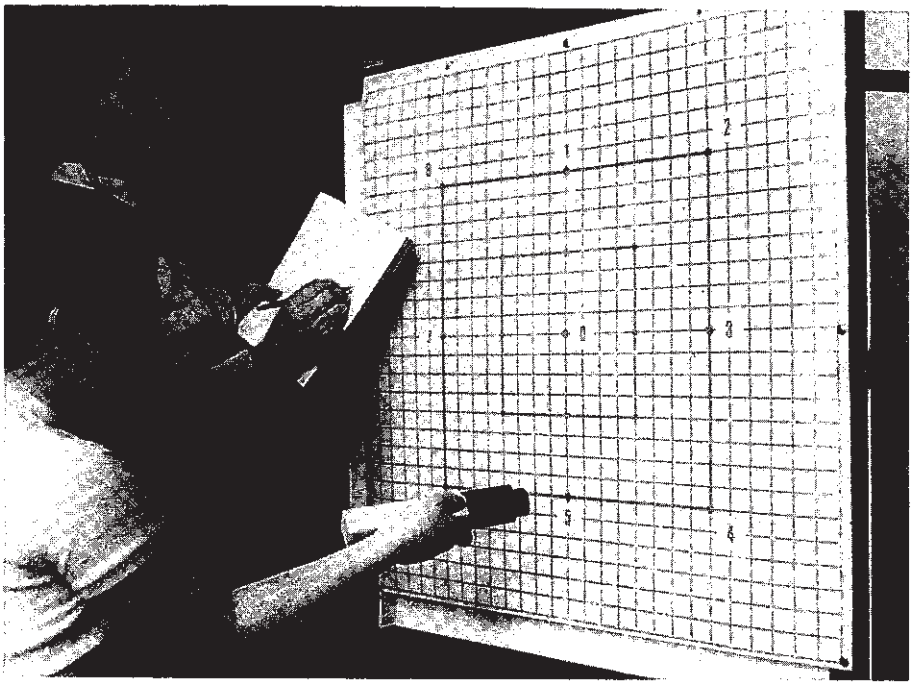
Professor Weiss has developed a technique to do this using two screens; red and green filters, and a torch to project a red arrow. Thus the effect of the normal efforts to fuse and accommodate can be seen at a glance by comparing the charts.

The patient observes the Hess-Weiss screen at a distance of 50 cms. using red and green filters and indicates the cardinal points on the screen by means of a red arrow projected by a torch held in his hand. The usual care is taken to keep the head steady and in a constant position throughout the test. The examiner plots the position of the red arrow on special charts for the purpose.

The test is performed first using the "fully dissociated" screen-forme libre (F.L.), to ascertain the full deviation. The test is then carried out again using the second screen which has numerous black dots accompanying the previous pattern i.e. with fusion and accommodation involvement- forme à choix multiple (F.C.M.) This second test indicates a more true to life situation than the fully dissociated test.

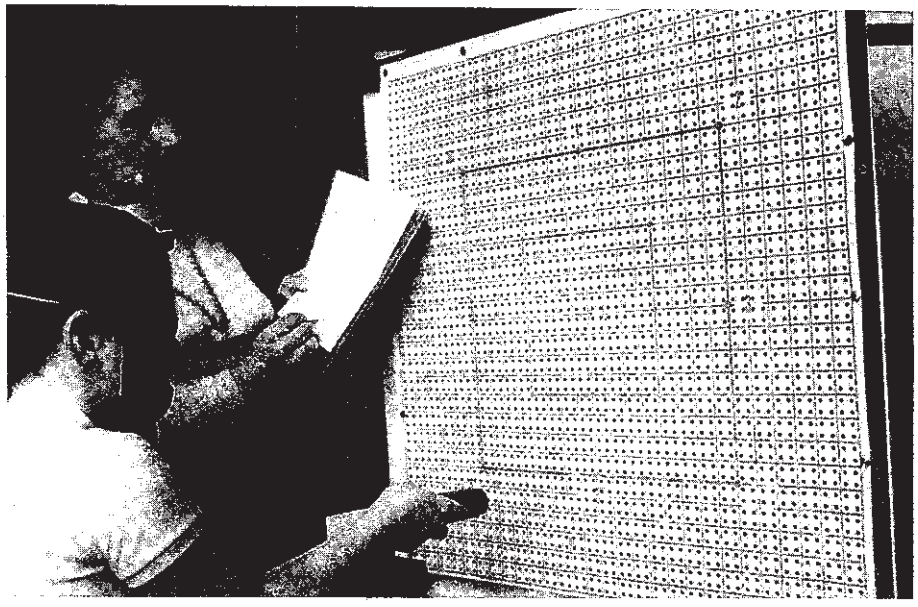
The Hess-Weiss Screens

The F.L. screen (fully dissociated) shows red/orange lines forming small squares of side 2.5 cms. which correspond to 5 prism dioptres at 50 cms. The cardinal points are also marked in the pattern. The central square field is 20 prism dioptres out from the centre and the peripheral field is 40 prism dioptres out from the centre. When viewed through the green filter, the lines appear black but are unseen when viewed through the red filter. The patient indicates the position of the cardinal points on the screen with a red arrow projected from a torch held in his hand. This arrow is only seen by the eye behind the red filter.



Examiners should note that the eye behind the red filter is the deviating eye and the one which is being plotted.

The F.C.M. screen (form of multiple choice) is similar to the F.L. screen in so far as the red lines are concerned, again these lines are only seen through the green filter. However, the screen has numerous black dots - four in every square formed by the red lines.



The great number of these small black dots provides a very strong stimulus to fusion and accommodation, as they are seen by both eyes simultaneously.

The theory of multiple choice depends on the fact that in physiological diplopia for any object not on the horoptor there can be more than one apparent position of that object. When there are numerous, similar objects it is feasible for one apparent object to be fused with another apparent object closely adjacent. Weiss (1971)

The Hess-Weiss is a simple and rapid means of examination and can be used by ophthalmologists, neurologists and orthoptists. It provides a means to further elucidate the problems of refractive error and oculo-motor deviation, by measurement assessed in the absence (fully dissociated) and then in the presence of fusion and accommodation which can be of great value in the clinical field.

Examination should be carried out using both screens, firstly without glasses and then with glasses; with prisms; or with corneal lenses and the charts marked accordingly.

Best results are obtained using a chin rest for the patient. Normal room lighting of the screen is satisfactory.

Uses of the Hess-Weiss Screens

1. To determine the effect of plus or minus lenses on the ocular muscle balance i.e. the wearing of glasses.
2. To determine the effect of an anisometropic correction on the ocular muscle balance.
3. Assessment of compensation or decompensation in cases of heterophoria including A and V syndromes.
4. To determine the prism required in vertical squint or phoria.
5. Adjunct in the analysis of intermittent squint.
6. Method of assessing the dominant eye. When the dominant eye is fixing the non-dominant eye tends to deviate more than the dominant eye does when the non-dominant eye is fixing.
7. Assessment of the type of abnormal retinal correspondence (harmonious or unharmonious) when used in comparison with other methods (objective) of assessment of the deviation.
8. In nystagmus where prisms may be used to reduce the nystagmus.
9. In paralytic squint where the deviation may be ascertained both fully dissociated and with the stimulus of fusion and accommodation.

Further study of the examples shown in Professor Weiss's book will provide more interest and understanding of this new equipment available to orthoptists.

In presenting the above, I have given as accurate a condensation as possible of the French text by Professor Weiss, which accompanies the paired Hess-Weiss screens. The following cases charted on the screens show some of the possibilities.

KERRI - aged 11 years, has a plexiform neuroma on the floor of the anterior part of the left middle cranial fossa extending into the left orbit. Vision is R6/6 L 6/9. Deviation in the primary position -4° R/L8Δ with fusion and good stereopsis. There is some head tilt to the left. The fully dissociated chart (F.L.) shows limitation of movement of the left eye in the field of the left superior rectus with some overaction of the right inferior oblique. On the F.C.M. chart (with the influence of fusion and accommodation present) the deviation is greatly reduced although some right hypertropia is still present. This residual deviation will still require treatment. See Figure III.

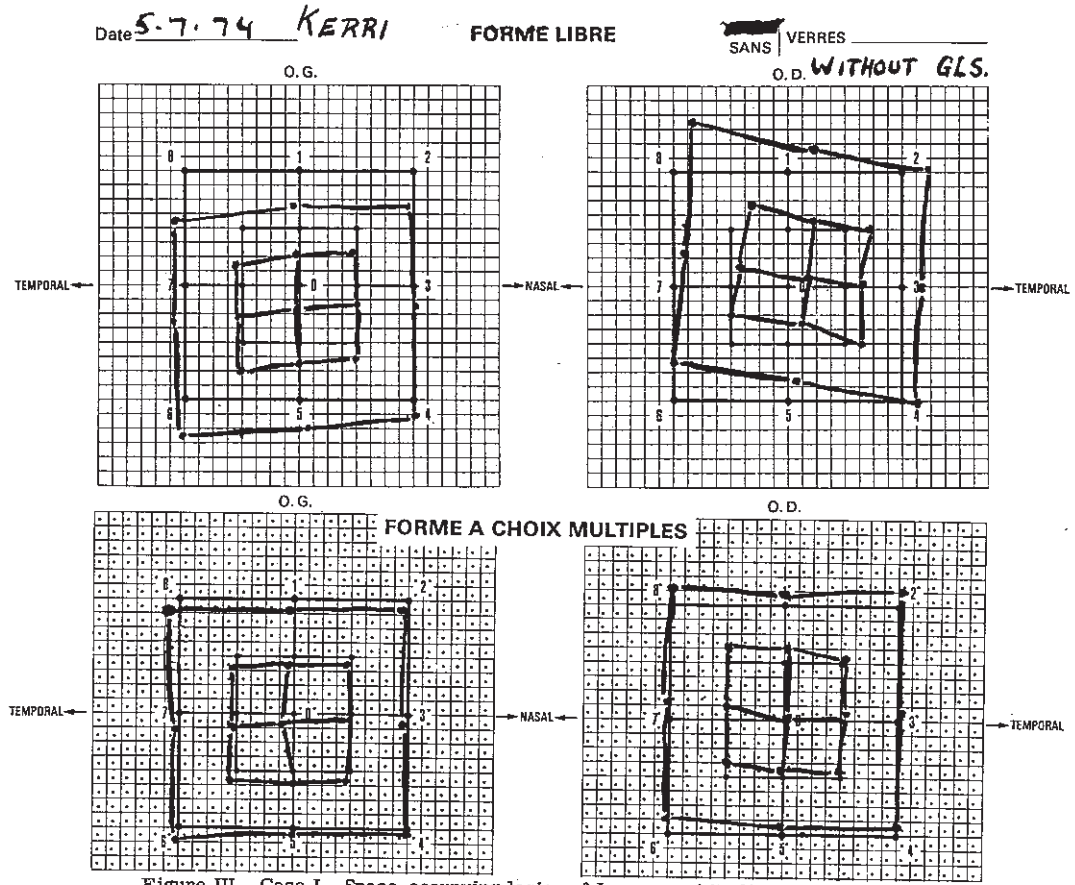


Figure III. Case I. Space-occupying lesion of L upper orbit, limiting the action of left superior rectus.

LIANO - aged 10 years, has a retinoscopy under mydriatic. Deviation on the synoptophore is +5 % with good fusion and stereopsis. Visual acuity without glasses is R6/6 L6/9. Hess-Weiss F.L. chart without glasses shows an esophoric deviation which is not significantly reduced on the F.C.M. chart.

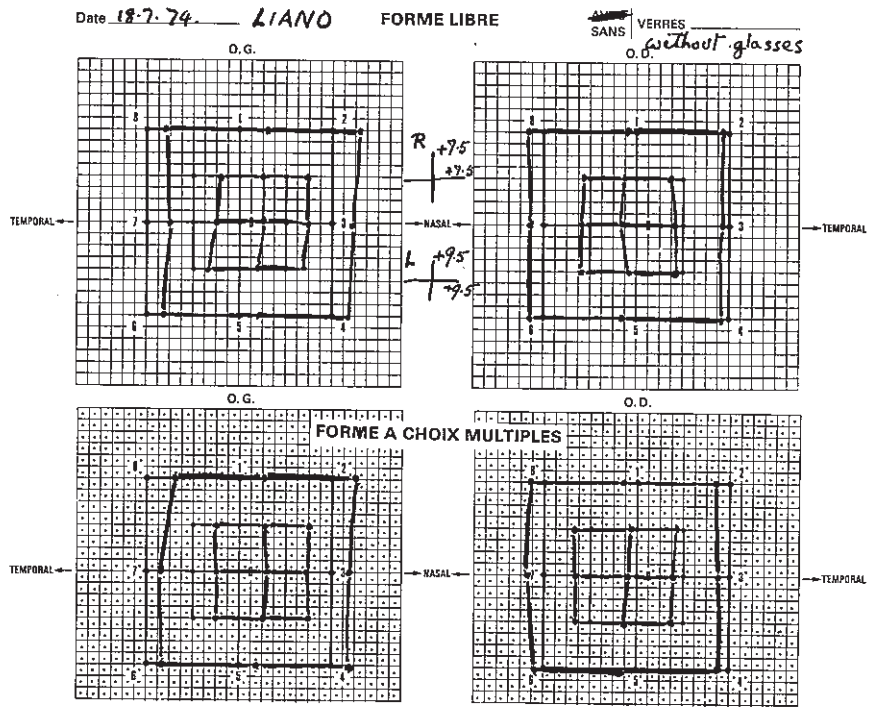


Figure IV. Case II. Anisometropic hypermetrope, tested in glasses.

Fig. IV With glasses R+ 3.00 D.S., L + 3.75 D.S., visual acuity is R 6/5 pt, L 6/6 pt; synoptophore deviation is zero with good fusion and stereopsis. Hess-Weiss F.L. chart with glasses shows a small esophoric deviation and the F.C.M. chart shows equilibrium of the visual axes. Fig. V.

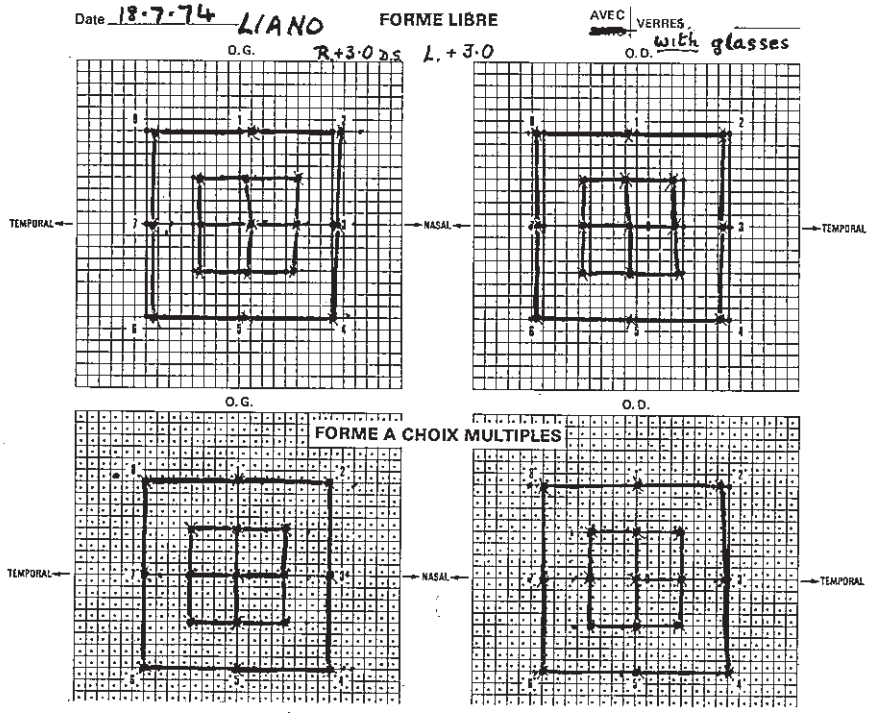


Figure V. Case II. Tested without glasses.

Further examination of these charts particularly those done without glasses show the dominance of the right eye.

JUDITH - aged 18 years, was involved in a motor vehicle accident on 23.1.74. She suffered a Le Fortes Grade III middle facial fracture with the main displacement on the R side. F.L. chart shows considerable limitation of elevation of the right eye with overaction of the elevators of the left eye. The F.C.M. chart shows a reduction in the deviation but the influence of fusion and accommodation is not sufficient to overcome the deviation. Judith still complains of diplopia mainly in upward gaze. Figure VI

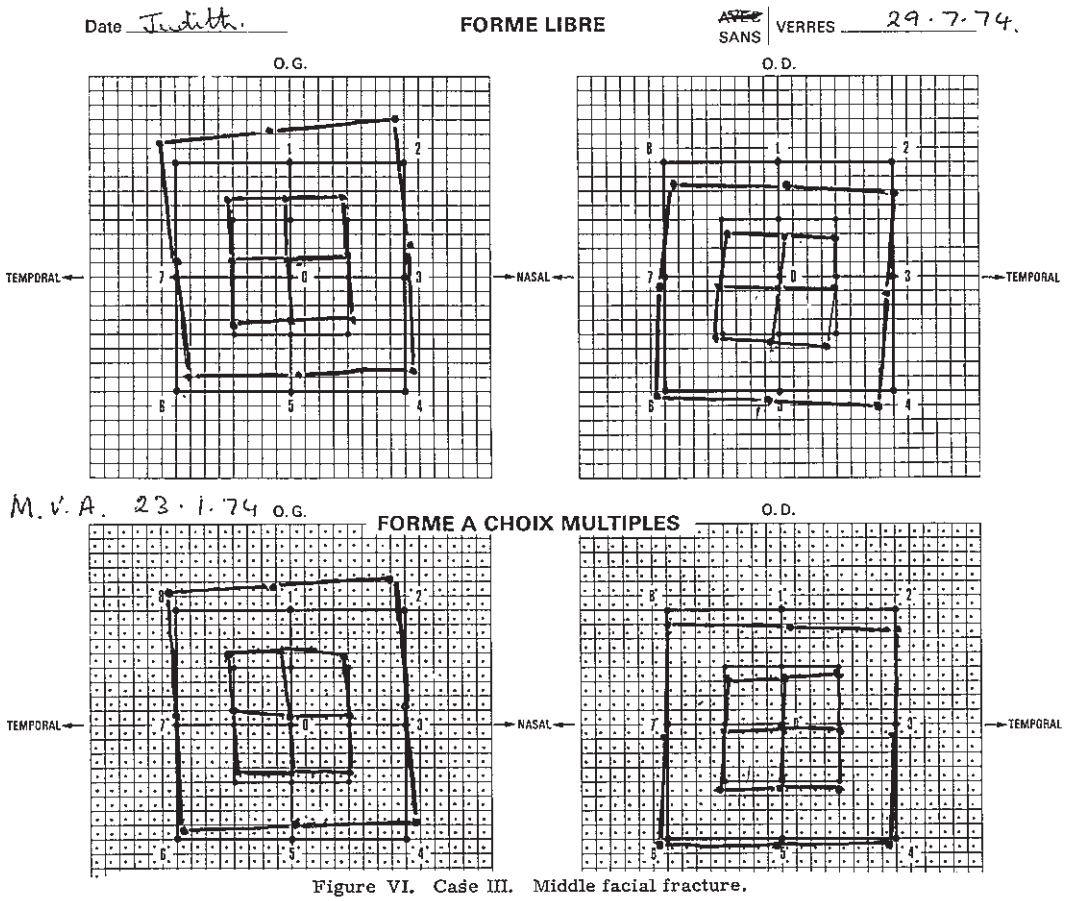


Figure VI. Case III. Middle facial fracture.

BRIAN - aged 9 years, has an exophoria measuring – 5° on the synoptophore with good fusion and stereopsis. He is emmetropic, visual acuity is 6/5 in either eye and his convergence is good following a course of orthoptic treatment. F.L. chart shows the exo. deviation and with the addition of fusion and accommodation the deviation is reduced to equilibrium as shown on the F.C.M. chart. No further treatment is indicated now. Fig. VII

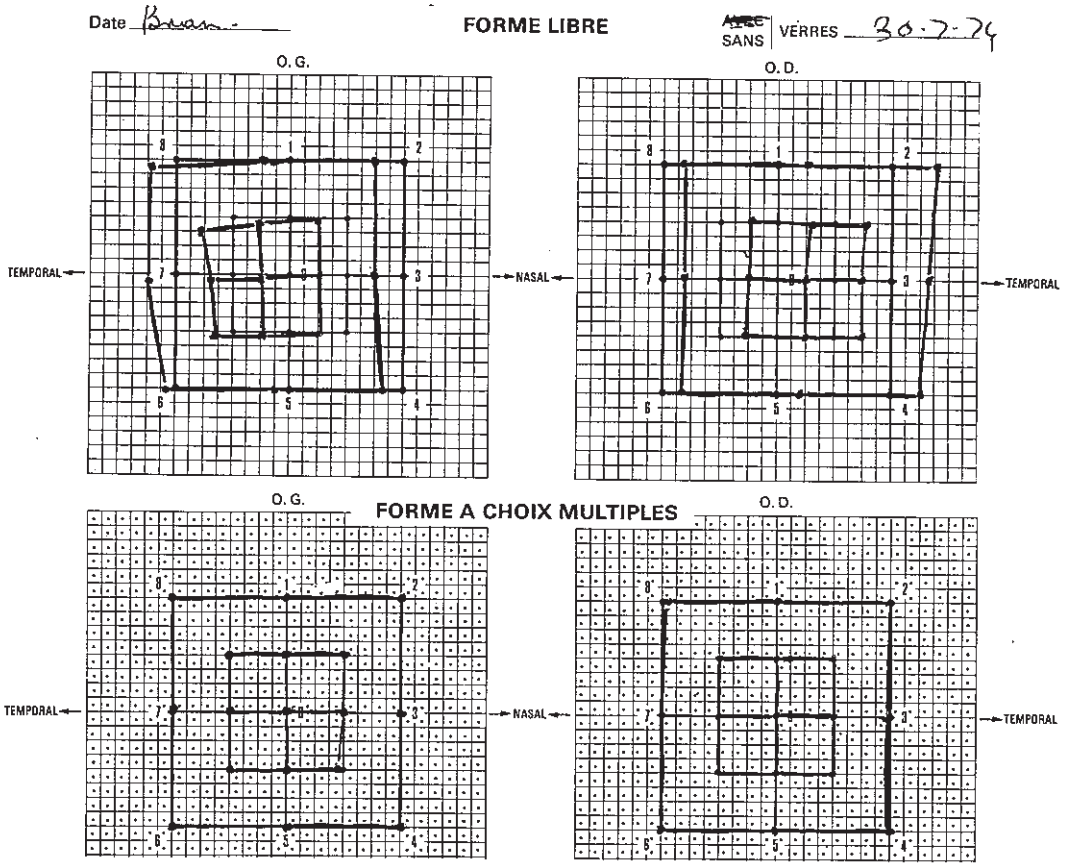


Figure VII, Case IV. Exophoria.

Further study of the examples shown in Professor Weiss's book will provide more interest and understanding of this new equipment available to orthoptists. The Hess-Weiss screens should become a worthwhile adjunct to the well equipped orthoptic clinic, providing another interesting and useful orthoptic procedure, which can be used in the interests of better eye care for the patients of our referring ophthalmologists.

My thanks go to Miss Lance, Head of the Orthoptic School of the New South Wales College of Paramedical Studies, for allowing me to examine the possibilities of this recently acquired piece of equipment.

I would also like to thank Dr. George Selby and Dr. Donald Dunlop for permission to present these cases.

REFERENCE:

Weiss, J.B. (1971) *Mesure des Desequilibres Oculo-moteurs par la methode de Formes à Choix,* Page 6, Doin, Paris.

PRESS-ON PRISMS

Patricia Lance

Presented in Sydney, 1971.

The author's interest in the therapeutic use of prisms was first aroused about twenty years ago by Dr. Gregory Flynn who used them in the treatment of post-operative convergence in overcorrected intermittent divergent squint. He slightly undercorrected the deviation with prisms fitted to the patients' glasses with special clip-on frames. The patient was seen daily by the orthoptist who gave fusional vergence treatment. She gave details of the smallest fusion angle to Dr. Flynn who then saw the patient and, if possible, reduced the strength of the prism correction. The difficulty with this type of treatment, especially for an orthoptist in private practice is that a large collection both of prisms and various clip-ons to fit spectacles of different types and sizes are necessary. As spectacles became more varied in shape this proved an almost insurmountable barrier and when many children objected to wearing the clip-ons because of their weight and appearance this type of treatment was largely abandoned.

In 1967 while the author was abroad she was impressed with the treatment at Marburg and Geissen in Western Germany in which prisms were used for patients who were hospitalised awaiting surgery. These were round glass prisms without frames and were taped onto the patient's glasses with sticking plaster. The weight of the glasses was then so great that the patients had to have the nose piece strapped to their foreheads, to keep the glasses from slipping down too far. The patient's angle of deviation was neutralised by the prisms and this was checked regularly to see if the angle had increased or decreased. The prisms were changed as it became necessary and the patients were given every chance to use binocular single vision. Because of the very unusual appearance of the children, while undergoing this form of treatment, and because of the need for frequent change in the strength of the prism, the author reluctantly decided that this form of treatment was feasible only with live-in patients, in spite of its obvious advantages. However, on visiting the United States of America that same year, she found that many orthoptists were using a new form of prism, known as the wafer prism, which was much lighter to wear. These proved to be expensive and also had to be taped onto the patient's glasses. Enthusiasm waned somewhat, although it was obvious that there was much successful work being done abroad with prisms.

During a congress in San Francisco in April, 1971, interest was again aroused on hearing Fletcher Woodward, an American orthoptist, talk about the prism adaptation test, (P.A.T.). Dr. Thorsen then spoke about the new press-on prisms, giving a demonstration of the method of applying these to the patient's spectacles. Those attending the congress were given the opportunity to practise applying the prisms and using a pantograph to cut the prism to the shape of the lens. With a little practice this proved quite easy.

These press-on prisms are an adaptation of the original lenses designed for lighthouses by Augustin Fresnel in the early nineteenth century. The adaptation has been made possible by the development of modern plastics. A membrane Fresnel prism resembles a series of small plastic prisms lying adjacent to each other on a thin platform of plastic.

To apply the prism:

i) From the large membrane as supplied, cut the required portion to fit the lens shape. This is done most easily with a pantograph.

ii) Before placing the prism on the lens, clean both the prism and the glasses with detergent and dry with a lint free towel. There must be no grease or dust on either surface.

iii) Hold the prism and the glasses under running water and apply the prism to the back face of the patient's glasses, placing the flat side of the prism against the lens, taking care to place the base in the correct direction and placing the prism symmetrically.

The prism may reduce the patient's visual acuity by about one line of Snellen's chart and so it is often advisable to place the prism in front of the fixing or preferred eye to discourage suppression of the usually suppressing eye. However, since the largest prism available is about 30 prism dioptres, it will often be necessary, especially in larger deviations, to divide the amount of prism between the two eyes.

Use of Press-on Prisms

The main therapeutic use of prisms is to facilitate the use of bi-foveal fixation. This can be for permanent or temporary use.

A. Permanent Use.

The criteria for use are the same as for normal prisms. The advantage of the press-on prisms is that they are lighter and so may be used in cases where large prisms are needed. They may be used for heterophoria or strabismus and are especially helpful for cases of vertical deviation. In incomitant squint where there is the problem of the angle varying in the different directions of gaze, some experimental work has been done where strips of prisms of varying strength are placed in three or four zones on the patient's glasses and this has proved beneficial in eliminating diplopia.

B. Temporary Use.

i) The pre-operative prism adaptation test (P.A.T.) is one of the main uses for these prisms. This test counteracts the angle of deviation, as measured for distance with the prism cover test. The patient is checked after wearing the prisms for at least an hour, to see if there is any change in the angle. There may be three reactions:-

(a) The angle may stay the same, allowing the patient to use bi-foveal fixation pre-operatively.

(b) The angle may be reduced. That is while wearing the prisms the eye may show an exophoric movement when tested for distance fixation. In this case the prisms should be suitably reduced and the patient tested again later. It is possible, but not expected, that in these cases the angle will gradually reduce until orthophoria is reached without prisms. In other cases it is advised that the smallest angle found by this method is the one on which surgery should be performed. It seems that these cases may be those who, if fully corrected, would diverge post-operatively.

(c) The angle may increase. This often happens quickly and these patients may be those whose deviation would increase again, perhaps even to the original angle of deviation, following surgery. This can be readily explained in cases with abnormal retinal correspondence and such cases, if the angle of deviation is not too large, may be better left without surgery. It is not understood so readily why other cases without an abnormal retinal correspondence increase the angle again post-operatively but it may be due to lack of fusion. Some authorities recommend increasing the prisms until the maximum angle is found and then performing surgery on this maximum angle.

(d) A vertical deviation may become apparent which was not present before. This may be a means of avoiding the use of binocular single vision or may be a deviation which should be considered by the surgeon. If the horizontal prism

is placed at an angle instead of symmetrically a vertical deviation may be corrected as well.
The prism adaptation test should be performed on all cases before surgery. If the patient used bi-foveal fixation and single binocular vision with the prisms they should be maintained on the glasses until surgery is performed. This will give the patient a reasonable period of bi-foveal experience in free space before surgery and it is hoped that this experience will facilitate the use of binocular single vision post-operatively. If the patient does not obtain bi-foveal fixation with the prisms, at least the test will have been useful in allowing the surgeon to judge possible post-operative reactions.

ii) Post-operatively there are several uses for prisms.

(a) Dr. Thorsen in his talk said that in cases of convergent squint where the angle was not completely corrected by surgery and a small residual convergent angle remained, prisms to overcorrect the angle should be used at once. He reasons that this will give the patient diplopia, as it throws the image of the fixation object on to a part of the retina of the squinting eye which is out of the suppression area. The prism worn must produce an exophoric movement, thus the patient has made a convergence effort to obtain fusion. If this occurs and the patient starts to use bi-foveal fixation with the prisms these are gradually reduced, checking all the time to ensure that bi-foveal fixation remains, until they are removed altogether and the patient's eyes remain straight.

(b) In cases of intermittent divergent squint where there is a convergent angle post-operatively, this angle should be almost counteracted leaving a small amount, about three prism dioptres, of esophoria. This remaining deviation should be able to be overcome by diverging. If the patient is able to do this and returns next day with no movement on cover test, then the prism correction should be reduced immediately by three to five prism dioptres. This is continued until the prisms are eliminated altogether.

iii) In cases of paralytic squint where the patient is unable to obtain single vision in any direction of gaze, he may be given single vision in the primary position by using prisms. These must be reduced as soon as possible if spontaneous recovery is occurring.

iv) In cases with a constant convergent squint with an accommodative element especially those with an abnormally high A.C./A. ratio, prisms may be used in different strengths for near and distance by using different amounts on the upper and lower segments of the lens. A prism may be used on the lower half only if the patient can use binocular single vision for distance but is always convergent for near.

v) In France and Germany work has been done with prisms in the trearment of abnormal retinal correspondence and eccentric fixation. As most of the literature on this is not in English, the author is not familiar with the methods used.

Summary

These new prisms which are comparatively easy to apply and are light and inconspicuous from the wearer's point of view open up a new field of endeavour in the orthoptic world. It is important that orthoptists should reassess all patients with a view to this form of treatment, and should be prepared to experiment with the use of prisms in the treatment of such problems as eccentric fixation, abnormal retinal correspondence and maybe even fixation disparity. Orthoptists can give the ophthalmic surgeon much information pre-operatively with the use of the prism adaptation test.

PRACTICAL USE OF FRESNEL PRISMS

Neryla Jolly

Presented in Sydney, 1971.

The first time the Fresnel prisms were publicly introduced to Sydney was about twelve months ago by Miss Lance at a meeting to demonstrate this new clinical aid.

The possibilities of their use were interesting. Their light weight allows use of a high power. In the weeks which followed, patients who could apparently benefit from their use came to my attention and "therapy" was duly carried out.

The patients given the prisms, fall broadly into two categories.

1. Paralytic deviations.
2. Intermittent convergent squint.

1. Paralytic Deviations (three patients)

The reason for the use of the prisms was to give relief for two patients until surgery was performed and for one patient until recovery was complete.

Application and adjustment to use

The patients requiring surgery each had a vertical deviation, one of traumatic origin, the other the result of decompensation of a heterophoria, the cause of which was unknown. Both patients required correction of a refractive error, and permanent use of glasses. The detachable prisms for these patients gave use of binocular single vision pre-operatively and could be easily and readily removed following surgery. The prisms were split between both eyes for the patient with the decompensated deviation and, in the patient with the paralysed muscle, the prism was placed before one eye in a segment on the lower half of the lens.

Result

Pre-operative diplopia was eliminated by using the prisms in the two patients requiring surgery and one has since had surgery and is able to use single vision without the prism.

The third patient had a small deviation which occurred after a coronary occlusion and was showing signs of improvement. He complained of diplopia on laevo-depression which was intermittently troublesome when driving. By fitting a 7$^{\Delta}$ base down to the lower half of the right lens, single vision was achieved. As the symptom was intermittent, the prism was attached as required. Eventually the patient was able to discard the prism while retaining single binocular vision.

2. Intermittent Convergent Squint. (four patients)

Prisms were used for two patients for intermittent over-convergence for near, both with a negligible refractive error for which they refused their correction. Both patients clinically showed an ability to control the near deviation. One had a deviation too small for surgery and had given a negative response to using phospholine iodide. The second had an operable deviation but, because of a history of convulsions was thought unsuitable for surgery. He at times over-converged for distance fixation.

A third patient, at a test in 1970, showed an esophoric deviation. Twelve months later, a small convergent squint of 7 degrees was manifest.

The other patient had a convergent squint intermittently controlled and a myopic correction.

Application and adjustment to use

The prism selected was, in each case, less than the synoptophore prism measurement (between half to three quarters) and it allowed the use of binocular single vision clinically. The ability to bar read was used as a final check of the use of single binocular vision.

The patients who would not wear their refractive correction were given plano lenses for each eye with immediate acceptance. The child with the over convergence for distance and near was given the amount of prismatic correction required, split equally for distance; but with the additional strength required for near placed before the usually squinting eye. The patient who did not respond to the phospholine iodide was given the full prismatic correction before the squinting eye, because it had been tried, unsuccessfully, before the usually fixing eye.

The third patient, who after twelve months showed an intermittent squint for near, was given the appropriate prism to wear while he was overseas for six months. When tested last, before going overseas, he was using binocular single vision when wearing the prism but had developed a squint for distance fixation when without the prisms.

The last patient has been given the prism before the usually squinting eye and is responding to treatment, maintaining binocular single vision with weaker prisms.

All cases have resulted in the use of binocular single vision, but the condition of the patient with the bifocal deteriorated when the extra prismatic correction for near was eliminated.

Generally

Subjective acceptance has been good. There has been some initial awareness of chromatic aberration in the large strength prisms. The effect on the vision I have found to be negligible.

When gradually decreasing the strength of the prism, 5^{Δ} reductions were usually used until half the original strength was accepted, after which prism strength was decreased in smaller amounts. At this stage, it seems, prolonged usage of the one strength may be necessary, possibly for six months, before a reduction is tried.

In the treatment of intermittent deviations bar reading produced a more rapid decrease in the prismatic correction.

Fresnel prisms offer a new concept, in the treatment of many cases of heteroporia and squint.

USES OF FRESNEL PRISMS

Shane Brown

Presented in Canberra, April 1973

The use of Fresnel prisms is relatively new. I hope to demonstrate in these fo case histories that they may be a very definite and worthwhile adjunct to our orthoptic treatment and diagnostic procedures.

The first patient, Mr. J.C. aged 70 years presented with

i) Right visual acuity 6/60 (due to cataract), left visual acuity 6/6,

ii) a IV nerve palsy of 4 weeks duration,

iii) intermittent vertical diplopia, which was distressing him greatly, in spite of an abnormal head posture,

iv) synoptophore angles: fixing right eye $+1^{\circ}$ R/L 7^{Δ}

fixing left eye $+3^{\circ}$ R/L 10^{Δ},

v) Maddox wing reading : exo 2^{Δ}, R/L 6^{Δ}.

The least prism correction that would allow him to join the diplopia was 8^{Δ} base down in front of the right eye. He was sent home with a Fresnel prism of this strength, and instructions for exercises to increase his field of binocular single vision.

At the second visit, one month later, I was able to decrease the prism to 4^{Δ} base down, as the vertical deviation had decreased to R/L 8^{Δ} without prisms. At the third visit, the synoptophore angle measured, fixing left eye, -1° R/L 5^{Δ}; he was left without prisms as he could now control the small deviation comfortably with the help of his head posture. He continued with home exercises and at the final visit was symptom free and very happy man.

Admittedly, Mr. J.C. was undergoing spontaneous recovery, and would have improved without the prisms. The Fresnel prism, which only partly corrected the deviation forced him to use his fusional range to correct the remaining deviation, and relieved him of the discomfort of constant diplopia.

Case II J.D., age 8 years, presented with

i) left eye blind from birth,

ii) no apparent deviation of the left eye,

iii) horizontal nystagmus of the right eye in primary position; this nystagmus disappeared in laevoversion,

iv) compensatory head turn to the right,

v) visual acuity 6/6 with the head turned.

J.D.'s mother was most concerned with the unsightly head turn, and wondered if anything could be done.

It seemed possible that a base out prism, allowing J.D. to maintain the adducted position of his fixing right eye without turning his head, might be the answer. Measurements showed that his customary head turn involved about 55^{Δ} of right adduction. However, the patient would not tolerate a Fresnel prism of more than 15^{Δ}. He complained that everything looked "stripey" with stronger ones, so he was allowed to go home to try the effect of the 15^{Δ} one for a month. He came back with no head turn while wearing the prism.

An operation had been considered, but his mother was loathe to have this, as J. had only one functional eye. J. is now wearing glasses incorporating a 15^{Δ} prism base out right. Without the trial Fresnel prism, he might have been ordered much weightier glass ones; we helped prove that the head turn could be corrected with a much lighter prism than expected.

Case III. Mr. Y., aged 75 years, had suffered a right IV nerve palsy twelve months previously, which had left him with some right hypertropia and diplopia. He had been prescribed bifocals with an 8^{Δ} prism base down incorporated in the right reading segment.

When seen in the orthoptic clinic, he

i) complained bitterly of diplopia while reading,

ii) said all the print ran together and he could not tell whether diplopia was horizontal or vertical.,

iii) gave measurements by prism cover test while wearing bifocals

at 6 metres : no deviation

at 1/3 metre, through reading segment (with prism): exo 6^{Δ}, R/L 4^{Δ}

In the belief that the vertical deviation was still giving trouble, he was given a 4^{Δ} Fresnel prism base down on the right reading segment (additional to the incorporated prism). Two days later he returned, still complaining. It was then decided to correct the horizontal deviation instead of the vertical, so the 4^{Δ} base down was replaced with a 6^{Δ} Fresnel prism base in. This completely eliminated the symptoms.

Having undergone these trials, Mr. Y was able to have the base out prism incorporated in his glasses. He was very grateful, as the whole process took a week only, and had it not been for the trial of Fresnel prisms he would have been put to the expense of yet another pair of glasses, which he could ill afford.

Case IV is that of Mr. N. who like our first and third patients had suffered a IV nerve palsy, rather dramatically. Ten years ago he had fallen out of bed, landing with his head in the chamber pot, which had to be broken before he could be extricated. Thereafter, once it could be recognised that no spontaneous recovery was taking place, he was prescribed prisms. He wore them for a short time only, as their weight worried him more than the diplopia.

In the orthoptic clinic we found

i) right IV nerve palsy

ii) synoptophore angle, fixing right eye $+5^{\circ}$ R/L 14^{Δ}
fixing left eye $+4^{\circ}$ R/L 11^{Δ}

iii) Maddox wing eso 5^{Δ}, R/L 10^{Δ}

He agreed to try the Fresnel prisms, and was given 10^{Δ} base down in front of the right eye, which was sufficient to join the diplopia. He was so happy to be "cured" that he said he preferred the "Stripes" to the weight of the glass prism. He now wears the Fresnel prism as a permanent fixture on his glasses.

These four cases illustrate some of the very useful roles that Fresnel prisms may play in orthoptics. We have used them to relieve diplopia while ecouraging further effort during recovery from IV nerve palsy (Mr. J.C.), and to guide our management of a head turn associated with nystagmus (J.M.) and of ill-defined diplopia for near work (Mr. Y.); finally we have found the Fresnel prism accepted for permanent wear by Mr. M., when

conventional prisms were rejected. Fresnel prisms have proved an exciting and illuminating adjunct to our orthoptic diagnosis and treatment.

Acknowledgements

I would like to thank the ophthalmologists in charge of the above cases for allowing me to present them here, and I would like also to pay tribute to my colleagues at the Sydney Eye Hospital Orthoptic Clinic for their advice and encouragement in the treatment of the cases and the writing of this paper.

TRANSPARENCIES

Jess Kirby

The eye that fails in convergence, that has a slow heterophoria recovery, that is partially amblyopic, that produces symptoms because it cannot carry its load; or that intermittently diverges or converges, or is closed for near or distance or in glare - this eye needs encouragement. It needs encouragement more constantly than orthoptics or home exercises can be given, and without the dissociation that part time opaque occlusion causes.

I commend transparencies because they give this support. They are tolerated without trouble, with no cosmetic impairment, and can be adapted to the requirements of each individual case. They have filled a longfelt want in my practice.

"Press-On" transparencies are graded in levels of visual acuity. They replace in a more refined and scientific way, clear lacquer which did not flow evenly, and cellotape which did not mould to the glass and which moisture caused to swell and distort.

For some years I have used a clear "Con-tact" paper which reduces visual acuity to 6/24, moulds to the glass, withstands water and is almost undetectable. Through it, patients can do simple binocular exercises such as appreciating physiological diplopia, and distant muscle balance control exercises. I also used this method on both adults and children post-operatively, and still prefer it, for some cases, to the use of the "Press-On" transparency. Some adult patients with a history of longstanding asthenopia react more favourably to the 6/24 clear "Con-tact" transparency, whereas those with lesser symptoms wear a "Press-On" transparency which only slightly favours the weaker eye.

However, "Press-On" transparencies have a wider application and are easier to use, especially for adults, since the transparency can be removed quickly and replaced as required. Many adult patients with symptoms cannot attend more than two or three times, and some of these responded slowly to the usual orthoptic methods. Previously with this group, part time opaque occlusion would be suggested. This occlusion was tolerated only by the very strong minded or the desperate. Transparencies are well tolerated, and the result is a dramatic relief of symptoms. Patients can feel the defective eye fail when the transparency is removed, and as the eye improves, they can reduce the time the transparency is worn according to their needs.

The selection of the appropriate type and grading is time consuming. With the correct grading the patient must be able to appreciate physiological diplopia with confidence.

When wearing a transparency, the child adapts to making the defective eye the "thinking" eye. The reaction from parents is good because an intermittent squint is controlled cosmetically. The transparency can be left in place and an opaque occluder can be attached to the other side of the glass, if the defective eye needs this extra boost. But also more importantly the parent can see through it, and if a deviation of the partially occluded stronger eye occurs it can then be removed until the weaker eye again indicates

that it needs assistance.

To demonstrate the use of transparencies, two case histories, both of adults, have been selected, one having longstanding asthenopia, the second unable to use a binocular instrument efficiently.

Case I

Miss J.R.H. aet 27 was referred with exophoria for near and distance, and convergence insufficiency of long standing. Her symptoms were headaches for years, and closing of the left eye for all near work. Examination showed:

exophoria with poor recovery

convergence near point 30 cms. with left eye failure

Maddox wing exophoria 18^{Δ}

Maddox rod exophoria 14^{Δ}

Worth lights : heteronymous diplopia, controlled voluntarily

Synoptophore angle : -12°, L/R 3^{Δ} with fusional convergence to O,o/o

Graded transparencies were tried. Physiological diplopia was appreciated with one which reduced her right visual acuity to 6/24. This was worn almost constantly and home exercises were carried out.

After two weeks Miss J.R.H. was symptom free; there was no need to close the left eye when not wearing the transparency.

Cover test : orthophoria

convergence near point : nose tip.

Maddox wing : exophoria 2^{Δ} to 10^{Δ}

Worth lights : 4 spontaneously

Synoptophore convergence to 20°

She is now able to do home exercises without the transparency, and has remained symptom free.

Case II

Mr. J.A. was first seen in 1956 aet 23 with fully controlled exophoria. There were no symptoms and he did not require orthoptics.

In 1972 he found he could not use a binocular instrument efficiently.

Maddox rod	: exophoria 18	Maddox wing	: exophoria 6 ..16
Convergence	: left eye failed	Titmus fly not appreciated	
Synoptophore	: angle -8°,	fusional range -15° to $+10^{\circ}$,	
	low grade stereopsis appreciated under stimulation.		

A "Press-On" transparency which reduced the right visual acuity to 6/9 was used whenever glasses were worn. This enabled him to appreciate physiological diplopia and to use home exercises.

After five weeks, fusional convergence had increased to an easy 40° and full stereopsis was obtained on the synoptophore at 0°. The Titmus pictures and circles were appreciated spontaneously, and stereograms could be used efficiently.

Conclusion

I have used graded "Press-On" transparencies for 12 months, and 6/24 "Con-Tact" for at least 4 years. Transparencies have been especially of value in all adult work, and when used post-operatively. By encouraging the failing eye, a transparency gives the patient comfort with good appearance, and a firm hold on binocular vision which he retains when use of the transparency is reduced and finally abandoned.

For allowing me to use these cases and for their advice and interest, my thanks go to Dr. Graeme Reedshaw and Dr. John Apel.

REVERSAL AMBLYOPIA

D. Croker

Presented in Sydney, 1971

This paper was prompted by six cases of reversal amblyopia seen in the past year. In each of these, fixation of the originally fixing eye became eccentric after a period of occlusion.

This condition was first described as occlusion amblyopia by Costenbader (1958) and later by Von Noorden (1964, 1966, and 1970) and Burian (1966). H.M. Goodier (1966) reported twenty one cases of reversed amblyopia, all over the age of 3 years. The average age of patients at the time of reversal was 4½ years.

G. Roper-Hall (1970) saw eight children, all under the age of 2 years and 8 months, the average age of change in amblyopia being 2 years 4 months. Children of this age are perhaps too young for accurate assessment of visual acuity although not too young for visuscope examination.

The six children here reported four girls and two boys were all between the ages of 3 years 3 months and 4 years 7 months. Onset of squint was at birth or during the first year. Binocular vision was not present in any one of these cases. Five of the six patients were right handed and had a left convergent squint, the sixth case was left handed and had a right convergent squint.

All children were fairly co-operative and we were able to obtain accurate visual results. The average age at the time of reversal of amblyopia was 4 years 3 months. The length of time for which fixing eye occlusion was ordered is not necessarily significant. One child had 8 months of fixing eye occlusion, but this was not worn constantly. The average amount of constant fixing eye occlusion given before reversal took place was 2½ months. (See Table)

There was no indication that there would be any change in the state of fixation; on all visits prior to the change in fixation, visuscope observations of the originally fixing eye were central and steady. There was rapid change over to eccentric fixation with loss of vision. All patients were seen at intervals of 2 months or less.

TABLE OF FINDINGS BEFORE AND AFTER REVERSAL OF AMBLYOPIA

Case No.	Age of onset months	Age at first occlusion yrs mths	Refractive Error R.E. L.E.	At first visit: Deviation	Visoscope	Visual acuity	Occlusion up to reversal (months)	On reversal: Visuscope	Visual acuity
1	9	2 : 6	+2.00 +1.00 / +1.00	L.C.S.16°	R central L paracaecal	R 6/6 L light perceptn	Inverse 2 Fixing eye 2	R paracaecal L parafoveal to central	R 6/60 L/3/9
2	12	4 : 4	+6.00 +6.00	R.C.S.15°	R paramacular L central	R 6/24 L 6/12	Fixing eye 3½	R central L paramacular nasal	R 6/12 L 6/36
3	13	4 : 6	+2.50 +2.00 / +0.75 +1.50	L.C.S.10°	R central L paramac nasal	R 6/9 L 6/36	Fixing eye 4	R parafoveal sup.nasal L central	R 6/18 L 6/6
4	10	3 : 9	+3.00 +2.50 / +1.00 +0.75	L.C.S. 4°	R central L parafov sup.nasal	R 3/9 L 3/12	Fixing eye ½ day 2 constant 2	R parafoveal nasal L central	R 6/24 L 6/9
5	6	3 : 6	+3.50 +4.00 / +1.00	L.C.S. 7°	R central L paramac nasal	R 3/6 L 3/36	Inverse 3 Fixing eye 2½	R paracaecal L central	R 6/60 L 6/12
6	10	3 : 10	+2.25 +2.25 / +0.25 +0.50	L.C.S.11°	R central L paramac to paracaec	R 3/9 L 3/60	Fixing eye 8	R paramac L central unsteady	R 6/36 L 6/9

Remarks

Case 1 Had surgery in May, 1970, when the visual acuity was equal. The result was cosmetically good. However the left visual acuity deteriorated to 3/60 post-operatively.

Case 2 Is now using a small angle abnormal retinal correspondence and has equal vision.

Case 3 Has central fixation in both eyes. After surgery performed in June 1970, the patient was cosmetically excellent. The right vision has deteriorated slightly and there is a residual right convergent squint.

Case 4 Now has central unsteady fixation in each eye with equal vision at 6/12. She continues to have part time alternate occlusion and is cosmetically good.

Case 5 Is unreliable, although is now fixing with the right eye, and on the visuscope has unsteady central fixation in each eye. Is cosmetically very good. Alternate occlusion for half a day is being carried out.

Case 6 Has central fixation either eye and continues to have alternate occlusion for half a day. Visual acuity is 6/18 each eye and is cosmetically fair.

Treatment

Alternate occlusion was given for two weeks in all cases. Four cases had fixing eye occlusion for two days and amblyopic eye occlusion for one day. This resulted in a return to the original fixation pattern. In the other two cases occlusion was alternated each half day for a fortnight. The result was central unsteady fixation in each eye.

Two cases have recently had surgery for cosmetic purposes.

In Case 1, as stated previously, the visual acuity in the originally amblyopic eye has deteriorated. Visuscope fixation in the left eye is paramacular nasal and unsteady. As co-operation with occlusion was not good, atropine to the right eye was given as well as right lens occlusion for half a day because it was felt inadvisable to give constant occlusion so soon after surgery. Case 3 had central fixation in both eyes post-operatively with equal vision and is cosmetically very good.

Conclusion

It is hard to form a theory for the cause of reversal amblyopia. However, it is interesting to note that the average age at the time of reversal was four years three months and this can be compared with those cases of H.M. Goodier where reversal occurred at the age of four years and six months. One could assume that this is an unstable period in the development of the fixation reflexes. As mentioned earlier there is no significant anisometropia. It is felt that once the visual acuity of the amblyopic eye has improved, it may gain dominance over the originally fixing eye. As we can see from the tables this does not continue, as the originally fixing eye quickly regains dominance after occlusion.

As these patients were in no case left for longer than two months between visits, it appears that it is wise to see young patients more frequently.

The author would like to thank those at the Children's Hospital who gave help in writing this paper.

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CASE REPORT : INVERSE MARCUS GUNN PHENOMENON

Mary Carter

Presented in Adelaide, April 1974

Mrs. M.H., aet.73, developed a right Bell's palsy in April 1972, for which she received electrical treatment. She was seen some four months later by the ophthalmologist, who found that she showed an acquired right "inverse Marcus Gunn" phenomenon, thought to be due to aberrant regeneration of the facial nerve.

Duke Elder (1973) describes this under the heading "Aberrent Nerve Regeneration (Paradoxical Movements)". "During the recovery period of peripheral facial palsy the interesting phenomenon of Paradoxical Facial Movements, that is, unintentional and abnormal mass movements of the facial muscles, may present itself. When for example, the patient wishes to close his eyes, other muscles supplied by the facial nerve contract with unexpected and curious results, the mouth, perhaps, being drawn to one side. Conversely, movements of the lower facial muscles may be associated with a contraction of the orbicularis oculi so that when the mouth is opened, or on movements of mastication, the eye is closed. (Martin Amat's phenomenon) This reaction has been called the inverse Marcus Gunn phenomenon, but although such a term describes the actual movements involved, these do not constitute a trigemino-facial association but are due to events within the territory of the facial nerve itself."

It was found that when Mrs. H. was asked to close her eyes, her mouth was drawn slightly to one side with elevation of her upper lip; also, when asked to open her mouth or to make chewing movements, her eye on the affected side closed.

She was photographed while intentionally (1) opening her mouth widely, (2) closing it tightly, (3) moving her jaw to the right, and (4) to the left. Still photographs of the lip movements which accompany intentional closure of eyes are unfortunately not available.

Inverse Marcus Gunn Phenomenon : spontaneous eye movements occur when subject intentionally (1) opens mouth (2) closes mouth (3) moves jaw to right (4) moves jaw to left

At the time of examination, Mrs. H. had an exposure keratitis. She has been seen at regular three-monthly intervals as, in addition, she has glaucoma for which she is using regularly P.V. Carpine 4%.

Acknowledgements

I should like to thank Dr. E. Finkelstein for permission to present this case, and for his help with relevant literature.

My thanks go also to the clinical photographers at the Royal Victorian Eye and Ear Hospital, and to the medical librarian for her help with references.

REFERENCE:

Duke Elder, S, & Scott, (1971) *System of Ophthalmology*, Volume 12, Henry Kimpton, London.

CASE HISTORY: "ALTERNATE DAY SQUINT" IN AN ADULT

Jan Magin

Presented in Adelaide, April 1974

In the alternate day squint of children, hitherto described, manifest deviation of one eye occurs only on alternate days. The case here described is one of constant convergent squint in an adult, in which the angle of deviation increased regularly on alternate days to become grossly disfiguring.

Mrs. A.O. aged 55, had worn glasses since aged 6 years, her present corrections and vision being:

right eye −16.0/+3.0 , 6/60
left eye −2.25/+0.50, 6/5

she knew that a right convergent squint, recognised at 6 years, had probably been present all her life. It was cosmetically acceptable, and she only became aware of it when the deviation increased and made her close work uncomfortable.

Seen in the orthoptic clinic on 17.8.72, Mrs. A.O. told us that 3 years ago, the eye began to "turn" (i.e. the deviation increased noticeably)

at night and when tired,

12 months ago, the eye "turned" every 24 hours, and was "non-squinting"

for every alternate 24 hours,

recently, the pattern had altered to cycles of 48 hours squinting

and 24 hours non-squinting,

she became very depressed when the eye "turned" and felt "off balance",
she had to cover the convergent right eye for close work on the "squinting" day,
A neurological examination, E.E.G. thyroid and blood tests (including cholesterol) had all been negative.

Orthoptic findings : "squinting day".

Cover test at 6 metres & at 1/3 metre : right convergent squint, approx. 60Δ
Ocular movements : poor abduction of right eye
Visual acuity : right eye 1/36, left eye 6/6
Synoptophore angle, fixing left eye : 30° (by reflections)
Visuscope : right eye fixing about 5°nasal to, and slightly above fovea,
left eye fixing centrally

Orthoptic findings : "non-squint day" 20.2.72

Cover test at 6 metres & 1/3 metre : right convergent squint, approx. 16Δ
Synoptophore angle, fixing left eye : +12° (by reflections)
Visuscope : as on previous visit

"Squinting days" were now becoming more frequent, and more uncomfortable.

Surgery, a right medial rectus recession, was performed on 10.4.73

Postoperative examination 30.5.73

Cover test at 6 metres : right convergent squint approx. 4Δ
Cover test at 1/3 metre : right convergent squint approx. 8Δ
Ocular movements : abduction and adduction of right eye very slightly defective
Synoptophore angle, fixing left eye : +11° (by reflections).
Visuscope : unaltered.

Comment

The post-operative result was cosmetically excellent. The patient no longer found it necessary to occlude her convergent right eye for close work; she was symptom free, and extremely happy with her good appearance, It was interesting to find that the increased deviation of a fairly inefficient eye could bother her so much.

Acknowledgement

I would like to thank Dr. John Hart for allowing me to present this case history.

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CASE HISTORY : UNILATERAL APHAKIA

Helen Hawkeswood

A.H. is 54 years old, a part time clerical worker. She and her husband are bird lovers, and have a feeding table in their back yard. One day seven years ago while they were feeding the birds, a peewee flew into her right eye; this resulted in a cataract, and for seven years the eye remained healthy but blind.

In July 1972 a capsulotomy was performed, and later A.H. was fitted with a contact lens. She was referred to us complaining of diplopia. Her vision was R.E. 6/12, L/E. 6/6. There was a variable divergent squint with unsteady fusion and simple stereopsis. Orthoptic treatment proved slow. It was not until the ninth visit that convergence started to improve, but by the eleventh visit it was so much better that we asked for the increased presbyopic correction, so that A.H. could read without having to close the right eye. She now comes periodically for review. Her convergence near point is almost full, and she appreciates full stereopsis. Questioned about the benefit obtained from treatment, she reacts very strongly in favour: she has no diplopia, she enjoys the accurate stereopsis, and she has taken up golf again.

Why did my other four cases of monocular aphakia fail to persevere with treatment?

The type of employment may be relevant. A contact lens is more comfortably worn if the patient is an indoor worker, as was A.H., and less comfortable if he works outdoors or in dusty surroundings. The orthoptist is wrong to assume that the contact lens is worn constantly just because the patient comes in wearing it. If the lens is worn on a part time basis, treatment must be slow. Diplopia becomes less of a problem too; it is much easier to shut one eye for a short time than for a long time. This may explain three of the four cases who failed to complete treatment. Careful questioning about their jobs might have saved unnecessary effort.

Depth appreciation must have some bearing on perseverance.

A.H. found it a great loss when she became monocular; others learn to adjust far more easily.

Then there is the personality of the patient. All orthoptists will agree that best results are achieved with tremendous co-operation from the patient. This we had from A.H.

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