THE EMPLOYMENT AND VISUAL ABILITY OF PARTIALLY SIGHTED SCHOOL LEAVERS AND YOUNG ADULTS

by

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Abstract

The investigation was undertaken in order to examine the visual ability and employment of partially sighted school leavers and young adults. The major aim was to develop a test of visual ability, the measures of which would indicate vocational aptitude. Ophthalmic, social, and psychological factors which affect the first employment entered after leaving school and subsequent employment success have been examined. A questionnaire was utilised in a major study of employment, and information on employment history, attitudes, expectations and experiences was obtained from 95 respondents, along with ophthalmic and educational details. The results showed that of those individuals who had been available for employment for a period of up to three years since leaving school, 50% had spent more than half of their available time without employment. For the entire sample, on the basis of the proportion of time which had been spent in full employment since leaving school, 31% were considered unsuccessful in employment. It was found that problems in social and emotional adjustment, development of attitudes, learning ability, the attitudes of employers, and the lack of expert guidance, advice and facility for assistance, all contribute to individuals failing to achieve full employment. Other than for individuals with visual acuity of better than 6/24, employment success was largely independent

of visual acuity. Individuals with a poor or restricted visual field, however, were more often unsuccessful in employment. A simple test of visual ability was developed. The test requires subjects to determine the number of target stimuli contained within a complex display of confusion stimuli. Scores of accuracy and total time required to complete the test differentiate between successful and unsuccessful individuals. A table of probabilities for employment success or failure has been calculated for a range of scores. The test provides a simple means by which vocational aptitude can be assessed. The results of the investigation show that there is a real need for the introduction of a special establishment designed to provide expert advice, guidance, and assistance in all aspects of vocational assessment, training, rehabilitation, and placement of the partially sighted.

For my parents, my family and

all my very good friends.

CONTENTS

SECTION II

The Preliminary Investigation

SECTION I.

Project Aims and Present Situation.

Chapter 1.

Aims, Background and Procedures.

1.1. Introduction.

In conclusion to an investigation of the employment of partially sighted school leavers Ruth Wilkes (1961) stated:-

> '.....it does seem that these partially sighted children were very much at the mercy of chance and their employers when they left school. With luck, a good employer and support from his family a partially sighted child can do very well, but there is little to help those who are not so fortunate.....'.

Those findings are still an accurate reflection of the experience of present day workers dealing with the vocational assessment and placement of partially sighted school leavers and young adults.

A Committee of Enquiry (1968) appointed to consider the education of the visually handicapped reported

in 1972

> '.....the whole question of vocational assessment and employment for the partially sighted should be the subject of further study as a matter of urgency'.....
>
> 'The main questions to be answered are:
>
> (i) How many of the partially sighted are likely to have difficulty in obtaining employment?
>
> (ii) What kinds of employment are particularly suited to the partially sighted?
>
> (iii) How can suitability for employment be assessed?
>
> ......'

At the same time as that Committee was hearing evidence, and as a consequence of the efforts of Mr. Jones, Principal of the West of England School for the Partially Sighted, Mr. Cantrell, Consultant Ophthalmologist of the West of England Eye Infirmary, and Dr. Wolffe of the Department of Ophthalmic Optics, University of Aston, this project was set up to try and find answers to just those questions.

1.2. Aims and Background.

Both Mr. Jones and Mr. Cantrell had observed throughout many years of personal and professional experience with partially sighted school leavers that employment success appeared to bear little relation to visual acuity. They considered that differences in employment capability between individuals with similar levels of visual acuity arose as a result of the successful individuals being better able to make more effective use of their residual vision. Concerned with ensuring that school leavers and young adults were placed in employment commensurate with their true abilities, they suggested that if the ability of the partially sighted individual to make effective use of residual vision could be measured, then such a measure might provide an adequate method of determining aptitude for employment.

As a direct result of their suggestions the project set out:-

(1) To investigate the visual ability of partially sighted school leavers and young adults.

(2) To develop a simple test which measured visual ability, which could be carried out with children of school age, and which could be administered and interpreted by teachers and careers officers.

(3) To examine the validity of the test as a means of predicting the employment potential of partially sighted school leavers and young adults.

As the investigation proceeded it became clear that many different factors, other than just visual ability, might have a significant influence on the employment and subsequent success of partially sighted school leavers and young adults. The results of studies of the normally sighted school leaver showed that social, psychological, developmental and educational factors all affected the transition from school to work and the subsequent employment of these young people. (Ch. 2).

As few studies had been undertaken to investigate

the influence of such factors on the employment of partially sighted school leavers and young adults, and as the influence of visual ability could not be adequately considered independently of these factors, the investigation further undertook :-

(4) To determine the factors which affect the employment of partially sighted school leavers.

(5) To investigate the source of factors.

(6) To examine their significance in relation to the first employment obtained after leaving school, and in relation to employment success.

The overall aim of the project was thus to provide a test of visual ability, the measures of which would indicate aptitude for employment, along with factual evidence and information on the influence of those factors which affect employment.

It was hoped that as a result teachers,

ophthalmologists and careers officers might be better able to guide leavers and young adults toward, and assist them to obtain, employment commensurate with their true abilities.

1.3. Method and Procedures.

After examination of relevant literature and design of potential tests of visual ability a preliminary investigation was undertaken in which the value of the new tests and standard techniques was examined. During that investigation information on factors which might affect employment was obtained from discussion with school leavers, young workers, teachers, careers officers and employers. Following analysis of the results obtained and construction of specific hypotheses a major study was undertaken in which 280 school leavers and young adults were contacted by questionnaire. The data obtained from 95 respondents provided information on specific factors affecting the first and subsequent employment and allowed definition of employment 'success' against which the predictive value of tests could be assessed. During this period of data collection development of further techniques of measuring visual ability was carried out culminating in the design of one kinetic and two static tests. The accuracy of these tests in predicting employment success was then assessed in experimental trials on 16 volunteer subjects obtained from the questionnaire respondents.

Chapter 2.

Relevant Literature and Recognised Problems.

2.1. Partial Sight: Definition, Causes and Incidence.

There is no statutory definition of partial sight, as there is for blindness (National Assistance Act 1948), but for the purpose of assessing eligibility for admission to the register the Department of Health and Social Security (1970) has put forward specific guidelines relevant to Form BD 8 'Examination for admission to the register of blind persons or to the register of partially sighted persons'.

> '.....a person who is not blind within the meaning of the 1948 Act but who is nevertheless substantially and permanently handicapped by congenitally defective vision or in whose case illness or injury has caused defective vision of a substantial and permanently handicapping character is within the scope of the welfare services which the local authority are empowered to provide for blind persons.'

(i) for registration purposes and the provision of welfare services, those with visual acuity -

  (a) 3/60 to 6/60 with full field;

  (b) Up to 6/24 with moderate contraction of the field, opacities in media or aphakia;

(c) 6/18 or even better if there is a gross field defect, e.g. hemianopia, or there is a marked contraction of the field as in pigmentary degeneration, glaucoma, etc.

(ii) for children whose visual acuity will have bearing on the appropriate methods of education -

(a) severe visual disabilities - to be educated in Special Schools by methods involving vision - 3/60 to 6/24 with glasses;

(b) visual impairment - to be educated at ordinary schools by special consideration - better than 6/24 with glasses.

Notes for guidance with respect to young people are added

(a) Infants and young children with congenital anomalies, including visual defects, unless obviously blind should be classes as partially sighted.

.....

(d) In making recommendations about persons up to and including the age of 16 years, examining ophthalmologists should bear in mind that - as with blindness - there are other factors which may influence local authorities in their decision about the special educational treatment to be provided.

There is some merit in having a flexible definition in that factors other than vision can be taken into account when considering educational provisions appropriate to a particular individual. Difficulties in directing individuals to appropriate occupational training programmes do arise, however, as a consequence of rigid

sub-sections contained within the registration form (See 2.2.).

The real incidence of partial sight in the total population of Great Britain is unknown. The recorded statistics are unreliable because registration is voluntary. For individuals over the age of 16 years registration is of little value as no special financial assistance, occupational guidance or retraining provisions are available to those who have difficulty in obtaining employment. As the present circumstances provide little incentive to the older partially sighted individual, it is widely assumed that many individuals aged between 16 and 64 do not consider it of any value to register as partially sighted. This is reflected in the statistics of new registrations of blind and partially sighted. In the year 1968 it was found that in the age group 16 - 49 years, which represents the major proportion of the working population, 500 people who had not previously been registered as partially sighted were newly registered as blind, and 445 people were newly registered as partially sighted. Within the age group 5 - 15, however, only 107 people were newly registered as blind, whilst 314 were newly

registered as partially sighted. If it is assumed that within the school age population the incidence of actual new registrations represents a reasonably accurate estimation of the real incidence of new registrations of blindness and partial sight, as a consequence of the necessity of assessing the suitability of individuals for the appropriate educational provisions, the figures suggest that within the adult working population approximately 64% of all individuals likely to be eligible to register as partially sighted do not in fact do so. It is, however, possible that a proportion of those registered as blind are classified as such in order to allow them access to the special provisions available for the blind, thus distorting the estimation.

The causes of partial sight, and their incidence, have received relatively little study. The only comprehensive investigation of the total age range affected, was undertaken by Sorsby in 1960. In examining the causes and incidence of conditions in the total population of the year 1958, he found that, as 70% of the newly registered partially sighted were over 65 years of age, the 'senile' affections of the eye were

predominant in any overall survey of the causes. (Table 2.1.).

'Senile' Cataract	25.7%
'Senile' Macular Lesions	22.4%
Glaucoma	8.1%
Myopia	12.9%
Diabetes	4.9%
Optic Atrophy	3.3%
'Others'	22.7%

Table 2.1. Causes of Partial Sight. (Sorsby 1961).

Concerned, however, with the absorption of partially sighted people into industry, he further examined the major causes of partial sight in all new registrations, for the young and middle aged, 15 - 49 years (Table 2.2) and separately for children under 15 years of age (Table 2.3).

Congenital Defects.		
Cataract	13.5%	
Optic Atrophy	1.9%	
Other structural anomalies/ Nystagmus	11.3%	
		26.7%
Myopic Chorioretinal Atrophy		18.7
Optic Atrophy (acquired)		7.7
Retinitis Pigmentosa/Macular Dystrophy		7.4
Diabetic Retinopathy		6.8
Iritis and Iridocyclitis		2.8
Retinal Detachment		1.9
Interstitial Keratitis		1.6
Glaucoma		1.6
Corneal Lesions		6.1
All other causes		18.7
		100.0%

Table 2.2. Major Causes of Partial Sight (New Registrations). Age Group 15-49 years. (Sorsby 1961).

Congenital Defects.		
Cataract	16.4%	
Optic Atrophy	3.5%	
Other structural anomalies/ Nystagmus	38.6%	
		58.5%
Myopic chorioretinal Atrophy		14.5
Optic Atrophy (acquired)		5.5
Retinitis Pigmentosa/Macular Dystrophy		5.1
Retrolental Fibroplasia		4.7
All other causes		11.7
		100.0%

Table 2.3. Major Causes of Partial Sight (New Registrations). Age Group - children under 15 years. (Sorsby 1961).

It was found that congenital anomalies constituted the major cause of partial sight in all new registrations of children under the age of 15 years (58.5%), and also in all new registrations of individuals between the ages 15 and 49 years (26.7%). In the majority of these individuals the defect was stationary and only a relatively small proportion had a restricted field. Myopia, the next major cause, accounted for 17% of all those under 50 years of age. Sorsby classified these latter individuals as patients with potential deterioration but pointed out that only a minority break down, generally in middle age and most commonly from macular haemorrhages or chorio-retinal atrophy, and that only a very small minority develop retinal detachment. Of all blind myopes, only 10% were blind as a result of bilateral myopic retinal detachment. For individuals within the two classifications, 'stationary' and 'potential deterioration', Sorsby considered that restriction on the type of employment, for fear of causing further ocular damage, was totally unnecessary. He did, however, consider that for patients with progressive disorders individual assessment was essential, not in relation to the type of work, but as to the outcome of the condition. Within this group he placed Retinitis Pigmentosa (6% of all cases under 50), Optic Atrophy (7%) and Diabetic Retinopathy (4%).

In the only comprehensive study of the vision of partially sighted children, Fine (1968) made a survey of 1,374 children in all schools and classes for partially sighted pupils in England and Wales. The causes of visual handicap were analysed in two groups, those born in 1951 to 1955 - Group A - and those born in 1956 to 1960 - Group B (Table 2.4). The results were not directly comparable to those obtained by Sorsby as a different classification system was utilised. Fine found that Cataract was the major cause in both groups (27.1% in Group A and 33.2% in Group B), followed by Myopia (14.0% in Group A)and Optic Atrophy (11.10% in Group B). In both groups, Cataract, Myopia, Optic Atrophy and Nystagmus were all major causes of visual handicap accounting for some 75% of all cases. Diseases of the retina and choroid constituted a larger proportion in the older group (A) than in the younger group (B), because many of the conditions develop during childhood and are not evident at birth. Retrolental fibroplasia occurred less often in the younger group than in the older group, as by that time it had been discovered that the major cause was maladministration of oxygen to the premature infant.

	A	B
	1951- 55	1956-60
Cataract and lens Displacement	27.1%	33.2%
Myopia	14.0	9.0
Optic Atrophy	12.0	11.1
Nystagmus	11.2	14.0
Albinism	9.7	11.6
Diseases of Retina & Choroid	8.7	3.7
Retrolental Fibroplasia	6.0	4.1
Coloboma & Developmental Defects	6.0	5.8
Buphthalmos, Glaucoma	1.8	2.7
Hypermetropia & Astigmatism	1.6	1.2
Corneal Lesions	0.9	2.0
Uveitis and Iridocyclitis	0.5	0.7
Tumour of eye	0.2	0.2
Cerebral Blindness	0.1	0.7
Pseudoglioma	0.1	-
Penetrating Injury	0.1	-
	100.0%	100.0%

Table 2.4. Causes of Partial Sight in Children.

Fine 1968.

Aetiology was also examined and was found to be unknown in 45.6% of all cases. Heredity was the commonest known factor 34.4%, followed by Prematurity 10.8%, Maternal Infection 4.1%, Post natal infection 2.0%, Trauma 1.8% and finally Intracranial lesion 1.3%.

Fine examined the visual acuity of the children and found that the largest group, 37.3%, had acuity of between $\frac{3}{60}$ to $\frac{6}{60}$ Snellen. The next largest group 34.8% were between $\frac{6}{36}$ and $\frac{6}{24}$, followed by 21.5% with $\frac{6}{18}$ or better. Only 5% had less than $\frac{2}{60}$ and the acuity had not been recorded for 1.4%. Of the 28 individuals in whom vision had been recorded as less than $\frac{3}{60}$, Fine found that there was no mention of the visual field in 17 cases, 5 were recorded as normal and 6 had restricted visual fields. Of the 487 with visual acuity $\frac{3}{60}$ to $\frac{6}{60}$, fields were not mentioned in 253, were normal in 125 and restricted in 109; of the 471 with acuity $\frac{6}{36}$ - $\frac{6}{24}$, fields were not mentioned in 247, were normal in 107 and restricted in 117; and of the 296 children with visual acuity of $\frac{6}{18}$ or better, fields were known to be restricted in only 54 cases.

There is considerable uncertainty about the total number of people in England and Wales affected by partial sight, due to the unreliability of the statistics

of registration. At the end of 1968 the registers of handicap maintained by the Department of Health and Social Security listed a total of 35,001 partially sighted persons and 102,730 blind. Of those registered partially sighted, the major proportion 62.9%, some 22,004 people, were over the age of 65 years, 12.3% (6,122) were between the ages of 16 and 49 years, 17.2%, (4,317) were aged between 50 and 65 years, and the smallest proportion 7.6% (2,558) were under 16 years of age. The 'Vernon' Committee of Enquiry (1968) attempted to estimate possible trends from the available statistics on visually handicapped children, but they considered that the statistics were too difficult to interpret and extrapolate.

They noted, however, a rising prevalence of dual or multiple handicap amongst blind children of school age, from 16.8% in 1959 to 23.8% in 1970. No firm statistical data were available for the partially sighted but the Committee believed that the prevalence of additional handicaps amongst the partially sighted was an increasing problem. The survey by Fine (1968) had indeed indicated that 23% of partially sighted school children suffered from additional handicaps that were in themselves sufficient to warrant special education. The 'Vernon'

report (1968) concluded that the numbers of visually handicapped children as a whole were unlikely to fall unless there was some major advance in the prevention or cure of congenital visual defects.

In view of the lack of reliable statistical data, it is difficult to estimate accurately the total number of partially sighted school leavers and young adults available for employment. The statistics suggest, however, that in any one year there may be at least 2,400 young people between 16 and 21 years of age.

2.2. Ascertainment, Vocational Guidance and Provisions.

Under the present procedures and regulations for registration, (Form BD 8), if the individual does not fall within the clinical criteria of blindness, and is certifiable as partially sighted, the examining ophthalmologist is required to consider the implications and make recommendations on education or employment. This presents enormous problems. In the case of the partially sighted individual of school age, under Section D of the BD 8 the ophthalmologist is requested to advise whether the child should be educated at a special school for partially sighted pupils or at an ordinary school 'provided that suitable modifications can be made to the normal regime'. Regardless of the guidelines given on the levels of distance visual acuity appropriate to each educational circumstance, it is unreasonable to ask and extremely difficult for the ophthalmologist to make a recommendation on a matter which affects education. In reality such a decision could only reasonably be made by an educationalist working in close co-operation with the examining ophthalmologist. The regulations at least state that the final decision must be made by the local

authority, but they too must be guided by and be able to consider the clinical criteria. There is however no request for an assessment of the 'near' visual acuity, the clinical factor perhaps the most relevant to education. 'Near' visual acuity does not necessarily bear any relation to the distance visual acuity, and in view of its importance, the omission of an assessment must rank as the main failing of the present ascertainment procedures.

In the case of young adults over the age of 16, the examining ophthalmologist, again under Section D, is also expected to be expert on the employment of the partially sighted. The form requests .....

> 'in the event of the patient being employable, can you indicate:
>
> (a) any activity you consider unsuitable (e.g. stooping, the lifting of heavy weights)?
>
> (b) any activity that is particularly suitable (e.g. a sitting job possibly handling rather small material for a glaucoma patient with small fields and good central vision)?

(c) if a change of present occupation is desirable on ophthalmological grounds?'

Part (a) reflects an outmoded attitude to partial sight. Current ophthalmological opinion would consider that in only a very few cases, for example following a retinal detachment or perhaps following surgery would heavy exertion be likely to cause any damage to vision. Parts (b) and (c) both require the ophthalmologist to have the knowledge and experience of a careers officer, a manifestly unrealistic demand. Unquestionably the most restrictive section of the BD 8 is section C (4), in which the ophthalmologist is requested to endorse whether or not the person is

'likely soon to become blind or have such a visual defect that they would benefit from training for employment or other services appropriate to the blind.'

Many partially sighted individuals who do not come within that classification could obtain some benefit from the facilities provided for the Blind.

These facilities are extensive and include two

special centres, Hethersett in Surrey and Queen Alexandra College at Harborne, Birmingham. At these centres young school leavers can undertake courses designed to assess employment potential and provide support and guidance during the transition from school to work. Students can be recommended for open employment, occupational retraining or further education, and their subsequent progress followed up by employment officers attached to the centre. At Harborne, a full time vocational training course in Light Engineering is also available to suitable candidates. In addition to these two centres for blind school leavers, two Industrial Rehabilitation Centres are provided for the newly blind. These centres aim to help people adjust to blindness. Entrants are helped to regain confidence in everyday activities and undertake classes in industrial workshops so that skills and abilities can be assessed and vocational guidance given.

Blind school leavers and young adults who have attended special centres and who wish to go

directly into employment, or have been considered suitable for a particular occupation, have further assistance available from Blind Persons Training Officers. The attention of these specialist staff can be crucial to the subsequent success of a newly employed blind worker. The officers are able to advise both employer and new employee on technical problems, for example the adaptation of machines, and additionally are able to spend several days with a new employee helping him master particular processes and solve problems of mobility both inside and outside his new place of work. In the major local authorities there is also the Blind Persons Resettlement Officer, whose function is to help find suitable employment or advise on rehabilitation or training.

In addition to assessment and rehabilitation centres for blind individuals, further training for employment is available at specialist Government Training Centres. At Letchworth a course in light engineering is provided and includes instruction in the operation of capstan lathes, drilling and milling machines and the use of specially adapted instruments. Courses in shorthand, audio typing and telephony are

run by the Royal National Institute for the Blind Commercial Training College. The Royal Normal College provides two extensive and wide ranging commercial courses, one lasting two years six months and the other lasting four years. A three year course in piano tuning, regulating and repairs is also provided. Courses in computer programming and a three year full time course in physiotherapy are also available through the Royal National Institute for the Blind. Further to all the specialist courses, staff, and special assistance available to the blind, the Department of Employment provides grants for sixty sheltered workshops which employ blind workers who are unsuitable for employment on the open market.

No such facilities are available to partially sighted school leavers and young adults, unless they are appropriately endorsed under Section C (4). Although the Principal of Hethersett has noted that of all the students who have passed through the centre the partially sighted have been the most difficult to place in employment (W. Cunliffe 1968), this does not necessarily mean that individuals not 'likely soon to

become blind' (Section C (4)) would not benefit from sharing such facilities. It would unquestionably be of far greater benefit to the partially sighted if there were created similar kinds of centres, but specifically designed for their special needs.

At present the provisions for vocational guidance and assessment for the partially sighted school leaver are exactly the same as those provided for the normally sighted. Procedures vary, but in general schools have a particular teacher or group of teachers who advise pupils on possible areas of employment and conduct visits to factories, shops and offices. Careers Officers within the area of the special school play a major role in helping advise pupils and guiding them in their choice of employment. It is, however, the Careers Officer of the local authority within whose area is located the home of the school leaver, who has the final responsibility of assessing capability and employment potential, and of finding and arranging entry into a suitable occupation. They have an almost impossible task. Even when the officer is familiar with the partially sighted and is able to make some interpretation of clinical information, the information given in the B.D. 8 is often many years out of date. It is, of course, also questionable whether or not that information bears any relevance to

such an assessment. As a final recourse, the partially sighted individual can register as a Disabled Person (Chronically Sick and Disabled Persons Act 1970) and obtain the help and advice of a Disablement Resettlement Officer (DRO), specially trained to deal with vocational guidance and placement of handicapped people. This provides an additional advantage in obtaining employment as employers are required by law to employ a 3% quota of disabled persons. The DRO has however the same difficulties as the careers officer, in not having any guidance as to the factors relevant to an assessment of the occupational aptitude of a partially sighted individual.

The Committee of Enquiry (1968) reporting on vocational guidance and assessment, noted these difficulties and stated .....

> 'We have been much impressed by the weight of evidence that was strongly critical of the existing arrangements ..... We agree with the evidence we received that form B.D.8 is unsuitable for children ..... When boys and girls leave school at the age of 16, we consider that a form of certification will be necessary in relation to their capacity for employment, and this form might require alteration after vocational assessment and training have taken place.'

They suggested that the replacement for the BD 8 might remain largely similar to the present form, but with deletion of the section on recommendations regarding education and inclusion of new sections requesting information on near vision and additional information on field defects, 'since both these parameters have considerable application to employability as well as education.' In order to try and overcome the problem of interpretation of clinical findings in practical terms, they recommended that vocational guidance should be undertaken by a team of experts including the careers officer, which should maintain liaison with the pupil's comprehensive assessment team who were first concerned with the identification and assessment of the child's visual handicap. The committee did, however, recognise that their suggestions would be complex to administer and that effective liaison would still be difficult with the careers officers in the home area of children attending schools outside their home local authority.

It is, however, still the current opinion amongst those concerned with the vocational guidance and placement of the partially sighted, that until a greater understanding has been gained of the real relationship between the ophthalmic parameters and their practical effects or limitations in employment, then advice on opportunities and determination of a suitable occupation will continue to be haphazard, uncertain and based on inadequate information.

2.3. Special Education and the Transition from School to Work.

Special educational facilities for the partially sighted, separate from those provided for the blind, were first established in 1908 by the London County Council. Their introduction was as a result of the findings of the first survey into the vision of children attending schools for the blind, initiated by Dr. Kerr, the first Medical Director of the London School Board and presented by the investigator Bishop Harmon to the Second International Congress of School Hygiene in 1907. The crucial finding of that survey was that the majority of children attending schools for the blind were not totally blind but were high myopes. Bishop Harmon concluded, and successfully persuaded the authorities, that as such children had useful residual vision they ought to be educated in institutions having facilities adapted to their special needs. The first special class 'for high myopes and children suffering from severe degrees of defective vision' was subsequently established.

This first class was rapidly followed by several others creating the foundation of educational

facilities appropriate for the partially sighted. The benefits were, however, severely limited by the then current ophthalmological opinion that reading print was damaging to the myopic eye. The motto of the first Myope School was 'Reading and Writing shall not enter here'. This opinion held such import that educational provisions remained restricted for nearly forty years following the opening of the first Myope School, notwithstanding the many well founded and necessary changes, based on informed opinion and experience, which were repeatedly put forward in subsequent reports.

In particular, the Report of a Committee chaired by Dr. R.H. Crawley and appointed by the Board of Education in 1931, went almost totally unheeded. The Crawley Committee set out to inquire into and report upon the medical, educational and social aspects of the problems affecting 'partially blind children'. The report detailed many of the errors and omissions of the early education provisions and put forward specific suggestions for improvements. One of the main recommendations made by the Committee was:

> 'the prevailing practice of prohibiting reading (except from very large hard-printed

> type) should be relaxed for myopes and abandoned for other partially sighted children.'

The report further recommended that restrictions on work under artificial light and on physical training could be relaxed; that children should not as a general rule be sent to schools for the blind but where possible educated in classes forming an integral part of elementary schools, and where such special classes were impracticable, reorganisation of residential blind schools should be considered so as to set some apart for partially sighted children only. The committee also recommended that 'partially sighted' was a more appropriate term than 'partially blind'.

In the years immediately following the publication of that excellent report, little change took place in the methods of education and provisions for partially sighted children. Several reasons for this were put forward in a report entitled 'The Health of the School Child', presented by the Chief Medical Officer of the Ministry of Education. It was suggested that since the number of partially sighted children within the area of most urban authorities was small, the proportion

estimated by the committee being 1 per 1000, it seemed difficult for authorities to make adequate arrangements for day schools, and combinations of authorities to provide boarding schools was unusual. Furthermore, despite the recommendations of the Crawley Committee regarding relaxation of some of the more severe restrictions imposed by ophthalmic advisors, the educational curriculum in special schools was still so limited by prohibitions that some medical officers 'hesitated to condemn children to such a meagre intellectual diet', and preferred to leave them in ordinary schools, even though they might make little progress.

It was not until after the introduction of The Handicapped Pupils and Special Schools Regulations (1945), (Education Act 1944), in which 'partially sighted' was designated a separate category of handicapped pupil, that many of the recommendations put forward in the 1934 Crawley Report began to be more widely accepted and, more importantly, be put into action. The regulations defined partially sighted children as .....

> 'pupils who by reason of defective vision cannot follow the ordinary curriculum without detriment to their educational development, but can be educated by special methods involving the use of sight'.

The blind were defined as .....

> 'pupils who have no sight or whose sight is or is likely to become so defective that they require education by methods not involving the use of sight'.

The developments following the introduction of these regulations led to the provisions for special education now current. Schools were reorganised so that the partially sighted were educated separately in new boarding schools or day schools, and subjects which had previously been considered as potentially damaging to the partially sighted eye were introduced into the school curriculum. Special educational techniques involving small group or individual tuition were also introduced, along with special equipment such as large print books, adjustable work surfaces, individual lighting fixtures, overhead projectors and low vision aids.

As experience has been gained and a greater understanding of the development and abilities of

the partially sighted child achieved, further educational techniques have been developed and the special education provisions kept under constant review. The Committee of Enquiry into the Education of the Visually Handicapped (1968) recently put forward many recommendations on school curricula, teaching aids and reorganisation of schools. As a consequence, particular emphasis has been placed on all age co-education, integration of partially sighted with normally sighted pupils, and the expansion of provision for CSE and GCE 'O' and 'A' level work.

It has become clear that the limitations of partial sight, once thought insuperable, can to a very large extent be overcome and a full education provided. With this realisation it has become the ultimate aim of those concerned with special education to provide partially sighted children with an education equal to that received by their normally sighted peers. That education is at present undertaken in England and Wales at 21 special schools, 2 of which are for both blind and partially sighted. Five of the schools are boarding schools, the pupils of which account for

approximately 40% of all partially sighted school children. In addition to the special schools for the visually handicapped there are 9 schools for delicate or physically handicapped children which also have a unit for the partially sighted, and 9 special classes for partially sighted children in 8 ordinary schools.

Fraser (1962) summarised the aims of special education as .....

> 'To provide an education comparable with that which the child would receive if he were not partially sighted.
>
> To fit him to take his proper place in society so that, although severely handicapped the disability will be of as little consequence as possible.
>
> To develop his innate abilities to the fullest extent, with the accent on sight using rather than sight saving.'

Few studies have undertaken to examine whether these aims have been achieved. The major effort of those that have investigated the consequences of visual handicap has been directed towards examining and understanding the educational and psychological implications. Birch, Tisdall, Peabody and Sterret

(1966) in a study of a sample of 1,250 partially sighted American school children, concluded that under achievement was'educationally the most important feature of the typical partially sighted 6th grader'. The children were approximately 2.5 years retarded academically as based on age and academic ability. The results of Karnes and Wallersheim (1963), who studied 16 children in great detail, also suggested that partially sighted children do not achieve in reading and arithmetic a level commensurate with their intellectual abilities, but the results of a study of 131 children between the age of 6 and 10 (Bateman 1963) showed that the most severely visually handicapped in terms of sight loss were reading at a slightly higher level than their grade standard, whilst the least handicapped were a little below the grade standard. These results indicate, as did those of Lansdown (1967) in Britain, that the degree of sight loss has little effect on academic attainment. It is considered by Lairy (1967) that psychological conditions intervene with partially sighted children. Lairy maintains that disturbance in the development of partially sighted children whose impairment arises at

birth may be very similar to that in blind children. Postural development may be retarded due to reduced visual and social stimulation. Emotional neglect may result in withdrawal and passivity or mannerisms. The evidence of Underberg (1961) Cowen et al. (1961) and Mehr et al. (1970) suggests strongly that social and emotional problems may indeed be more severe for the partially sighted than for the normally sighted or blind. Evidence from the survey by Fine (1968) of 1,374 partially sighted children in England and Wales showed that 9.6% displayed mannerisms, 32% of the children were thought by their teachers to be emotionally disturbed and 7.3% were considered maladjusted. On the whole, the teachers considered that although some children were succeeding despite adverse home conditions, those with problems stemming from the home background tended to progress poorly in school.

The vast majority of investigations do not consider the implications of partial sight in the subsequent employment of partially sighted school leavers. Karnes and Wallersheim (1963) did suggest school curricula should include more shop work and

craft activities but only because they found partially sighted children to be low in motor abilities. Delthill (1963) writing on the vocational guidance of the partially sighted suggested that desire to overcome the handicap may be of equal importance to employment success as intelligence, but van den Bergh (1964) has pointed out that minimising the reality of handicap, although rare, is equally an inadequate attitude as that of 'giving up'. In a random sample of 40 school children, aged 10 - 15 years, he found only 6 children who could be considered 'nearly normal' in social and emotional adjustment. It was further suggested that an effective vocational service would in time exert a beneficial influence on the 'life perspective' of young partially sighted children, and on the attitudes of their parents, as it was a means of substantially influencing the 'central experience of future' and the approach toward adulthood. Few investigations have, however, studied the young partially sighted school leaver actually in employment. In one such investigation undertaken in America in 1959, at a time when consideration of the

consequences of partial sight in education was just beginning to arouse interest, Fennefos (1959) followed up 35 students from special schools. Of these leavers only 4 had stated that their employer had questioned their ability and only 3 considered that they had failed to achieve employment for that reason. Although 85% of the group were high school graduates and unrepresentative of partially sighted school leavers in general, and despite the attack of two further writers, Drake (1960) and Hruschka (1962) who both condemned the educational system as failing to ensure adequate preparation for employment, the apparent adequacy of the provisions as suggested by Fennefos seemed to stifle any further consideration of problems in employment.

In Great Britain, as in America, despite reports from individuals on the inadequacy of the facilities and services provided for vocational guidance, training and placement of partially sighted school leavers (Wilson, 1959; Sorsby, 1961), only one small scale investigation of the employment of school leavers was undertaken. Ruth Wilkes (1961) followed up 32 partially sighted school leavers and young adults aged between 16 and 21 years. Her findings suggested that more

than two thirds of all the boys and one half of all girls had outstanding problems of adjustment to life and work after leaving school. Although there was no real evidence of the influence of parental attitudes on children, the manner in which they had reacted to the suggestion of special education for their children had seemed to depend on their intelligence, the value they set on education and whether they had other handicapped children and had previously had contact with special schools. The young school leavers themselves and their parents felt that other people associated attendance at a special school with mental retardation. Some of the young leavers also complained that as their particular difficulties of focussing or in seeing with a restricted field were not understood by other people, as was blindness, they received little help from workmates who could often see nothing obviously wrong with them and occasionally considered that they were 'putting it on'. Wilkes also found that first jobs tended to be short lived, especially when the work was unskilled, as was the case for the majority of leavers. Whilst half the group had been found work by the Youth Employment Service within three weeks of leaving school, and another 4 within a month

or more, out of 24 who looked for second jobs only 7 had found them through the Youth Employment Officer. Although Wilkes clearly pointed out in 1961 that the employment of partially sighted school leavers seemed to be very much a matter of chance under the provisions then current, and indeed substantially the same at present, and careful study of the social and personal needs of leavers was required, no further investigations were undertaken in the intervening years. Consequently, there is no real understanding of the practical effects or limitations of partial sight in employment nor understanding of how other factors, such as the influence of the home and educational environment, attitudes towards work, social and emotional adjustment might affect employment success.

The transition from school to work, and the factors affecting vocational choice and the employment of normally sighted school leavers has, however, been extensively investigated (Wilmott 1966; Carter 1962, 1969; Veness 1962; Maizells 1970). These studies have shown that employment is affected by social and psychological factors.

Maizelles (1970) determined that the most predominant factor in vocational choice was 'inner directed choice'; that is, choice made with reference mainly to the individuals own talents and interests, and based upon their own assessment of their academic or practical suitability derived from school achievements and experiences. A secondary factor was 'other directed choice'; that is, choice made with reference mainly to outside sources of information and advice or in consideration of future prospects, security and position. A third less important factor was 'tradition-directed choice'; which is a choice made as a consequence of family or neighbourhood traditions such that no alternative can be considered.

The results obtained by Maizells for male school leavers were almost exactly similar to those obtained by Veness (1962), the most frequently occurring reasons for employment choice being 'inner directed'. For female school leavers however Maizells found, unlike Veness, that choice was more often influenced by the appeal of some feature of the job considered and by job prospects, and was less likely to be

influenced by interests or achievements at school, by the advice of others, or by tradition. Maizells considers, however, that the differences arise probably only as a result of differences in composition of the two samples.

Veness (1962) is of the opinion that for the majority of school leavers the transition from school to work is relatively smooth, but that problems arise in relation to work achieved and the individuals ambitions. Maizells found that as many as 50% of males, and particularly those in unskilled employment, had not obtained the level of work which they had originally wanted but, as was found also by Carter (1962), modification of vocational aims was not necessarily associated with dissatisfaction and regret. Wilmott (1966) in a study of 177 boys in East London found that as many as 80% were satisfied with their first employment. He considered, however, that for the majority there was a chronological cycle with movement toward dissatisfaction and back. Within the first 2 years after school, and at the most 3 years, there is a relatively stable satisfied stage until the novelty of work wears off and problems

of boredom and dealing with adult authority become particularly acute. The most discontented age is 17 or 18 years, beyond which there is a general move back to satisfaction in employment. Wilmott found, however, that a proportion were continuously dissatisfied and had frequent employment changes. These individuals were less well adjusted, resented authority and had disliked school.

In conclusion to her study of 330 leavers Maizells stated .....

> 'The results ..... would appear to confirm that the change from school to work is, in present day society, a focal point in adolescent development, associated with uncertainties, disappointments, frustrations and stress situations. (There is) ..... a general lack of correspondance between the needs and expectations of young people, on the one hand, and what is provided by the relevant community services, including industry, on the other .....
>
> Only by (radical) measures can the transitional years be transformed from a period in which young people move into their predestined socio-economic roles into one in which, through continuous links between school and work, they explore and discover their potential talents, experiment with a variety of social and economic tasks, seek and establish their true identities and determine for themselves their place in society'.

Clearly, if the transition from school to work for the normally sighted leaver is fraught with such difficulty, in the current circumstances it must inevitably be immensely more difficult for the partially sighted school leaver. Indeed then, how much more radical must the measures be to help them 'discover their potential talents .. ... establish their true identities and determine for themselves their place in society'?

SECTION II

The Preliminary Investigation.

Chapter 3

Aims, Procedure and Sample Construction.

3.1. Aims and Intentions.

The experience of those concerned with the vocational guidance and placement of partially sighted school leavers, and the reports of the factors involved in the transition from school to work, show that there are many different and interrelated aspects which might affect employment success. In view of this complexity and the inadequacy of information on the employment of partially sighted school leavers, it was considered that a preliminary investigation, in some depth, was required in order to try and determine those aspects which most warranted detailed study in a major investigation. This was particularly so as such an investigation would be limited by both time and manpower. Furthermore as

the concept of a measure of visual ability, for use as a predictor of employment success was a radical and previously unexplored idea in relation to the partially sighted, tentative exploration of possible techniques and relevant procedures of assessment was necessary before embarkation on a major programme.

The aims, therefore, of the Preliminary Investiagation were wide ranging and covered the following aspects:

(1) To examine those factors which influence choice, placement and execution of employment of partially sighted school leavers.

(2) To identify those aspects, or sources of difficulty which might be of major importance and contribute to eventual employment success or failure.

(3) To construct some form of definition of employment success.

(4) To construct hypotheses of the possible relationships between employment success and those factors indicated to be of major influence in employment choice, placement and execution.

(5) To construct hypotheses of the possible relationships between employment success and the ophthalmic characteristics of leavers.

(6) To examine the validity of measures currently used as measures of visual ability, and to

develop and investigate other possible techniques for use as predictors of employment success.

(7) To assess the feasibility of studying these problems in greater depth, and determine methods by which a study could be undertaken and possible solutions to problems tested.

Furthermore, as the investigation dealt with partially sighted individuals, and at every stage would require their full cooperation, a principal aim in the preliminary investigation was to gain as much understanding as was possible, of the implication and consequences of partial sight for these young people.

Along with the experimental work undertaken during the preliminary investigation, much time was spent in informal circumstances talking with and being involved in some of the pursuits of the older pupils at the West of England School. A great deal of time was also spent, again in informal circumstances, talking to former pupils and their families about the problems that had been experienced on leaving school and undertaking employment.

3.2. Procedure.

With the invaluable cooperation of the West of England School for the Partially Sighted, arrangements were made for discussion to be held with careers officers dealing with school leavers in that area, and consulting rooms provided for the Ophthalmic investigation of past pupils of the school. Former pupils of the school, who had left within the period Summer 1963 to Summer 1970, and who still lived within the immediate area, were approached by letter outlining the aims of the project and requesting that they return to the school for discussion about their work and progress since leaving. The leavers were also asked if they would consent to take part in some simple vision tests.

Following the initial discussion with teachers and careers officers, and after completion of the ophthalmic examination of former pupils, all the special schools in England and Wales and two Scottish schools were contacted for the pupose of obtaining a sample of school leavers for the major study. Many of the heads of schools, however, wished to have further discussion of the proposed project before consenting to provide names and addresses of leavers. These discussions served to provide further wide ranging opinion as to the factors they felt were of most importance in influencing employment success. At the same time, lengthy discussions were held with individuals within the careers service,

responsible for school leavers in the areas of the West and East Midlands, Greater London and Scotland.

On completion of the discussions with heads of schools and careers officers, further structured interviews were carried out with those leavers in the South West who had assisted in the first stage of the investigation. These interviews were for the purpose of providing a basis for those questions to be asked in a major survey. Interviews were also undertaken with employers of these leavers and young adults, in order to obtain informed opinion on the problems that employers faced in the employment of partially sighted young workers, and also to provide a basis for determining the feasibility of examining these problems in greater depth in a major study.

A form of visual task analysis of the employment of leavers in the South West was also undertaken at their place of work in order to examine the feasibility of wide scale investigation of the relationship between ophthalmic characteristics and the limiting parameters arising in specific areas of employment.

Full details of the methods and procedures adopted at each stage of the preliminary investigation are detailed in the appropriate chapter section along with the results obtained.

3.3. Structure of the Sample.

It was the initial intention to obtain a sample drawn from among those individuals who had left school during the period Summer 1965 to Summer 1970. In order, however, not to lose valuable time in tracing individuals who had left the area or to involve respondents in lengthy travel, only those individuals who were known still to be in the area were contacted. In order to provide an adequate sample, the period was extended to include those who had left the school up to 7 years prior to the commencement of the project. Thirty-two individuals still lived within a radius of approximately 50 miles from the school.

On the basis of a legal maximum of fifteen individuals per class, and by considering each year to be the full maximum, all of whom had left school to take up employment, it was estimated that the theoretical population from which the sample was drawn totalled one hundred and twenty individuals. The 32 individuals who were contacted, therefore represented 27% of the total population. Of these 32 individuals 11 were willing to return to the school and take part in the project.

The sample obtained was atypical of the particular school population in that it was not representative of individuals who had left the area to seek employment. It was further atypical of the entire partially sighted population of school leavers, in that the school from which the sample was drawn was an independent boarding school. The pupils of boarding schools represent

approximately 42% of all school leavers, there being five boarding and fourteen day special schools for the partially sighted in England, plus two boarding schools taking both blind and partially sighted.

The aim of the preliminary investigation was, however, to obtain information from which hypotheses might be formulated and not to seek correlations of relationships that might be generalised to include the entire population.

The sample, although small, contained a large proportion of older and more mature individuals and was, therefore, suited for the purpose of the preliminary investigation. Where hypotheses were formed on the basis of the information obtained, the constraints of the sample were borne in mind.

3.4. Characteristics of Respondents and Non-Respondents.

Characteristics of respondents and non-respondents were compared in order to determine if information obtained from respondents was reasonably representative of the school leavers in the population under study in the preliminary investigation, and also to have some indication of the likely accuracy of any information that might be obtained in a larger survey.

The aspects that were of importance were:

(1) Age and Sex Distribution.

(2) Employment History.

(3) Ophthalmic Condition and Visual Acuity.

(4) Academic Qualifications and Intelligence.

3.4.(1). Age and Sex Distribution.

Table 3.1 gives the age range and sex of respondents compared to non-respondents.

Age	Respondents		Non-Respondents	
	Male	Female	Male	Female
less than 19 years	0	0	1	0
19 < 22 years	2	1	5	5
22 < 24 years	2	3	3	4
24 years and over	3	0	0	0
Not Recorded			3	

Table 3.1. Age and Sex Distribution of Respondents and Non-Respondents. (Number of Individuals).

Table 3.2 gives the theoretical distribution of age and sex of both groups expected in the total population of leavers from the school. The theoretical age and sex distributions were derived from the known statistics on all partially sighted school leavers in the period under study (Education Statistics 1970). The expected numbers of respondents and non-respondents in the total population were derived from the response incidence of 34.37% obtained in the sample.

Age	Population		Non-Respondents		Respondents	
	Male	Female	Male	Female	Male	Female
less than 19 years	25	20	18	15	7	5
19 < 22 years	17	13	12	9	5	4
22 < 24 years	17	13	12	9	5	4
24 years and over	8	7	5	6	2	1

Table 3.2. Theoretical Distribution for Total Population from which sample was drawn. Age, Sex, Respondents and Non-Respondents (Number of Individuals.)

The sample contained only one male under the age of 19 years, although the total number of respondents should have been 12, of which 7 should have been male, and five female. It was extremely improbable that the majority of all leavers under the age of 19 years had left the immediate area to seek

employment, as might at first have been concluded from the response rate obtained. It was even more improbable in view of the fact that the immediate area had been taken as within fifty miles of the school. The explanation was that the authorities within the school and careers services who had assisted in compiling the sample had provided the names of those school leavers who they felt were best suited to assist in the investigation. Individuals had been considered suitable if they had had extensive and varied employment experience. The omission of younger leavers was not noticed at the time of sample construction as dates of birth had not been examined before the sample was contacted by the investigators.

There was a far lower response amongst females in the age group 24 years and over than was expected from the distribution in the total population. The older group loss seemed most likely to be due to these young women having married and left employment to have children.

The response rate for males aged 19 to 23 years was much as expected, but a higher response than expected was observed amongst those 24 years and over. The precise reason was not clear. It may have been as a result of a greater awareness of the long term effects of the difficulties encountered on leaving school, reflected

in a willingness to help others. Alternatively, this group may have encountered even more difficulty at their present age than was the case when they were younger, and were thus seeking some kind of assistance from the investigators. The latter suggestion was borne out to some extent by the comments of the young adults.

The sample was, however, considered quite adequate as the respondents were mature and experienced individuals and were probably more suited to discuss the problems that they had encountered when leaving school, than the younger school leavers who were still very much involved in those difficulties.

3.4.(2). Employment History.

Although fairly comprehensive details of the employment records of some non-respondents were available, the only reliable information common to both respondents and the majority of non-respondents was the record of whether they were employed or unemployed when last contacted by the School or Careers Service. In the majority of cases the date of this last contact had been twelve months previous to the date of investigation. The sample was thus classified as to whether or not they were employed at that time.

Table 3.3 gives the numbers of respondents compared to non-respondents who were employed at that time.

Analysis of employment status, using the Fisher Exact Probability Test (S. Siegel 1956) indicated that there was no significant difference between the two groups. There was, however, a slightly greater proportion of unemployed individuals amongst the respondents, than was the case among non-respondents.

	Respondents	Non-respondents
Employed	8	14
Unemployed	3	4
Not Recorded	0	3
Fisher Test	p = 0.32	

Table 3.3. Employment of Respondents and Non-Respondents (Numbers of Individuals).

It was considered that the greater incidence of response from amongst unemployed leavers might have arisen as a result of these individuals having a special inclination to take part in an investigation which was concerned with their particular difficulties in employment. As details of the employment histories of non-respondents could not be obtained for comparison with respondents, it is of course only speculation that unemployed respondents were largely individuals who had had greater difficulty in obtaining and remaining in employment.

The results of the analysis of employment did, however, suggest that this might be the case. This suggests that the results of any large scale sample survey designed for use as a determinant of proportions of partially sighted people having difficulty or failing in employment must take into account the likelihood of such a bias.

3.4. (3). Ophthalmic Condition and Visual Acuity.

Information on ophthalmic condition and visual acuity was available from the school records of 18 non-respondents and was compared to that obtained from the respondents. The frequency with which a specific ophthalmic condition occurred in each group was recorded (Table 3.4.). As more than one condition was present in several cases, the total number of conditions was greater than the total number of individuals in each group.

	Respondents			Non-Respondents		
	Frequency	Emp.%	Unemp.%	Freq.	Emp.%	Unemp.%
Cataract and lens displacement	5	20	29	4	10	17
Myopia	5	20	29	7	20	26
Optic Atrophy	2	7	13	2	10	8
Nystagmus	5	20	29	12	40	34
Diseases of Retina & Choroid	0	0	0	1	0	8
Retrolental Fibroplasia	2	13	0	1	5	0
Coloboma & Developmental Defects	3	20	0	2	10	0
Buphthalmos & Glaucoma	0	0	0	2	5	7
	22	100%	100%	31	100%	100%
Number of Individuals		11			18	

Table 3.4. Frequency of Occurrence of Ophthalmic Condition. Respondents and Non-Respondents. Proportions (percent) Employed and Unemployed.

No statistical analysis of differences in ophthalmic conditions between respondents and non-respondents could be carried out due to the small number of individuals in each group and the relatively large number of conditions present.

The only clear difference indicated was a higher incidence of Nystagmus amongst non-respondents, the majority of whom were in employment. Amongst respondents, the majority of individuals with nystagmus were unemployed. It was also indicated that amongst non-respondents there was a slightly lower incidence of Cataract and Optic Atrophy, and a higher incidence of Myopia than was the case amongst respondents.

Table 3.5 gives the visual acuity of respondents and non-respondents.

Analysis using the Fisher Exact Probability Test (S. Siegel 1956) indicated that there was no significant difference between the two groups in the distribution of visual acuity ($p > 0.05$).

It was, however, indicated that amongst non-respondents there was a slightly greater proportion of individuals with visual acuity of $\frac{6}{36}$ or better, than was the case amongst respondents.

Respondents (R)			Non-Respondents (NR)	
Employed	Unemployed		Employed	Unemployed
4	0	$\frac{6}{18}$ or better	4	1
0	0	$\frac{6}{24} < \frac{6}{36}$	3	1
0	0	$\frac{6}{36} < \frac{6}{60}$	2	1
3	3	$\frac{6}{60} < \frac{3}{60}$	3	1
1	0	$\frac{3}{60}$ and worse	2	0

Table 3.5. Visual Acuity, Employed and Unemployed Respondents and Non-Respondents. (Number of Individuals).

The data also indicated (Table 3.6) that amongst employed individuals there was a greater proportion of non-respondents with a visual acuity of $\frac{6}{36}$ or better; and that amongst unemployed individuals there was a greater proportion of respondents with a visual acuity worse that $\frac{6}{36}$. Analysis using the Fisher test showed that that the differences were not significant.

Employed			Unemployed	
R	NR		R	NR
4	9	$\frac{6}{36}$ or better	0	3
4	5	Worse than $\frac{6}{36}$	3	1
Fisher Test	P=0.28		P= 0.11	

Table 3.6. Visual Acuity. Employed and Unemployed Respondents and Non-respondents. (Numbers of Individuals).

Although no significant differences were indicated, the results suggested that the sample of respondents was biased slightly as a result of containing a greater proportion of unemployed individuals with acuity of less than $\frac{6}{36}$, than was the case in the total population.

3.4.(4) Academic Qualifications and Intelligence

Where Intelligence Quotients (IQ) were available, the scores were utilised to calculate the average IQ of both employed and unemployed respondents, and compared to those of non-respondents (Table 3.7)

	Respondents		Non-Respondents	
	Employed	Unemployed	Employed	Unemployed
Average IQ	92	92	104	82

Table 3.7. IQ of Respondents and Non-Respondents, Employed and Unemployed

The data was extremely suspect as four different tests had been used, Stanford Binet, Terman Merrill, Wechsler and Williams. The results, although compared directly, could therefore be used only to give an indication of possible trends.

If the data were to be considered reliable, the results indicate that respondents were generally of average intelligence, Mean IQ 92, with no difference between the employed and the unemployed individuals; but that the employed non-respondents were above average intelligence, Mean IQ 104, and unemployed non-respondents below average intelligence, Mean IQ 82.

A more reliable criterion was the record of academic qualifications, that is, 'O' levels, 'A' levels or similar qualifications. Analysis using the Fisher Exact Probability test showed no difference in academic attainment between respondents and non-respondents. (Table 3.8). It was, however, indicated that a greater proportion of non-respondents had no qualifications than was the case for respondents

Academic Qualification	Respondents	Non-Respondents
Any qualification	3	5
No qualification	8	13
Fisher Test $p = 0.15$		

Table 3.8. Academic Qualifications Respondents and Non-Respondents (Number of Individuals).

The sample of respondents was thus considered as reasonably representative of all school leavers with the possible exception of the gifted and employed, and the dull and unemployed.

Chapter 4.

The Factors Investigated.

4.1. Criteria, Methods, and Procedures.

A detailed Ophthalmic examination of all respondents was carried out for the purpose of identifying specific ophthalmic factors that might be related to employment success. Different techniques of measurement were compared and the feasibility of utilising such techniques in a major study was assessed.

The criteria of employment success, used in the preliminary investigation, were based on an assessment of the employment record of the individual and on consideration of the likely long term prospects. Those who had spent the majority of their time since leaving school in full time employment were considered successful. Those who had spent the majority of their time unemployed, had had a very large number of jobs, or had manifestly poor long term prospects in their present employment, were considered unsuccessful. In this way the sample was split into two different groups, the one group having had no real difficulty in obtaining or carrying out employment reasonably commensurate with their abilities and with reasonable and adequate prospects, the other group having had such difficulty.

The analysis of the measurements obtained and factors investigated was made extremely difficult due to the small sample and large number of variables involved. Statistical analysis was in some cases either impossible or inappropriate due to the inadequate number of individuals examined. In such cases, in order to avoid repetition, the reasons for which it was not possible to carry out statistical analysis have been omitted. Where such analysis was possible the test used and result obtained are detailed in the text.

The methods and techniques utilised in obtaining measurements of the various factors are fully discussed in the appropriate sub-section.

4.2. Ophthalmic Condition.

The data on ophthalmic condition were obtained from the diagnosis made by a consultant ophthalmologist, as detailed in the school ophthalmic records, and corroborated by the investigator.

	Successful		Unsuccessful
1.	Coloboma of Iris and Choroid, Microphthalmos and Strabismus	1.	Congenital Bilateral Cataract.
2.	Aniridia and Bilateral Cataract	2.	Retrolental Fibroplasia, High Myopia and Nystagmus
3.	Aniridia, Bilateral Cataract and Nystagmus	3.	Congenital Nystagmus, High Myopia, Retinal Atrophy.
4.	Retrolental Fibroplasia and Myopia.	4.	Optic Atrophy, High Myopia and Nystagmus.
5.	Congenital Bilateral Cataract and Strabismus	5.	Optic Atrophy and Nystagmus.
		6.	Congenital Bilateral Cataract and Nystagmus.

Table 4.1. Ophthalmic Condition, Successful and Unsuccessful Subjects.

Table 4.1 gives the conditions present in successful and unsuccessful individuals, and demonstrates a major problem that arises when trying to classify and analyse such data. As many individuals present more than one causative or possibly causative condition, and as a large number of different conditions are involved, meaningful investigation of possible relationships cannot be carried out without a very large sample of individuals.

Furthermore there is often doubt as to which may be the primary causative condition. This has led to different investigators ,such as Kerby (1952), Sorsby (1961) and Fine (1968) all using different classifications.

The classification used in Table 4.2 is similar to that used by Fine (1968), and gives the frequency with which specific conditions were present in each of the two groups of subjects. There was, on average, 2.3 different conditions present in each subject.

	Frequency of Occurrence of Ophthalmic Condition.	
	Successful	Unsuccessful
Cataract	3	2
Myopia	1	3
Optic Atrophy	0	3
Nystagmus	1	5
Retrolental Fibroplasia	1	1
Coloboma, Aniridia, Microphthalmos	3	0

Table 4.2. Frequency of Ophthalmic Condition, Successful and Unsuccessful Subjects.

The data obtained were insufficient for statistical determination of the extent of any association that might exist between specific ophthalmic conditions and

employment success or failure.

It was, however, indicated that in the sample under study, High Myopia, Optic Atrophy and Nystagmus were all associated with employment failure.

The results obtained further emphasised the fact that a very large number of subjects would be required if statistical investigation of possible relationships between ophthalmic condition, or groups of conditions, and employment outcome was to be undertaken in a major study.

4.3. Aetiology and Sequelae.

Aetiology can have many possible classifications. Fine 1962, used seven categories: Heredity, Pre-maturity, Maternal Infection, Post-natal infection, Intra-cranial lesion, Trauma and Unknown. The two major groups in her study of partially sighted school children were in the categories 'unknown', 45.6%, and 'heredity' 34.4%. These also were the two principal categories obtained in the sample.

Table 4.3. gives the aetiology for individuals in the two groups. No meaningful comparison could be made.

Aetiology	Successful	Unsuccessful
Heredity	3	1
Unknown	1	3
Prematurity	1	1
Maternal Infection	0	1

Table 4.3. Aetiology, Successful and Unsuccessful Subjects. (Number of Individuals).

The validity of attempting to relate the aetiology of a particular condition to subsequent employment success or failure, is, however, questionable. A specific ophthalmic condition arising from an intra-cranial lesion may well be associated with employment failure

as a result perhaps of neurological damage and impaired intellectual function, but in general the consequences of the condition rather than a specific aetiology are more likely to be the factors which affect employment success. Not withstanding the fact that the investigation of aetiology determined the most important association between Retrolental Fibroplasia and the maladministration of oxygen to premature infants, it was decided that aetiology would not be recorded in the major study.

Sequelae, such as sympathetic ophthalmia, enucleation and aphakia, are similar to aetiology in that direct correlates themselves are spurious. It is more likely that the consequences of such sequelae, for example in the trauma of readjustment to a different visual situation, or the uncertainty of outcome are the more relevant factors.

Information on hospitalisation was available for the small sample but was not recorded as the likely effects of the resultant interruption to progress in education and employment were not fully appreciated at that time. It was further apparent that to obtain accurate data on this aspect for a large number of individuals would be extremely difficult and outside the scope of the investigation. Sequelae were not, therefore, considered in the major investigation. It is to be hoped that such studies will subsequently be undertaken.

4.4. Prognosis.

Prognosis, the expected course of a condition, was recorded for the purpose of examining if any association might exist between subsequent employment outcome and ophthalmic conditions which were originally diagnosed as ' stable' or'uncertain'.

Prediction of the course of a particular condition is extremely difficult at the best of times but it is possible to state with reasonable certainty those conditions which are inherently stable and unlikely to change without some form of external interference.

Sub-classification into categories defining the rate or speed of the degeneration, is of importance when considering possible areas of employment or suitable education and training. Individuals whose vision is likely to deteriorate to a level whereby they would be effectively blind, must be recognised and suitable training started at as early a stage as possible. Such identification is already carried out by ophthalmologists. Where possible, re-training is provided and new employment suitable for a blind person is found for such individuals. Individuals whose vision is deteriorating but who are not likely to become'blind' are those, however, not catered for within the current provisions and with whom the investigation is concerned.

The classification of Prognosis utilised, was 'stable', 'slowly degenerative' and 'rapidly degenerative'. As subjects could not be placed with any certainty in the categories defining the rate of change in the condition, these last two categories were combined.

Table 4.4 gives the final classification utilised and the frequency with which each category occurred for successful and unsuccessful leavers.

	Successful	Unsuccessful
Stable	3	4
Uncertain	2	2
Fisher Test	$p > 0.05$	

Table 4.4. Prognosis Successful and Unsuccessful Subjects (Number of Subjects).

Analysis using the Fisher Exact Probability Test (S.Siegel 1956) indicated that there was no significant difference in employment outcome between individuals whose ophthalmic condition had been considered at the time of leaving school as 'stable' and those whose condition it had been considered might deteriorate.

Further investigation of the data showed, however, that of the 4 subjects whose condition had been considered

as 'uncertain' at the time of leaving school, the vision of only 1 subject had in fact deteriorated in the period between leaving school and taking part in the investigation. That subject had also been unsuccessful in employment. Of the 7 subjects whose condition had been considered 'stable', it was found that in two cases the vision had deteriorated. Both these subjects had, however, been successful in employment.

The results indicated, not unexpectedly, that there was a large element of uncertainty in predictions of the expected course of conditions.

It was considered, therefore, that if investigation in a major study was to be undertaken of the relationship between employment outcome and the course of a condition, information on the course would have to be obtained by means other than the use of the original prognosis. Alternatively, if this was not possible, and the expected course of the condition was the only information available, the results obtained would have to be considered taking into account the likely inaccuracy of prognostication.

4.5. Additional Handicap.

Of the group of 11 leavers examined, 9 individuals did not have any additional form of handicap. The remaining 2 had very mild defective hearing in addition to their visual handicap. Neither of these individuals had found any difficulty as a result of their additional handicap. In both cases, the hearing condition was such that it could not really be considered as an additional handicap.

The possible consequences of additional handicap could not therefore be examined in the preliminary investigation. It was felt, however, that the presence of an additional handicap must be of some relevance in the employment of such partially sighted school leavers. Partial sight alone gives rise to problems and an additional handicap can only add to these difficulties.

Fine (1962), in a study of 1,374 children attending special schools for the partially sighted, found that 41% of the population had an additional handicap. In view of the number of individuals likely to be affected and the probable importance of an additional handicap, it was felt that particular attention should be directed in the main study toward individuals who suffered such difficulty.

4.6. Visual Acuity.

The original postulate that gave rise to the investigation was that the employment success of partially sighted leavers appeared to be unrelated to their visual acuity. It was further suggested by educationalists and ophthalmologists that those individuals with very low vision who coped quite successfully with various and demanding forms of employment, were exercising some kind of visual ability.

That some partially sighted individuals were better able to make effective use of their residual vision than others with a similar level of resolution was, however, only a general and untested observation. Nevertheless, it was felt that the apparent lack of relationship between employment success and visual acuity might have arisen for several reasons.

It was considered that there might be errors inherent in the measures of visual acuity, or that the measures obtained might have been misinterpreted. Alternatively, it was considered that all the varied factors involved in employment success, such as intelligence, and ability to get on with others, flexibility, social and emotional maturity, and other such factors, together, might be of greater relevance to employment than visual acuity, and obscure any individual relationship that might exist between visual acuity and employment success.

To test whether there might be a relationship between visual acuity and employment success, and to investigate possible reasons, the visual acuity of successful and unsuccessful leavers was measured. Three different types of visual acuity test were used; a Snellen Single letter, a Snellen line of letters, and a Landolt C Chart.

4.6.(1). Single Letter Acuity. Snellen Letter.

Table 4.5 gives the corrected and uncorrected acuity in minutes of arc, of Successful and Unsuccessful individuals. The target was a single Snellen letter.

Successful.			Unsuccessful.		
	Corrected Acuity	Uncorrected Acuity		Corrected Acuity	Uncorrected Acuity
1.	2'	36'	6.	4'	3'
2.	20'	20'	7.	12'	36'
3.	8'	8'	8.	4'	16'
4.	3'	10'	9.	6'	24'
5.	1.5'	60'	10.	3'	3'
			11.	4'	10'

Table 4.5. Visual Acuity (Minutes of Arc) Corrected and Uncorrected Snellen Single Letter. Successful and Unsuccessful Subjects.

Analysis using the Mann-Whitney 'U' Test (S.Siegel, 1956). showed that there was no significant difference in Corrected Visual Acuity between leavers who had been successful in employment and those who had been unsuccessful ($0.331 > p > 0.268$), nor was there any difference between successful and unsuccessful leavers in their level of Uncorrected Visual Acuity ($p = 0.214$).

Although the results indicated that there was indeed no significant association between visual acuity and employment success, as the observation of teachers, careers officers, and ophthalmologists had suggested, it was indicated that a slightly greater proportion of those unsuccessful in employment had poorer visual acuity than was the case for those successful in employment.

4.6.(2). Line Acuity. Snellen Letters.

The distance visual acuity for a line of Snellen letters was also recorded in order to investigate possible differences in measurement arising as a result of the type of test used. Visual acuity in normally sighted individuals has been shown to be superior for a single letter compared to acuity for a line of letters. (Stuart and Burian 1962). The reduction in acuity for a line of letters as compared to a single letter, the crowding phenomenon, has also been found to vary as a function of visual acuity, but does not appear to be associated with or peculiar to any specific cause of reduced vision. (Flom et al., 1963).

Table 4.6 gives the line acuity obtained for successful and unsuccessful leavers. Analysis using the Wilcoxon Matched Pairs Signed Rank Test (S.Siegel, 1956) showed that for the entire sample there was a significant difference between Single Letter and Line Acuity. Single letter acuity was significantly better than line acuity. ($p < 0.001$).

Further analysis using the Mann-Whitney 'U' Test showed no significant difference in line acuity between successful and unsuccessful leavers ($p = 0.268$).

The results did indicate, however, that successful leavers had on average slightly better acuity for a line of letters than unsuccessful individuals, whereas for single letter acuity the converse was the case. This would seem to suggest that successful individuals are less affected by the crowding phenomenon than unsuccessful individuals.

	Successful		Unsuccessful
1.	6'	6.	4'
2.	20'	7.	18'
3.	12'	8.	9.5'
4.	4'	9.	6'
5.	2'	10.	5'
		11.	18'

Table 4.6. Line Acuity (Minutes of arc), Successful and Unsuccessful Subjects.

For all subjects the average difference between letter and line acuity was 3.9' minutes of arc, with a standard deviation of $\pm$ 4.67 minutes of arc. Thus an individual measured as having a visual acuity of $\frac{6}{60}$ on a line chart may well have exactly the same resolution as an individual measured as having a visual acuity of $\frac{6}{36}$ on a single letter chart.

The results were obtained using only a very small number of partially sighted subjects, and cannot therefore be considered to be truly representative of those which might be obtained for all partially sighted individuals. They do indicate, however, that visual acuity measures are dependent on the type of chart used and that comparison of the visual acuity of individuals cannot be made without reference to,or taking into account the type of chart from which the measures were obtained. Although the results of the preliminary investigation of the relationship between employment success and visual acuity had indicated that there was no significant association, thus supporting the observations which had been made by careers officers and teachers, the visual acuity measures obtained for different charts suggest that a contributory reason for their observation might have been that the measures of acuity upon which the observation had been based were in fact unsuitable for comparison.

4.6.(3). Resolution Acuity. Landolt C Chart.

Both single letter and line acuity are, in a strict sense, recognition tasks and do not solely measure resolution. To examine the possible differences between these two tasks, Resolution Acuity was measured using single presentation Landolt C charts. The Landolt C chart was presented at 25 cms. as this was the only type available. The distance recognition acuity to a single letter was used for comparison.

Table 4.7 gives the resolution and recognition acuities for the whole group. Analysis using the Wilcoxon Matched Pairs Signed-Ranks Test showed that Recognition is significantly better than Resolution ($P = 0.05$). The average difference was as much as a factor of 2 times; a result which is remarkably high. It is possible that part of the difference was due to one measure having been recorded at distance, 3 to 6 metres and the other at 'near', 25 cms. Very small changes in chart position at 'near' can produce large variations in results. Many individuals when presented with a near test chart lean forward to increase their perception; to counteract this the investigator drew away the near chart in order to try and maintain a constant distance. This may well have resulted in the chart having been drawn too far back, thus obtaining an artificially reduced measure for resolution acuity. The results show, however, that

in the majority of cases there is a consistent difference between recognition and resolution Acuity and by similar factors of magnitude.

The validity of the results was therefore accepted, but with doubt as to the real magnitude of the difference.

	Successful			Unsuccessful	
	Recognition	Resolution		Recognition	Resolution
1.	2'	5'	6.	4'	14'
2.	20'	44'	7.	12'	9'
3.	8'	6'	8.	4'	7'
4.	3'	4'	9.	6'	14'
5.	1.5'	2'	10.	3'	7'
			11.	4'	6'

Table 4.7. Resolution and Recognition Acuity (Minutes of Arc). Successful and Unsuccessful Subjects.

Further analysis of the results obtained for Resolution Acuity, using the Mann-Whitney 'U' Test, showed that there was no significant difference in resolution acuity between individuals successful in employment and those unsuccessful in employment ($0.08 > p > 0.06$). The results did, however, indicate that a greater proportion of successful subjects had a better resolution acuity than was the case for unsuccessful subjects.

4.6.(4). Further Sources of Variance in Visual Acuity Measures.

The results of the investigation of visual acuity measures showed that wide variation in measures could arise as a function of the type of test used to obtain the measure. Additional sources of discrepancy can be the different conditions, internal and external, under which the test is carried out.

External conditions such as the general room illumination and the illumination of the test chart should be constant, but this is not always the case in different consulting rooms and with different examiners. Furthermore, there can be little control over conditions internal to the subject, such as fatigue and attention.

To investigate the extent of variance in measures which might arise as a result of differing conditions, and to obtain an indication of the accuracy of those noted in the ophthalmic records, the visual acuity measures obtained by the investigator were compared to those contained in the school ophthalmic records, the latter measures having been obtained by several different examiners.

Table 4.8 gives the measures obtained from the records and those obtained by the investigator.

Analysis using the Wilcoxon Matched Pairs Signed Ranks Test showed that the measures obtained from the school ophthalmic records were significantly poorer than the measures obtained by the investigator ($0.025 > p > 0.01$). The average difference was 3 minutes of arc with a standard deviation of $\pm$ 2.72 minutes of arc.

	Visual Acuity, Single Letter				Visual Acuity (Chart Unknown)			
	Investigator				Ophthalmic Record			
1.	2'	6.	4'		1.	2'	6.	2'
2.	20'	7.	12'		2.	20'	7.	10'
3.	8'	8.	4'		3.	10'	8.	10'
4.	3'	9.	6'		4.	2'	9.	10'
5.	1.5'	10.	3'		5.	3'	10.	10'
		11.	4'				11.	12'

Table 4.8. Visual Acuity (Minutes of Arc) as measured by Investigator and Ophthalmic Record Measures.

As the measures contained in the ophthalmic records had been obtained a period of years prior to those obtained by the investigator it might be expected that the difference between measures might be distributed randomly; some subjects showing a slight improvement, others a slight reduction. The results showed, however,

that in a significant majority of cases, the visual acuity recorded by the investigator was better than that recorded in the ophthalmic records. This suggests that the difference in measures was not as a result of vision changes over a period of time but as a result of the difference between the examiners and the method by which the measures were obtained.

Ideally, to assess the true extent of differences in measures arising as a result of differences in the conditions or methods, repeated measures should have been undertaken by several different examiners, using different charts and under strictly controlled circumstances. It was felt, however, that such a strictly controlled investigation was inappropriate in a preliminary investigation, the results of which were for use only to indicate possible sources of error in the measurement of visual acuity of partially sighted subjects. The aim of the preliminary investigation was furthermore to examine whether aspects which might affect the vocational assessment of partially sighted school leavers warranted further investigation.

Although the results obtained were questionable, in that the sample was small and the methods of investigation were inadequate, they indicated that measures

of the visual acuity of partially sighted individuals could vary markedly as a result of the conditions under which the measurement was obtained, and as a result of the type of chart used. It was indicated, furthermore, that the average variance could be as much as 3 minutes of arc. It was considered, therefore, that the observation that there was an apparent lack of association between visual acuity and employment success, could have arisen as a result of the measures of visual acuity upon which the observation had been based, having been imprecise. Individuals who were thought to have had similar visual acuity might in reality have had markedly different resolution.

It is clear from even this small sample of results that for the proposed revised form of certification (Committee of Enquiry 1968 Para.3.12.) some recommendation needs to be included as to the conditions, method and type of chart used to record the visual acuity of school leavers. The single stimulus resolution charts offer the most simple and precise technique, but do not take into account the influence of interpretation, as do single letter charts, nor the effect of 'crowding', as do the line charts. For the purpose of recording visual acuity for use also as a simple indication of visual 'capability', a line of letters would probably provide a more relevant form of measurement.

4.7. Visual Field

4.7.(1). Direct measures of the extent of the Visual Field.

The extent of the binocular visual field was recorded using the Aimark Projection Perimeter and the central visual field investigated using the Bausch and Lamb Autoplot.

The full extent of the binocular field was investigated for the purpose of determining any difference that might exist between successful and unsuccessful leavers. Eight quadrants were examined using $\frac{3}{330}$ mm. and $\frac{5}{330}$ mm. white targets; corresponding to an angular substance of 31.08' and 51.60' minutes of arc respectively. All the subjects responded to the 3 mm. target and consequently only these results, in the four major quadrants - Superior, Inferior, Right and Left, were used for the analysis.

Table 4.9 gives the results for the two groups.

Successful				
	Sup.	Inf.	Rt.Quad.	Lt. Quad.
1.	15	70	75	65
2.	40	65	60	70
3.	30	50	70	65
4.	55	70	90	55
5.	50	45	70	65

Table 4.9 continued over....

Unsuccessful	Sup.	Inf.	Rt. Quad.	Lt. Quad.
6.	40	60	80	85
7.	45	60	75	50
8.	15	50	80	45
9.	35	55	60	60
10.	40	60	75	80
11.	50	60	60	65

Table 4.9. Extent of Visual Field (Degrees), 4 Quadrants, $\frac{3}{330}$ mm. White target.

The investigation of the extent of the visual field is a procedure which requires subjective response from the patient as to when he can see, or cannot see, a target. Recording the position of the target, and thus delineating the extent of edge of the field, requires a clinical decision on the part of the examiner. Accuracy in measurement is very much dependent on steady fixation by the subject.

The accuracy of the measures obtained for the visual fields of the partially-sighted individuals examined, some of whom had extensive nystagmus was therefore extremely low. The results would indeed have been inadequate as absolute descriptions of the extent of retinal sensitivity. The measures were, however, taken not for the purpose of clinical investigation, but to define the functional extent of the visual field.

The measures in effect recorded the position in the visual field, at which a partially sighted individual, when attempting to look straight ahead, responded to a 3 mm. white target. The measure, therefore, although recorded as interval data could be considered only as ordinal.

Analysis of the results obtained,was carried out using the Mann Whitney 'U' Test.

Hypotheses	Probability of observed results	Region of Rejection	Result
Sup. visual field is greater in successful than unsuccessful.	$0.456 > p > 0.396$	0.05	Not Sig.
Inf. " "	$0.331 > p > 0.268$	0.05	"
Rt.Extent " "	$p = 0.456$	0.05	"
Lt. Extent " "	$0.465 > p > 0.396$	0.05	"

Table 4.10. Hypotheses, and Probability of Occurrence of Results Observed for Extent of Visual Field.

The hypothesis tested was that there was no difference in the extent of the Superior, Inferior, Right and Left Visual Field between successful and unsuccessful individuals. Table 4.10 gives the probabilities associated with the occurrence of the results obtained for successful and unsuccessful subjects. The results showed that there were no significant differences in the extent of visual field between successful and unsuccessful individuals. It was indicated, however, that with respect to the inferior portion of the field, which is the most

important for mobility, a greater proportion of successful individuals had a larger inferior field than was the case for unsuccessful individuals.

4.7.(2). Measures of Functional Value of the Visual Field.

A method for 'scoring' the visual field which provides a quantitative evaluation of the extent of the field, has been described by B. Esterman (1968). The method divides the visual field into 100 units of unequal size and distribution and is designed to reflect the functional value of the different parts of the field. The device thus yields quantitative and comparable scores of the functional visual field. The major criticism of the technique is that the estimates of 'functional value' of particular areas of the field are based on a clinical and untested assessment. The technique, furthermore, provides scores only of the uniocular field. Functional value of the visual field is dependent on the actual requirements of a particular task; of which there can be immense variation in the employment situation. Empirical validation of the accuracy of measures of the functional visual field in relation to the employment situation is thus required.

Such validation has not yet been undertaken. Determination of the effect of visual field loss on efficiency in employment would be of immense value in the assessment of employment potential of partially sighted individuals suffering from a field loss. Validation would, however, be extremely difficult. A large number

of subjects with various amounts of visual field loss would be required to undertake various tasks, efficiency in each of which was dependent on the effective use of different portions of the visual field. It was considered that extensive validation of current estimates of the functional visual field was outside the scope of the project. It was hoped that development of the test of visual ability would allow subsequent investigation of the effects of specific visual field loss, and would thus provide a more useful assessment of the employment aptitude of partially sighted persons.

In order, however, to examine if the Esterman Method of scoring visual fields might distinguish between successful and unsuccessful partially sighted individuals, scores for each subject were obtained from the Aimark Projection Perimeter field plots. As the plots were binocular fields, and the Estermann method is designed for use with each eye separately, modification to the method for obtaining scores was necessary. Scores were obtained by placing the temporal half of the Esterman Grid on each side of the binocular field plot. As the temporal portion accounts for 60% of the score in the uniocular field, the score for a full binocular field in which the nasal portions overlap, was equivalent to 120%. The scores obtained were expressed as a percentage of 120. It was felt that this modified method provided a more accurate

assessment of the binocular field than simply adding uniocular scores and dividing by two. In the latter technique an individual with a full visual field in one eye but totally blind in the other would achieve a score of only 50%. The uniocular individual has of course not lost 50% of the available visual field. Using the modified method the same individual would, however, achieve a score of 83.3% .

Table 4.11 gives the scores of Functional Visual Field of successful and unsuccessful individuals, obtained using the modified method. Only 10 of the 11 subjects were examined.

	Successful		Unsuccessful
1.	80	6.	88.5
2.	79.5	7.	84.
3.	82	8.	80.5
4.	86	9.	78.5
5.	80	10.	87.

Table 4.11. Modified Esterman Grid Scores of Functional Visual Field. (Percent) Successful and Unsuccessful Subjects.

Analysis using the Mann Whitney 'U' Test showed that there was no difference between the two groups in the extent of the visual field as scored by the Esterman Grid. ($p = 0.396$).

In the hope that a more adequate measurement than just the extent of the field might be obtained by weighting the Grid score with the inclusion of areas of reduced sensitivity within the field, the central visual fields were investigated. The Autoplot was used, and the fields, in each eye, investigated with white targets of $\frac{3}{1000}$mm.; $\frac{6}{1000}$mm.; and $\frac{12}{1000}$mm. in size; corresponding to an angular substance of 10.2', 20.4', and 40.8' minutes of arc respectively. Eight quadrants within the central 25^{o} of field were plotted, but again with very little accuracy, due principally to the unstable fixation of subjects. Some subjects were simply unable to see at all, the smaller targets. The attempt to incorporate these results was thus abandoned.

Subjects,did, however, demonstrate immense variablility in the size of the field sensitive to small targets, even when the likely error in measurement was taken into account. The extent of sensitivity to small targets in the para-macular area appeared to be independent of the Central Visual Acuity. For example, one subject with a central visual acuity of $\frac{6}{24}$, 4 mins. of arc, could not respond to a target smaller than 20' mins. of arc outside 12.5^{o} into the Temporal field, whilst another subject with a central acuity of $\frac{6}{72}$, 12' mins. of arc, could see such a target up to 25^{o} into the Temporal field.

This suggested that the gradient of sensitivity

across the retina might well be more relevant to the ability to make effective use of residual vision than the absolute extent of the field.

It was not possible to undertake detailed examination of the paramacular sensitivity of partially sighted subjects, as sufficiently sophisticated instruments were not available during the preliminary investigation which was carried out in the field. Such investigation is only feasible in the laboratory situation.

The measures obtained in the field using $\frac{6}{1000}$ mm and $\frac{12}{1000}$ mm. white targets, were used to give some indication of gradients of retinal sensitivity, but their validity is questionable due to inaccuracy of measurement.

The hypothesis examined was that the gradient of retinal sensitivity would be smaller for successful subjects than would be the case for unsuccessful subjects. Only the most reliable measures obtained from 3 subjects within each group were used for analysis. (Table 4.12).

Successful			Unsuccessful		
$\frac{6}{1000}$ mm.	$\frac{12}{1000}$ mm.	G	$\frac{6}{1000}$ mm.	$\frac{12}{1000}$ mm.	G
586	858	0.7	467	1000	0.46
364	810	0.45	141	228	0.62
1100	1100	1.0	296	674	0.44

Table 4.12. Visual Field (sq.cms.) at 1 meter for 6 mm. & 12 mm. targets (white) & Gradient. Successful & Unsuccessful Subjects.

Analysis using the Mann Whitney U Test showed no significant difference in gradient between successful and unsuccessful subjects ($p = 0.2$). It was, however, indicated that a greater proportion of successful subjects had a larger visual field of greater sensitivity than was the case for unsuccessful subjects.

Chapter 5.

Visual Ability.

5.1. Initial Considerations.

At the outset of this study, careers officers, teachers, and others concerned with the vocational guidance and placement of partially sighted school leavers had expressed the opinion that some partially sighted individuals were better able to make more effective use of their residual vision when carrying out visually demanding tasks, than other individuals with similar visual acuity. They further suggested that if it were possible to measure this visual ability, the measure might provide a useful and accurate tool for the assessment of employment potential. The overall aim of the project was, therefore, to examine the concept of visual ability, determine, if possible, the constituents and develop a measure.

In order to provide a basis for the development of a measure of visual ability it was the aim of the preliminary investigation to examine the validity and applicability of known techniques which have been proposed as measures of visual efficiency. It was intended also to examine and assess applicability of new techniques designed as possible measures of visual ability. These latter tests were for the purpose of providing direction for the development of a test of visual ability which could be used as a predictor of employment potential.

The new methods used were based on a simplistic evaluation of how to measure and what might constitute visual ability. The simplistic approach was dictated by the requirements of those individuals who were to administer, and evaluate the results of any such test.

From the point of view of teachers and careers officers any test is required to be relatively simple to operate, and the results simple to interpret. Furthermore, if the results are to be used as predictors of employment area or employment success then the test must relate to the working situation.

The simplistic approach was dictated even more so by the characteristics of the subjects to be tested. The population of young partially sighted school children and school leavers embraces a wide range of intelligence, aptitude and visual acuity. Any test must be applicable to such a group and, again, must be relatively quick and easy to understand and undertake.

It was considered that an every day task which satisfied most of these criteria and which might provide a measure of visual ability was that of reading. It is a task which is almost a basic requirement in every job; if not in the actual work situation then at least within the interview situation when the applicant is being assessed for an employment. It is a task which demands adequate resolution, involves recognition and perception, and is

affected by 'span' of resolution and stability of fixation, (Taylor 1957, Buswell 1937). Dependent on the material to be read it takes into account to a certain extent the element of intelligence. As some individuals do far more reading than others it does, however, suffer one disadvantage in that performance can vary dependent on familiarity. The reading task, furthermore, offered a means by which a quantitative measure, speed corrected by comprehension, could be obtained of information intake from a totally visual medium.

Reading does not, however, take into account those variables common to the work situation whereby decisions must be taken and based on visual information contained within dynamic representative displays. A partially sighted individual would not necessarily be unsuitable for a particular employment if he were unable to read instructions on the operation of a machine. He would, however, be unsuitable if he were unable to observe faults arising during operation or errors in output. In order to take into account this particular aspect a further visual ability task was devised in which subjects were required to observe and sort different sizes of freely moving solid objects.

5.2. Measures of Visual Efficiency.

5.2.(1). Snell and Sterling. 1925.

The measure of visual efficiency devised by Snell and Sterling in 1925 was based on earlier work by Snell, in which the efficiency of individuals with sub-normal visual acuity was evaluated in their work situation. Snell at that time stated that there was no loss of efficiency for individuals with acuity of better than $\frac{6}{12}$ and that the acuity beyond which one was totally incapacitated was $\frac{3}{60}$. Nevertheless, in the later paper, 100% efficiency was taken as equivalent to $\frac{6}{6}$ acuity. Furthermore, the relationship between efficiency and acuity was calculated by setting the logarithm of efficiency proportional to the visual angle resolved. That relationship is in fact the converse of the Weber-Fechner law where response, in this case efficiency, is more normally proportional to the log of the stimulus, in this case the visual angle of the object resolved.

Table 5.1 gives the visual efficiency of successful and unsuccessful individuals determined from the relationship between acuity and efficiency devised by Snell and Sterling (1925).

Successful		Unsuccessful	
1.	83.6	6.	58.5
2.	3.3	7.	14.0
3.	28.6	8.	58.5
4.	69.9	9.	40.9
5.	91.4	10.	69.9
		11.	58.5

Randomization Test. $t = 0.29$; $p > 0.1$

Table 5.1. Visual Efficiency Scores (Percent) Snell and Sterling (1925). Successful and Unsuccessful Subjects.

As the Snell Sterling Scale converts ordinal visual acuity measures into interval data, analysis could be carried out using the Randomization Test (S. Siegel 1956). Analysis showed, however, no significant difference in visual efficiency between successful and unsuccessful subjects. The result indicates therefore that in determination of the employment potential of partially sighted school leavers, no advantage is to be gained from use of the Snell Visual Efficiency Scale. The major factor which invalidates its use as a measure of visual ability is that it is constructed on the basic assumption that visual efficiency is totally dependent on, and bears a direct relationship to visual acuity. As has been indicated by the observation of teachers and careers officer, visual efficiency would seem to be independent of visual acuity.

It was also observed during the preliminary investigation that the majority of careers officers who had attempted to use the Snell Sterling Scale as a guide in the assessment of visual ability, had in fact used the scale incorrectly. As they were aware that the Visual Efficiency Scale expressed Snellen Visual acuity measures in terms of percent visual efficiency, they had been converting Snellen measures directly into percentages. For example, an individual with Snellen visual acuity of $\frac{6}{60}$ was calculated, on the direct basis, as having a Snell visual efficiency of 10%, or an individual with visual acuity of $\frac{6}{24}$ was calculated as having a visual efficiency of 25%. The Snell Sterling Scale is, of course, completely different; a visual acuity of $\frac{6}{60}$ in Snellen notation is 20% Visual Efficiency and $\frac{6}{24}$ is 58.5% visual efficiency. It was indicated by the comments of some of the individuals concerned that the misuse had arisen as a result of the similarity in the names of the scale and of visual acuity measures. The Snellen notation of visual acuity was thought to be the appropriate notation from which to calculate 'Snell' measures of visual efficiency. Even where this particular confusion had not misled those careers officers

who were more familiar with partially sighted clients, it was observed that in the majority of cases Visual Efficiency was not calculated on the basis of the Snell Sterling Scale. The most popular method appeared to be the conversion of the Snellen measure into 'minutes of arc' and expressing this measure again incorrectly in terms of percent visual efficiency. For example, $\frac{6}{36}$ was expressed as 6 minutes of arc visual angle, and was therefore (100-60) 40% visual efficiency. The more frequently occurring measures, $\frac{3}{60}$, $\frac{6}{60}$, $\frac{6}{24}$ and $\frac{6}{18}$ were considered to be 5%, 10%, 60% and 70% visual efficiency respectively. Although incorrect this calculation does approximate fairly closely to the measures developed by Snell and Sterling; $\frac{3}{60}$ Snellen is 3.3% Visual Efficiency, $\frac{6}{60}$ is 20%, $\frac{6}{36}$ is 40.9%, $\frac{6}{24}$ is 58.5% and $\frac{6}{18}$ is 69.9%.

The scale, however, would seem not to differentiate between partially sighted individuals who have been successful in employment and those who have been unsuccessful and as such provides no real guide to the aptitude of partially sighted individuals.

5.2.(2). L. Cebon (1967).

Another method of determining visual efficiency, in this case based on the relationship defined by the Weber-Fechner law was devised by L. Cebon in 1967. The method determines visual efficiency as a function of the logarithm of visual acuity. Visual Acuity of $\frac{6}{5}$ is taken as 100%

efficiency and $\frac{6}{60}$ as 15% efficiency. The efficiency levels are further modified by amounts proportional to the functional visual field loss as determined by the Esterman Grid. The technique goes on further to weight visual efficiency by amounts dependent on the adequacy of binocular vision, as measured by the extent of diplopia present or the degree of strabismus.

The method devised by Cebon was designed for assessing visual loss in individuals who had previously had normal sight. Although it defines the 'degree' of vision available to a partially sighted individual in terms of visual efficiency, all aspects of the method are not directly applicable with the congenitally partially sighted person. In particular, weighting the measure of visual efficiency by an amount proportional to the loss of binocular vision is not appropriate for an individual who has never had binocular vision. The method does, however, take into account the possible consequences for efficiency of degrees of loss of functional visual field. As it would seem reasonable to assume that the amount of visual field available to a partially sighted individual would affect employment aptitude, it was considered that this method, utilised without the weightings for binocular vision, might provide a useful assessment of the visual efficiency of partially sighted school leavers and young adults.

Table 5.2 gives the measures obtained for successful and unsuccessful individuals using the approximated method for determining visual efficiency based on the Cebon Visual Efficiency Scale.

Successful		Unsuccessful	
1.	66.9	6.	51.8
2.	2.6	7.	11.8
3.	23.5	8.	47.1
4.	60.1	9.	32.1
5.	73.1	10.	60.8
		11.	44.5

Randomization Test. $p > 0.1$

Table 5.2. Visual Efficiency Scores (Percent). Approximated method based on Cebon Visual Efficiency Scale (1967).

Analysis using the Randomisation Test showed no significant difference in scores of visual efficiency between successful and unsuccessful individuals.

As in the case with the Snell Scale of Visual efficiency, the measures of efficiency in the Cebon Method are derived principally from a direct transposition of measures of visual acuity. The result obtained was not therefore, unexpected. Weighting the measure of efficiency by an

amount proportional to the visual field loss is undoubtedly a valid procedure and would almost certainly improve the accuracy of any measure. It would not seem to be, however, in this case, sufficient to overcome the initial inaccuracy arising from the basic assumption that visual efficiency is directly related to visual acuity.

5.2.(3). Psychophysical Scaling.

The Psychophysical Scale of Visibility described by Hill (1968), departs from the older Fechnerian principles on which virtually all methods of assessing visual efficiency have been largely, if in some cases somewhat loosely, based. Psychophysical principles are those where direct magnitude estimations are made and numbers assigned, on the basis of a proportional system, to a series of discrete stimuli. The relationship determined by such psychophysical scaling is described mathematically by Stevens Power Law of sensory magnitudes. (Stevens S.S. 1959). Several different sensations have already been measured by this technique, such as loudness, vibration, electric shock, colour saturation, visual numerousness and apparent brightness. (Stevens 1956, 1959; Indow and Stevens 1966; Podgham and Saunders 1966).

Hill (1968) determined the relationship between the ease with which a City Scape was visible under different luminance conditions, for individuals with normal visual acuity. The estimate 'ease of seeing' was found to be related to the 'visibility', which could also be expressed as minimum discernable angle. By simple mathematical

transposition, and taking the base line of minimum discernable angle as one minute of arc, equal ratios of subjective visibility called Visual Utiles were shown to be related to changes in the minimum discernible visual angle subtended by an object, expressedd by the equation $U = \log (a^{1.45})$ where a = 1 min. of arc. Thus by substituting for 'a', 'Visibility' can be described in Utiles for any level of visual acuity.

Table 5.3 gives the Visibility in Utiles for successful and unsuccessful partially sighted individuals, calculated using the function $U = \log (a^{1.45})$ where 'a' was taken as the best visual acuity.

	Successful			Unsuccessful	
	Visual Acuity.	Visual Efficiency in Utiles.		Visual Acuity	Visual Efficiency in Utiles
1.	2'	0.44	6.	4'	0.87
2.	20'	1.89	7.	12'	1.56
3.	8'	1.31	8.	4'	0.87
4.	3'	0.69	9.	6'	1.13
5.	1.5'	0.26	10.	3'	0.69
			11.	4'	0.87

Randomization Test $p > 0.1$

Table 5.3. Visual Efficiency in Utiles (Hill, 1968) Successful and Unsuccessful Individuals.

Analysis using the Randomization Test showed no significant difference between the two groups. ($p > 0.1$).

The result was not unexpected as the measures obtained by the method are again not directly applicable to partially sighted individuals. As they are based on the responses of normally sighted individuals, the measures state only the efficiency that might be expected of a normally sighted individual whose acuity has been degraded to a specific level.

A more valid method which might be suitable for use with partially sighted individuals would be one developed from the responses of normally sighted individuals to a target in which visibility had been degraded by different degrees of image blur. Relating the results to the partially sighted would, however, be complicated by the effects of experience. The perception of a partially sighted individual who has a visual acuity of $\frac{6}{36}$ is, as a result of experience, almost certainly superior to that of a normally sighted individual 'blurred back' to $\frac{6}{36}$ acuity.

A psychophysical scale of visual efficiency constructed on the basis of responses obtained from a large number of partially sighted individuals would, however, determine the real relationship between visual efficiency and visual acuity.

Development of such a scale was not undertaken in the major study as it was felt that visual ability was dependent on the effective use of residual vision and that the level of acuity, as suggested by the results of the investigation of measures based on visual acuity, was of less importance to visual efficiency.

5.3. Preliminary Measures of Visual Ability.

5.3.(1). Reading Task.

The advantages of using a reading task as a visual ability test were manifold. Virtually every form of employment other than totally unskilled work requires some reading ability and it is not unusual for the reading requirements within the work to increase along with the responsibility. Even in employment that requires no reading it is not unusual for candidates for employment to be assessed in reading by the prospective employer. Unfortunately such tasks are often used as a quick intelligence measure and the partially sighted individual who has difficulty in reading in these circumstances is, not uncommonly, incorrectly assumed to be sub-normal in intelligence.

Reading, furthermore, is affected by 'span of attention' (Taylor, 1957). The more able reader can perceive and digest more words or groups of letters in one fixation than is the case for the less able reader. As already mentioned, it would appear from the results of the visual field investigation that the extent of the sensitivity of the paramacular area and surrounds can vary markedly between partially sighted individuals and independently of central visual acuity. Thus an individual who can easily resolve the smallest print, may be able to see at each fixation only one word or part of a word, whilst another individual with a poorer visual acuity may have a less clear but more

extensive image, allowing easier recognition of individual words or groups of words.

The speed and comprehension of reading is also affected by fixation. Unstable fixation can result in entire lines of print, groups of words or individual words being missed or misinterpreted and entail the reader in painstaking retracing. Where fixation is unstable reading is affected more so for the individual with a small field of vision than for an individual with a large field.

It had also been shown in previous investigations of the reading ability of partially sighted school children that neither reading speed nor comprehension is related to visual acuity (Birch et al. 1966).

Three reading tasks were therefore examined as possible tests of visual ability. As reading is affected by the size and type of print (Shaw 1970) three different types of print were used: Newsprint (N8), Bookprint (N10) and Large Bookprint (N14). Standardised tests of reading were not used as material was not available in the different print sizes. Standardised tests were not, however, necessary as comparison in terms of 'reading age' was not the aim. The aim was principally to determine if there was any difference in reading ability between individuals who were successful in employment and individuals who were unsuccessful.

The newspaper article was of 941 words in length and of print size N8 (1.4 mm.). Subjects were asked to read the article in their own time and informed that a few simple questions would be asked 'just to make sure they were not skipping bits'. The time taken was recorded and the reading speed calculated in 'words per minute' (W.P.M.). Six questions were asked in order to provide a score of reading speed corrected for comprehension (C.W.P.M.).

Table 5.4. gives the results obtained.

	Successful			Unsuccessful	
	W.P.M.	C.W.P.M.		W.P.M.	C.W.P.M.
1.	275	45.8	6.	263	157.8
2.	166	110.6	7.	145	96.6
3.	134	111.7	8.	182	151.7
4.	222	111	9.	105	84
5.	418	418	10.	174	174
			11.	99	99

Mann Whitney 'U' Test: W.P.M. $p = 0.123$

C.W.P.M. $p = 0.535$

Table 5.4. Reading Speed (Words per Minute), Reading Speed Corrected for Comprehension (Words per Minute). Newsprint (N8). Successful and Unsuccessful Subjects.

Analysis using the Mann Whitney 'U' test showed that there was no significant difference in either reading speed ($p = 0.123$) or reading speed corrected for comprehension ($p = 0.535$) between individuals who had been successful in employment and those who had been unsuccessful. The results indicated, however, that a greater proportion of individuals successful in employment had a faster reading speed than was the case for individuals unsuccessful in employment.

The bookprint material, size N10 (1.8 mm.) and large print material, size N14 (2.52 mm.) were read for a set period of 10 minutes each. Subjects were instructed that after the ten minutes had elapsed a few simple questions would again be asked. Comprehension was scored from the answers to questions on content. Questions were asked in relation to material contained within approximately every four hundred words of the passage.

The results obtained are given in Table 5.5.

Bookprint (N10)				Large Print (N14)			
Successful		Unsuccessful		Successful		Unsuccessful	
	WPM	CWPM	WPM	CWPM	WPM	CWPM	WPM	CWPM
1.	274	182	6. 273	227	1. 302	226	6. 249	199
2.	136	136	7. 146	98	2. 135	90	7. 119	59
3.	129	82	8. 160	160	3. 144	96	8. 112	56
4.	171	47	9. 114	114	4. 208	69	9. 65	65
5.	315	315	10. 197	197	5. 313	313	10. 216	216
			11. 50	16			11. 80	40

Table 5.5. Reading Speed (WPM) Corrected for Comprehension (CWPM). Large Print (N14) Bookprint (N10) Successful and Unsuccessful Subjects.

The results obtained showed that for large print (N14) successful individuals had a faster reading speed both uncorrected and corrected for comprehension, than unsuccessful individuals. Analysis using the Mann Whitney 'U' Test showed that the differences in reading speed between the two groups of subjects were for large print, only just less than significant at the 0.05 level (WPM $p = 0.06$; CWPM: $p = 0.06$). Analysis of the results obtained using book print (N10) showed no significant differences between the two groups (WPM: $p = 0.214$; CWPM: $p = 0.456$).

The difference, which was almost significant, observed between successful and unsuccessful subjects when reading large print, could have been as a result of the experimental procedure adopted. The tests were all administered at the same lengthy session, which lasted approximately three hours or more. The reading tests had been carried out toward the end of the experimental session and were administered in a set order. The newsprint was presented first, the bookprint second, and the large print was the last test in the series. Subjects were, therefore, quite fatigued by that stage. As the large print is equivalent to between $\frac{6}{36}$ and $\frac{6}{60}$ at a distance of 25 cms. from the emmetropic eye, the majority of subjects could resolve the print when held at a relatively comfortable distance. The results would seem, therefore, to suggest that the faster reading speeds, both corrected and uncorrected for comprehension, obtained for successful individuals when reading large print, reflects not a true difference in reading ability between the two groups, but a greater attention and concentration achieved by successful individuals than that achieved by unsuccessful individuals when fatigued and under stress.

5.3.(2). Dynamic Sorting Task.

The reading task covered many of the visual factors that were necessary for inclusion in an assessment of visual

ability. An unfamiliar task was required, however, whereby the previous experience of subjects would have less influence on the results and where the intelligence component might not be so prominent. In particular, movement of 3 dimensional objects was desired in order to provide more adequate simulation of the work situation. The task, as before, was required to demand attention, discrimination and decision, and to be affected by instability of fixation and 'span' of discrimination.

A task, involving sorting several different sizes of ball bearings into groups of equal size, was designed. The largest size ball bearing was $\frac{3}{4}$ inch in diameter, and the smallest $\frac{1}{8}$ inch. Eight groups containing bearings of equal size, in 2 groups of 5, 3 groups of 6, and 3 groups of 7, were used to give a total of 49 ball bearings presented in a moving display. Three different levels of size discrimination were required. Between each group from 1 to 4, there was a size difference of 12.5%, between groups 4 to 6 the size difference was 25%, and between groups 6 to 8 there was a size difference of 50%. It was not the intention at this stage to investigate differences in size discrimination, and a constant size difference would have been more appropriate. The bearings used were, however, the only ones available

at that time. Theoretically any size and shape of objects could have been utilised as the aim of the test was to determine the ability of the individual to find similar sizes of object in a complex dynamic display.

Subjects were required to pick out ball bearings of equal size from amongst the moving display of 49 bearings. The display was contained within a small tray 6 inches in length, 4 inches in width and 1 inch deep. The tray was mounted across a rounded block of wood, such that the slightest disturbance would tilt it and move all the ball bearings. The tray was tilted from side to side by the examiner, approximately every second, thus providing a simple moving display.

In order to remove the effect or contribution of kinaesthesis, subjects were not allowed to pick out the balls by hand but were required to touch with a pointer those of equal size. These were then removed by the examiner into one of eight individual trays. Subjects could then see both the moving display and the individual static trays when making further decisions. The task began with the removal of the largest group first, and subjects could view the display from whatever distance they desired.

Performance was scored by recording the time taken to complete the task; that is, the time taken to sort out

all the balls into eight groups of equal size. The score was 'corrected' by the number of errors made. The correction factor was purely arbitrary in that the time taken was increased by 10% for every group in which all the bearings were not all of the correct size. For example, if one group contained one ball of the wrong size, the error was counted as 10%, if it contained two balls of the same but again wrong size the error was still only 10%, if, however, it contained two balls of different size, and both were incorrect the error was 20%.

Table 5.6. gives the total time in seconds (TT) taken by each subject, the error score in percent (ES) and the corrected time (CT).

	Successful				Unsuccessful		
S	TT	ES	CT	S	TT	ES	CT
1.	75	10	82.5	6.	130	40	182
2.	125	20	150	7.	135	0	135
3.	145	0	145	8.	105	20	126
4.	100	20	120	9.	145	20	174
5.	70	40	98	10.	545	30	708.5
				11.	160	10	176

Table 5.6. Dynamic Test Results. Successful and Unsuccessful Subjects. Total Time in Seconds (TT). Error Score in Percent (ES), Corrected Time (CT).

Analysis, using the Mann-Whitney U Test, showed that successful subjects took significantly less time to complete the task than unsuccessful subjects ($0.041 > p > 0.026$). There was no significant difference between the two groups in the number of errors made ($0.465 > p > 0.396$); and as a result, the corrected times of the successful subjects were also significantly faster than those of unsuccessful subjects ($p = 0.026$).

Although the sample was small, and the experimental conditions were not strictly controlled, the results clearly indicated that for partially sighted individuals who were successful in employment, speed of observation of stimuli within a complex, 3 dimensional dynamic display was significantly faster than that for individuals who had been unsuccessful in employment. Further analysis using the Spearman Rank Correlation Coefficient (S.Siegel 1956) showed that speed of observation was independent of visual acuity ($r_s = 0.45$; $p < 0.051$).

It was therefore considered that development of a test of visual ability, the measures of which would indicate aptitude for employment of partially sighted school leavers, might be usefully based on procedures which scored observation of stimuli in complex displays.

5.4. Visual Task Analysis.

A visual task analysis of the employment of subjects was undertaken in order to try and elicit those factors within the work situation which gave rise to difficulty, and in order to examine these factors in relation to the ophthalmic characteristics of the worker. Furthermore, it was wished to assess the feasibility of carrying out such an analysis on a wider scale.

The task analysis procedure was designed to be undertaken by observation of each individual in his or her own particular employment. It was the intention to examine the employment in its individual stages of operation. Within each stage the working distance and critical detail size were to be measured, the position of critical detail and movement recorded, and the use of special aids or origin of particular hazards noted. The speed of operation and dexterity required were each to be scored on a three point scale by both investigator and subject. The level of difficulty of the work was also to be scored on a five point scale by the subject, employer and investigator. Adequacy of lighting was to be scored on a three point scale, and the type noted. Colour vision requirements were to be assessed, and finally mobility requirements and possible general hazards determined.

Only six individuals in the sample were employed

and everyone agreed to co-operate in the task analysis. The jobs studied were: Waitress/Dishwasher, Market Gardener, Gardener, Shop Assistant, Machinist, Switchboard Telephonist.

It became apparent, however, after investigation of the employment of the subjects that the parameters under examination were not necessarily those which affected the successful execution of the employment. Much of the information recorded seemed to be of little use for defining parameters for construction of a job 'profile'.

The difficulties that gave rise to inefficiency or resulted in subjects making errors in their employment were so diverse that it appeared unlikely that assessment of the suitability of a particular individual for a particular employment could be realistically undertaken in such a manner.

Specific requirements of a particular employment such as colour vision, dexterity, and speed of operation, can indeed be determined and matched to equally precise measurements of the potential employee. Assessment of suitability for employment that has such precise requirements is not difficult. What was difficult, however, was to determine the limiting factors in those areas of employment in which the majority of individuals were employed and which had no such precise parameters.

Theoretically, the only information needed to determine whether or not a partially sighted individual is visually capable of carrying out a particular employment, is the size of the smallest critical detail within the task and the minimum resolution attainable by the individual. If the individual can resolve that minimum critical detail then he is visually capable of undertaking the work. The measurement of minimum critical detail size undertaken in the task analysis was an attempt to determine the minimum critical detail involved in each task. This attempt along with that of attempting to define the critical parameters of employment was abandoned when it became apparent that such determination was almost impossible because the minimum resolution required to carry out the work adequately was such an uncertain quantity. The problems that were encountered can best be illustrated by two examples.

The first concerns a young man of exceptional capability. He holds a Duke of Edinburgh Gold Award, is prominent as a youth leader, and has a visual acuity of only 3-60. His employment was then as a market gardener. If it had not been the case that his brother, also partially sighted, had once worked for the same employer, and that the employer had had the experience of having previously employed a partially sighted worker, he would have

undoubtedly lost his job as a result of a costly error.

Part of the young man's responsibility in the early days of his employment was to feed and look after poultry. These birds subsequently contracted a disease, manifested by small marking around the beak and head. The young partially sighted worker was unable to see these markings and having no reason to enter the enclosure and inspect the birds in such detail as would be necessary to resolve these markings, the disease went unnoticed by him until the employer himself became aware of it. All the birds eventually had to be destroyed. The employer retained his partially sighted employee only because he was prepared to accept that the young worker was not grossly negligent but was simply unable to observe at a glance that which would have been quite obvious to any individual with normal vision. A further factor that persuaded him to keep his employee was that it was quite feasible for the young man to continue to carry out his work equally as well as any other person, by introducing a simple modification well within his capabilities. In order not to make the same mistake again he could in future simply take a closer look at the poultry.

This may appear to be an extreme example of just how difficult it is to identify the critical visual requirements in a task. It is almost certainly the case that in the more controlled industrial environment the

parameters are more easily identified, but unexpected difficulties can still arise.

In the case of another individual who also experienced unusual problems in her employment the employer was again remarkably understanding and considerate. The subject concerned had been previously trained at an Industrial Rehabilitation Unit as a telephonist. She was, therefore, competent and skilled in her work. For many months, working mainly on night shifts, she had carried out her work quite satisfactorily, but with the advent of late Spring, and having gained sufficient experience to work on busy day shifts, her efficiency became far less than satisfactory. Her work was of an unusually responsible nature and very little inefficiency was acceptable, least of all to the girl concerned. The reason for the inefficiency was not at first explicable but became quite clear as the weather improved. It transpired that, as a result of the increase in sunlight in her work area, her perception of the illuminated indicators on the switchboard had become increasingly impaired. As a consequence she took longer to see which connection was requested and made errors in switching connections. Even with a venetian blind covering the windows and a buzzer to indicate that a

connection was required, her accuracy in locating the correct line was low.

The switchboard equipment at that time could not be moved and she subsequently returned to her night shift work. When under the now artificial illumination the contrast was sufficient for her to be quite as efficient as required. Her employers eventually installed a completely new system, with modifications designed to allow operation by blind individuals, and which she can operate quite satisfactorily in strong sunlight.

These types of problems observed at the work of these and other partially sighted young people who co-operated in the Visual Task analysis, served to indicate that the form of study required to examine and classify visual requirements of employment was a task outside the scope of the proposed major investigation.

There is, however, no reason why such an attempt may not be made in the future, by a larger group of workers, and on the basis of known Ergonomic principles.

Chapter 6.

Employment.

6.1. Aims and Procedure.

Throughout the preliminary investigation, considerable discussion took place with careers officers, heads of schools, teachers, employers and partially sighted young workers. The aim of these discussions was to obtain as great an understanding as possible of the problems that might arise when a young school leaver sought to enter employment.

To a large extent the discussions held with careers officers and teachers were unstructured, but essentially much the same questions were asked of all of them. The questions centred around the particular difficulties that they faced when attempting to assess the employment aptitude of partially sighted school leavers and young adults, and in providing vocational advice and guidance.

The discussions held with employers and school leavers were in the form of an informal structured interview. The major purpose was again to obtain information as an aid to understanding the problems that face the partially sighted school leaver. In addition, however, the information was required for tentative comparison of individuals in order to determine possible effects of different attitudes or approaches to

employment.

As a result of these discussions and interviews, specific aspects were identified as major sources of difficulty and provided direction for the major study. These aspects fall within three main areas, Choosing Employment, Obtaining Employment and Carrying Out Employment.

6.2. Choosing Employment.

Ten leavers were interviewed. The reasons given for choosing their first job, together with the different sources of their information and advice are shown in Table 6.1.

First Employment	Reason for Choosing	Source of Information.
Shelf filler in supermarket	No suitable job available taken as temporary position	Parents
Assistant Cook	Only job available	Careers Officer
Market Gardener	Only job available and brother had previously worked there.	Careers Officer
Waitress	Careers Officer suggested it.	Careers Officer
Junior Clerk	Parents suggested it.	Careers Officer
Shop Assistant	Didn't choose, wanted to be childrens nurse but had no qualifications. Present job the only one available.	Careers Officer
Baker	Always wanted to be a Baker	Don't know
Gardener	Nothing else available.	Parents
Machine Operator.	Had managed to get a place on training course	Blind Persons Resettlement Officer.
Secretary	Always wanted to be a Secretary.	Careers Officer

Table 6.1. Employment, reason for choosing and source of information on the first job obtained after leaving school.

The reasons given for choosing particular employment, revealed that many different factors and circumstances effectively dictated their choice.

Half the group had taken in effect what was the only job open to them at the time. One individual had entered the only training course on which he could obtain a place, and only two had obtained employment that they had really wanted. The remaining two, having had no idea as to the type of employment which they might have liked to enter, had taken the first employment offered.

The interviews plainly revealed that the majority of leavers had had very little idea of the area or type of employment that they might have liked to enter when they left school. Carter (1969) found a very similar situation amongst normally sighted school leavers. The partially sighted school leavers had, however, to rely very much on the advice of others who, although well informed about employment, had either little understanding of partial sight or were completely misinformed. Parents with more than one partially sighted child, one of whom had already left school, felt that with the benefit of their previous experience, they could help their younger children more adequately when they came to choose employment. Parents whose oldest or only partially child was about to leave school, in the main, did not know how, or felt unable to advise or help. They, like their children had to rely on the expertise of the school and careers officers.

The careers officers themselves, however, have their own difficulties. In areas other than where a particular

officer is assigned to deal with handicapped leavers, the partially sighted school leaver may be only one among many other leavers and the officer concerned may have little or no understanding of visual handicap. It was found that in these cases, and even where officers had experience, an assessment of employment aptitude had been obtained by using Visual Acuity as a rating scale of visual ability. As had been made clear from the results of the Preliminary Investigation, visual acuity does not provide an accurate method of assessing ability. It had, indeed, been noted by the more experienced careers officers that by whatever means visual acuity was converted to a score of visual efficiency, the measures obtained bore little relation to the success with which individuals could carry out employment. It was the opinion of the majority that they had no adequate means by which to assess the employment aptitude of partially sighted school leavers.

From the discussions held with the young workers it was apparent that, at the time of leaving school, many had had little idea of the type of work which they might have liked to enter or felt that they were capable of undertaking. The reasons for which these school leavers were unable to make any real assessment of their

own aptitude, or had no particular employment in mind, even after guidance and advice had been provided by the school and careers office, are explained to some extent by the results of investigations of the social and emotional adjustment of both partially sighted and normally sighted school leavers.

Bateman (1967), Van den Bergh (1964) and Lairy (1969) all found that partially sighted youngsters tended to be somewhat emotionally and intellectually retarded compared to normally sighted children of similar age. It is also known from studies by Carter (1962), that up to about the age of eleven normally sighted school children tend to fantasise about the work that they would like to enter. This suggests that the young partially sighted school pupil, at the age of fifteen when he is beginning to receive information and advice on employment, is still in the process of maturing and does not possess the sufficiently realistic attitude necessary to consider the advice and information received. Even where this may not be the case, all the young leavers have the immensely difficult task of assessing their own capabilities. This, according to Maizells, is 'inner directed choice', which is the principal factor in bringing about vocational

choice, and is dependent principally on the past experiences of the individual.

A popular statement amongst the thirteen to fifteen year olds with whom the author frequently spoke in the school was 'I would like to be ..... but I don't know if I can see well enough to do that'. Job choices ranged from wanting to be a racing driver - the boy in question insisted that he would consider nothing else until he had proven that he could not do it - to another who wanted to be permanently unemployed 'because it is the only thing I'm good at'.

That these factors are real sources of difficulty was borne out to a large extent by the comments of the leavers interviewed. The majority stated that it was not until some time after they had left school and had experience of work that they could begin to consider seriously the form of employment they felt they would like and, more importantly, thought that they would be able to carry out successfully.

6.3. Obtaining Employment.

Many of the more mature young workers who had had varied employment experience had decided upon particular work which they wanted to enter and were actively considering how they might obtain that work. A major obstacle was lack of qualifications, either academic qualifications or qualification by experience. Of the individuals who had had more than one employment, with the exception of one, all had attended some form of training establishment. The courses which had been attended ranged through work preparation at an Industrial Rehabilitation Unit, special training at a Government Training Centre, and Further Education at College. The average length of time spent on special courses was 15 months, and 5 of the 6 individuals had undertaken more than two different courses.

The importance of having proven ability to carry out the desired employment was emphasised by the comments of the employers. They considered that proven ability was the most important single factor in their decision whether or not to employ a partially sighted applicant. It was, in many cases, the only basis on which they could assess suitability. Employers who had never had the experience of a partially sighted person stated that their impression before they interviewed the applicant, was that partial sight was synonymous with mental retardation or

blindness. Some leavers said this was no doubt the impression left even after the interview, particularly where they had been asked to demonstrate reading or writing, the potential employer being somewhat taken aback by the postures adopted or the manner in which tasks were carried out.

Many leavers when applying for jobs deliberately did not state that they were partially sighted, or in cases where they were registered as handicapped did not tell the employer prior to the interview. In this way they could ensure that the potential employer did not have any preconceived misconceptions about their ability.

Registration as a handicapped person is a choice open to partially sighted persons. Special provisions for assessment of job capability, retraining and placement are available for individuals registered as handicapped. Furthermore, under the Disabled Persons Act (1970), at least three per cent of the labour force of any firm employing more than twenty people must be reserved for the registered disabled. This is in order to try to ensure that some employment is always available for handicapped individuals. The law, however, is not quite as powerful as it may seem, as an employer can refuse a

particular individual if he or she is considered to be a hazard to themselves or others.

The three individuals interviewed in the preliminary study who had registered as disabled and had undergone assessment for employment felt that they had received little benefit. On the whole, the employers stated that where an applicant was registered as disabled, it made little difference to their decision. The leavers, however, felt that a stigma was attached to the registration.

Employers further stated that where there was no evidence of ability to carry out the work, they had been willing to be guided by careers officers and indeed often relied totally on their advice, but that in the final analysis the decision whether or not to employ was purely a 'cost effective' consideration; that is, they would only take on a partially sighted individual if they thought the person would be at least as competent, if not more so, than any of the other applicants. When asked at a later stage, however, why they had decided to take on an inexperienced, unqualified partially sighted employee, the most frequent answer was 'To give them a chance'.

6.4. Carrying Out Employment.

It was found that several major difficulties could arise immediately after the partially sighted applicant became an employee. These difficulties were more severe for individuals who had just left school. In every case the young school leavers had undertaken their employment on a 'trial' basis. The employment was in effect guaranteed only for a few weeks to 'see how they got on', and if they were unable to carry out the work satisfactorily in that period they would be required to leave.

These are difficult enough circumstances for normally sighted school leavers. It is known from studies of normally sighted school leavers that the transition from school to work is one of the focal points in adolescence and is associated with uncertainty, anxiety and stress (Maizells, 1970). It can thus be appreciated just how much more difficult it is for the partially sighted school leaver. They have already had all the problems and difficulties of choosing, searching for and finally obtaining work, only now to find themselves in a most insecure and demanding situation, quite unlike that which they have ever previously experienced.

Of the 10 leavers interviewed in the preliminary investigation 2 had been required to leave at the end of

of their trial-period, and all commented on how difficult that initial period had been. The major problem, quite apart from the unfamiliarity of the situation and the greater physical demands and discipline, was that they all found that they took longer to learn how to carry out the work than was the case for normally sighted new employees. In some cases there were certain aspects of the work which they simply could not do without assistance or without devising means different from those used by normally sighted individuals. The difficulty was due to the fact that they could not pick up the same amount of information 'at a glance' as could the normally sighted worker. A careful search, involving many fixations, was required to locate and discriminate fine aspects of the task. It took a long period of time and practice to achieve sufficient familiarity with the work that conscious effort and concentration were not continuously required just to maintain even a basic standard.

The majority did not enter such demanding jobs when they first left school, and many employers were sympathetic and accepted the initial difficulties in learning the work. The leavers, however, said that the same difficulty arose in every subsequent job, other than where they had previous training or experience. Several had indeed been asked to leave fairly soon after starting work as a result of their

initial apparent incompetence. The employers interviewed also commented upon the length of time it had taken to train the new partially sighted employee and the development of modifications to their normal procedures which were often necessary.

In Wilkes' (1961) study of partially sighted school leavers there was evidence of severe depression in a number of individuals and of isolation in more than 20% of the group. Emotional distress arising from frustration and disappointment has far reaching effects, and was apparent in the preliminary investigation from the reasons given for leaving employment. Four individuals had left their first employment less than 6 months after starting. The reasons given were loneliness, not liking the work, or not getting on with the other staff. Only one left because he could not see well enough to do the work. In more detailed discussion, all ten leavers said they had experienced a great amount of difficulty in their relationships with the other staff; so much so that in three cases this had been the main reason for leaving subsequent jobs.

A.H. Van den Bergh (1964) has pointed out that there is a high incidence of social and emotional maladjustment

amongst the partially sighted and that this can manifest itself in one of two extreme reactions. The individual may either refuse to accept the idea of being handicapped or may lose all self-confidence and consider himself to be totally handicapped. Both these extremes were in evidence amongst the leavers interviewed, and had very much affected their employment success and prospects. One girl had refused to accept her handicap, and had insisted on attempting to undertake tasks which she could not see well enough to carry out. The mistakes which resulted and the poor relations that developed between her, her workmates and her employer led to her being asked to leave from five different jobs before eventually, with maturity and an understanding employer, she came to terms with her difficulties and achieved a secure job. Another individual who had attempted further education at college and had not completed the course stated that he had left because at the time he felt that the other students were 'not sufficiently serious' and 'kept interrupting' his work. Now somewhat older and more mature, he appreciates that in reality he had been unable to see well enough to continue the course without help, but through an inability to adjust to his handicap he had been unable to ask for or accept any

assistance. He had also at that time isolated himself because he felt 'different' and had not made any friends.

Loss of confidence was the more evident of the two consequences. The more extreme reactions had occurred for two individuals, who as a result of their state of mind had become virtually unemployable. Their experiences since leaving school had led them to resign themselves to a lifetime of unemployment, isolation and failure. Both expressed an apparent willingness to change their situation, but found many different excuses for not actually applying for any employment. The visual acuity of both these individuals places them very much on the borderline between normal and partial sight and it is interesting to note that Bateman (1963) has pointed out that just this borderline group has often the most difficulty in adjustment.

The final consequence of the difficulties experienced when leaving school and in the early years of work, appeared to be that for the older male there was immense unwillingness to risk changing jobs even if it was felt that their present work was well beneath their true capability. Security was the paramount requirement of any job, in the opinion of the two oldest males. For the

younger adults and females, employment satisfaction was expressed in the same terms as would be the case for any other young worker; satisfaction was achieved as a result of pleasure in doing the work well, enjoyable company and interesting events (Carter, 1969). There was, however, possibly more emphasis expressed by the partially sighted young workers than might be expected from the normally sighted worker on the value of the experience being gained. They were well satisfied with any employment, even if they could not get on with others or the pay was poor, if they felt that the experience which was being gained was a sound basis for entry to a more satisfactory employment in the future.

The interviews with the careers officers, employers, and the partially sighted school leavers and young workers indicated emphatically that the factors which affect employment choice, placement and success are complex, diverse and yet interrelated. Influence from the school and home environment, social pressures, maturity, adjustment and the attitudes of others all seem to have as much relevance to employment success as the limitations that might or might not result from low visual acuity. It was felt, therefore, that a major investigation of the visual

ability and employment of partially sighted school leavers could not be carried out without also examining the influence of these other relevant factors. It was initially intended also to examine in the major study if problems of adjustment might be alleviated by the introduction of a work experience programme for children in their final year of school. It was not possible, however, to carry out such an investigation due to legal restrictions on the employment of school children.

SECTION III

The Employment of Partially Sighted School Leavers and Young Adults.

Chapter 7.

Rationale, Methods and Procedures.

7.1. Rationale.

The information gained from the preliminary investigation and the relevant literature on partially sighted and normally sighted school leavers suggested that there were several major sources from which problems might arise when young leavers sought to obtain or entered their first employment. The nature of the guidance given or advice as to the demands likely to be met in employment, and the ability of young leavers to appreciate that advice and to assess their ability to meet those demands, could profoundly affect both the range of employment entered and the very manner in which employment is undertaken. Inappropriate placement could arise either as a result of erroneous information having been obtained from uninformed sources, or as a result of young leavers being unable to appreciate sound advice because of immaturity or inexperience. Furthermore, inappropriate

placement could lead to the formation of negative attitudes which could have a far reaching effect on the individual himself and his future employment. Difficulty in relationships with normally sighted individuals, frequent changes of employment and lengthy periods of unemployment appeared to be the major consequences.

Even when a young leaver was well prepared for the rigours of the 'real world', it would appear that the variation in ability to cope with the experiences likely to be faced in the first few years after school, together with the support and guidance given during that time could mean the difference between, on the one hand, a young leaver coming to believe that he was an inadequate outcast, and on the other hand his coming to know that he was, and was recognised as an integral, contributing member of society.

The information obtained from the preliminary investigation suggested that there were specific aspects which might affect the employment success of partially sighted school leavers and young adults. These aspects were:

1. The source and nature of information and advice on employment.
2. Methods of seeking or obtaining employment.
3. Unemployment.
4. Qualifications.

5. Area and types of employment entered.
6. Achievement in employment.
7. Visual, physical and mental demands of employment.
8. Expectations and attitudes of the partially sighted employee.
9. Attitudes and expectations of employers and other employees.
10. Relationships in employment.
11. Home and social environment.

As the preliminary investigation had suggested that the effects of these factors might be equally as important as the influence of visual ability, it was felt that development of a test of visual ability and investigation of the relationship between measures of visual ability and employment outcome could not be undertaken without taking into account the influence of these other factors. Furthermore, as there had been no previous investigation of the extent to which these other factors might affect the employment success of partially sighted school leavers and young adults, it was felt that investigation of their influence might provide information of great value to the individuals concerned with the vocational assessment, guidance, and placement of these young people.

The original aims of the project, which were to develop a test of visual ability and to determine the

relationship between the measures of visual ability and employment outcome, were therefore expanded to include investigation of the influence of the other factors which might affect employment. As it was necessary to obtain details of employment history and ophthalmic condition from a fairly large representative sample of partially sighted school leavers and young adults in order to examine the relationship between measures of visual ability and employment outcome, expansion of the project to include investigation of other relevant factors posed, it appeared then, only a few additional problems in data collection.

It was proposed, therefore, to obtain a representative sample of partially sighted school leavers and young adults, undertake further development of a test of visual ability, and examine the relationship between measures of visual ability and employment outcome. It was further proposed to obtain from the sample of partially sighted school leavers and young adults, a detailed account of their employment and experiences since leaving school, to examine the implications of the ophthalmic, social and psychological factors, which it had been suggested might affect their employment, and determine the consequences of those factors in relation to the first employment entered after school and in relation to subsequent employment success. It was hoped that the information obtained on the influence of

the factors which affect the employment of partially sighted school leavers and young adults, along with a test of visual ability the results of which would indicate employment aptitude, would provide real direction and valid tools so that in the future partially sighted school leavers and young adults might be better assessed, more successfully guided and more appropriately placed in employment commensurate with their abilities.

7.2. Methods and Procedures.

The information which was required in order to achieve the aims of the investigation was extensive and wide ranging. A major problem which faced the investigator at this stage was how the relevant information was to be obtained.

There were two principal sources from which data could be obtained; the partially sighted individual himself, and the records of employment history and ophthalmic condition maintained by the Careers Service. In many casesthe ophthalmic data was duplicated in hospital and school records. The records on employment history were, furthermore,rich in supplementary information of a nature that gave informal insight into the individual.

The preliminary investigation had indicated that access to documentary information would present little difficulty as the officers responsible for these records were deeply concerned with the employment of partially sighted school leavers, and were more than willing to provide and help in the collation of data.

It was proposed, therefore, to obtain data on ophthalmic condition from the documentary sources, as this would release the investigator from having to carry out lengthy examinations of individual school leavers.

It was initially proposed also to try and obtain from documentary sources information on aspects of educational achievement, home background and parental attitudes which, in the opinion of the teachers and careers officers who had dealt with the leaver, were relevant to the subsequent employment of the young person.

The data on ophthalmic condition were subsequently obtained from various sources with relatively little difficulty and without excessive delays. The sources of information were the schools, careers office and hospital records of respondents, and in a few cases from the records maintained by the respondent's own ophthalmic practitioner.

Data on aspects of the home background and parental attitudes, however, proved to be sensitive and difficult material to obtain. In the final event aspects of parental attitudes and the more informal observations of careers officers on relevant influences of the home and social environment had to be omitted (Ch. 7.3). The information on home background was obtained directly from the school leavers themselves, and that on educational achievement obtained from the school.

The information on the experiences of partially sighted young adults since they had left school, the details of their employment, difficulties encountered,

their attitudes and opinions, relationships and the circumstances of their home and educational background could only be obtained directly from the school leavers themselves.

For several reasons, a postal questionnaire was chosen as the best means of obtaining this information. The aspects to be examined were numerous, and in order to obtain a standard error of less than 2 percent and ensure the minimum likelihood of error in the analysis of information drawn from a population of approximately 2,500 individuals, an adequate sample size would have to consist of approximately 500 persons. (Moser and Kalton 1969). It was not considered feasible that even a small proportion of this number could be interviewed. Furthermore the population was widely scattered throughout the country and the experience gained in the preliminary investigation had shown that tracing subjects, arranging and travelling to interviews was immensely time consuming. Neither was it financially feasible to hire interviewers.

The advantages of the low cost and relatively high speed of postal questionnaires were not outweighed by their major disadvantage of low response rates, (Moser and Kalton, 1969), although there was also the peculiar difficulty of approaching a population of visually handicapped via an essentially visual medium. The

preliminary investigation, however, had shown that response from that sample population had been in excess of 30 percent. It was therefore, felt that response would be adequate as the investigation and questionnaire were immediately relevant to the individuals who were being asked to participate.

The questionnaire was initially constructed on the basis of the information that had been obtained from the preliminary investigation and was designed to elicit information on the factors which,it had been suggested, might affect employment. The print in the questionnaire was large type (N14) which was well within the visual capabilities of the majority of the population to whom it was sent. Simple straightforward questions were devised, and where possible were designed so that written answers were required in the minimum number of cases. The majority of questions could be answered by marking an appropriate box.

A pilot study was carried out with the assistance of the school leavers and young workers who had taken part in the preliminary investigation. Their answers to the questions, along with the information that had been provided by them during their interviews, allowed assessment of the accuracy and adequacy of the questionnaire. Modifications to question wording, layout,

and provisions for answers were carried out as indicated by the comments and criticism of the respondents. The major modification which was required was the reduction of the number of questions which asked for written answers. It was suggested by the respondents in the pilot study that too much writing would markedly affect the response rate, as for many writing was an arduous task. As a consequence, as many questions as possible were designed to be answered with a simple yes or no, or by ticking an appropriate box within a series of different alternatives. Little relevant information was lost by using this technique, but as the questionnaire was constructed using large print it did add considerably to its size and bulk. There was, however, no alternative. The questionnaire finally sent to the partially sighted school leavers and young workers was also printed on different coloured pages for the various different sections and was not unattractive in appearance.

7.3. Sample Construction and Data Collection.

A total of 21 schools for the partially sighted in England and Wales, and 2Scottish Schools were contacted. The aims and objectives of the investigation were explained in detail and the heads of schools asked if they would cooperate in the study by providing the names and addresses of all their school leavers during the period 1963 to 1971. Heads of schools were also asked if it would be possible to obtain from the school records details of the ophthalmic history and educational achievement of leavers.

Several heads of schools agreed immediately to assist and sent on all the details requested, and further offered to complete themselves, any forms for details of ophthalmic condition and education. Many, however, wished to have further discussion with the investigators before being prepared to release any information. As a consequence of these discussions, the majority of the heads of schools agreed to provide the names and addresses of leavers but with the proviso that permission to release names was granted by the Chief Education Officer of the local authority. Furthermore, many schools had not retained the ophthalmic records of leavers, having sent these to the careers services. Permission to obtain this information would therefore be required from the careers service. It was further suggested that as many of the leavers might still be current clients

of the careers services permission may well also be required from the appropriate authorities before leavers could be approached.

In the hope that it would not be necessary to request permission individually from every Chief Education Officer and every Principal Careers Officer of the numerous different authorities involved, the investigator inquired of the Central Youth Employment Executive if it might be possible for permission to be granted on their sole authority. The executive was, however, unable to help as it was customary only for research organisations which were supported by the Department of Employment to have access to records, and the release of information to other individuals was at the discretion of the local authority concerned.

In order to assess the reaction of the authorities to the requests for information, before having to embark on a major programme of visits and discussions throughout the country, only the largest authorities were first contacted. The authorities chosen were within the two main centres of the Midlands and Greater London, which between them are responsible for approximately 45% of all partially sighted school leavers

in England and Wales. The Scottish Education Department was also contacted and agreed unreservedly to every request. They provided the names and addresses of all partially sighted school leavers within their auspices, and the Medical Officer of Health in particular provided great assistance by completing in great detail all the forms on ophthalmic history.

The two major authorities were, however, unwilling to allow any information to be released without first satisfying themselves as to the validity of the proposed investigation. A detailed exposition of all the data that was to be collected, along with an explanation of the aims and intentions of the investigation, was requested by both authorities. After submission of these reports, and following their consideration by the authorities, lengthy discussions were subsequently undertaken. In one authority discussions were held with a committee of scientific and medical advisors, and in the other with the officers of the careers services. In each case, specific procedural criteria for data collection were imposed, and some objections raised and changes suggested.

The objections raised by the two authorities were much the same and were concerned mainly with the information requested on the home background and attitudes of parents of school leavers. It was generally expressed

that any such information which might be known to the authorities was retained only in special circumstances. It was suggested that only details on family size and parental occupation should be requested and obtained via the questionnaire, thus allowing the respondent to decide himself whether or not to supply the information. Neither authority was willing to release the names and addresses of normally sighted school leavers for use as a control group.

The procedural criteria proposed were different for each of the two authorities. In the one case, permission for a questionnaire to be sent and records to be released was to be sought from all the school leavers by the authority itself. Only where school leavers agreed to take part in the investigation, were questionnaires to be sent. The other authority was prepared to provide, without reservation, the names and addresses of all leavers within their auspices, but would release details from their records only where respondents provided written permission.

The negotiations with the two major authorities from the time they were first contacted to the date by which all the questionnaires and relevant data had been

obtained took some eighteen months in total. Neither authority had ever released such information, other than to research organisations specifically appointed by a Government department. Consequently, whilst they were enthusiastic about the aims of the project, and gave willingly of time and effort, their approach was that of great caution. The delays incurred were mainly as a result of it being necessary for the authorities to arrange special meetings of senior officers to consider the circumstances and for opinion or approval to be sought from authoritative sub-committees which met infrequently.

From the outset of the discussions with the major authorities it was clear that obtaining permission for the names of school leavers to be released would be a lengthy and time consuming procedure. It was therefore considered that it would be totally impractical to expand the investigation beyond the areas first chosen.

Several schools outwith the authority of the two main centres had, however, provided the names and addresses of their leavers. Where these schools had retained their own records on ophthalmic history it was not necessary to approach the relevant authority for information. Leavers from these schools were approached directly and their permission for the school to release this information was requested.

The sample of school leavers and young adults finally contacted was drawn therefore from a mixed population, approximately half of which had, at some time since they left school, come within the auspices of the careers services of Birmingham or Inner London. The remainder had attended schools outwith these authorities but in the areas of Greater London, The Midlands, Southwest England and Scotland. The schools which these leavers had attended were broadly representative of the full range of educational facilities available.

It was not possible to determine the total number of individuals within the population from which the final sample was drawn, as in the case of the London authority only the names of respondents were passed to the investigator . On the basis of the total number of children attending schools for the partially sighted in each of the years under study and from the known number of new registrations within the age groups 5 - 15 years, along with the estimated number of registered partially sighted aged 4 years, it was estimated that approximately 300 pupils left special schools for the partially sighted each year. It was estimated therefore that the total population of partially sighted school leavers during the period under study was at the maximum 2,400 persons.

It had been expected that, from within the areas to which the study had been restricted, at least 500 names might be obtained. In the final event only 280 names were obtained, which represented approximately 12% of the total population of all partially sighted school leavers. It would have been more desirable for the purpose of analysis to have had access to a larger initial population, in view of the likelihood that at best only one third might be expected to respond. The population obtained was, however, the largest which could be achieved without incurring further unacceptable delay.

7.4. Analysis of Results.

From the population of 280 partially sighted school leavers and young adults, to which the investigator had access, a total of 95 individuals responded to the questionnaire. As a consequence of the relatively small number of individuals within the sample, and the large number of factors under investigation, sophisticated analysis was not possible.

In order to examine the influence of the factors affecting the first employment obtained after leaving school, and of the factors affecting subsequent employment success, each of the factors had to be treated as though the data had been obtained from a unique independent sample drawn from four different populations: those still in their first employment, those who had left their first employment; successful individuals and unsuccessful individuals. Each sample was of course not independent. It was, however, not possible to undertake analysis in any other way without having obtained an extremely large sample.

It was felt that although the method of analysis was strictly speaking inappropriate, the results obtained would not be totally invalidated by the possibility of relationships between factors. The results, however, cannot be considered as absolute determinants of the extent or lack of influence of factors, but can be

considered only as the best indications that could be derived from the available data.

Chapter 8.

Description of the Sample.

8.1. Sample Size, Age and Sex Distribution.

The total number of individuals to whom the investigation had access was 280, 12.7% of all partially sighted school leavers. The sample investigated totalled 95 school leavers and young adults, representing 4.3% of all those who had left special schools for the partially sighted during the period Summer 1963 to Summer 1971. The response rate was thus 34%.

Table 8.1. gives the age and sex distribution of the sample compared with the age and sex distribution within the total population of partially sighted school leavers in the same period. (Education Statistics 1972). Of those leavers aged 20 years and under, the response rate for males was slightly lower than expected, and for leavers aged 21 years and over the response rate for males was slightly higher than expected. The return was in fact almost exactly the same as that achieved in the preliminary investigation, and as indicated by that investigation was quite probably a result of greater concern about employment amongst the more mature males.

The proportion of leavers within the sample aged

up to and including 18 years was much higher than the actual proportion within the total population. This was possibly as a result of the routes employed in constructing the sample. The careers office records, from which the majority of the sample was obtained, normally include only those individuals under 21 years of age. Individuals up to and including 18 years of age are relatively recent or current clients. Over the age of 18 years there is a higher 'drop-out' rate where individuals move home and do not inform the service, or obtain employment by other means.

The sample was therefore considered reasonably representative of the total population of school leavers within the period under study, but with a slight bias towards males over 21 years of age and toward both males and females 18 years of age and under.

Age Range	Up to and including 18 years of age:		19 years including 20 years of age:		21 years old and over	
	M	F	M	F	M	F
Number	18	11	11	7	33	15
M/F ratio	1.6:1		1.6:1		2.2:1	
M/F ratio in Total Population	1.9:1					
Distribution of ages in Sample	30.5%		19.00%		50.5%	
Distribution of ages in Total Population	11%		22%		67%	

Table 8.1. Age and Sex Distribution in Sample and Total Population.

8.2. Educational Background and Ability.

The sample was drawn from a total population within which the full educational spectrum was represented.

Within the sample of 95 leavers, however, only 16 had attended boarding school, whereas in England and Wales, a total of 42% of partially sighted school pupils attend boarding school. The sample was therefore biased heavily towards day pupils.

As a result it was not possible to compare the success of leavers from the different forms of educational mix in current use. To state that one form of education produced more successful leavers, or even just that there was no difference between them, would, however, be of little value without some knowledge of why that was the case.

Aspects of educational structure such as whether the individual was a day pupil or boarder, or whether education was carried out along with normally sighted children, blind children, other handicapped children, or only along with other partially sighted children may well affect the formation of psychological factors which ultimately affect employment. In view of the fact that an ultimate aim of education is to teach skills, the use of which allow individuals to become contributing members of society, it would have been of value to determine the

influence of these aspects. Determination of the most appropriate educational structure for partially sighted children can only proceed on the basis of real knowledge of the effects of such factors. It was, however, beyond the scope of this study to undertake such detailed investigation. It is to be hoped that such studies will in the future be undertaken.

It was important, however, to know if the sample was representative of the total population of school leavers, with respect to ability. If it were to contain a preponderance of either the very able or the dull, then the results would be of little use as a basis for decisions affecting the total population. Unfortunately, the distribution of academic qualifications amongst the total population of leavers in the period under study could not be determined as no appropriate statistical data could be found. No comparison could thus be made between the distribution observed in the sample and that which would be expected.

The preliminary investigation had, however, indicated that with respect to academic ability, the respondents were representative of the population approached.

On the basis of that information it was considered that the sample of 95 partially sighted school leavers

and young adults investigated in the major study was likely to be representative of the total population with respect to ability but, as indicated from the results of the preliminary investigation, there might be a lower proportion of the very gifted and the very dull than was actually the case in the total population.

8.3. Geographic Distribution.

The sample was drawn from leavers who were at the time living in the Greater London Area, the West Midlands, South West England and Scotland. It was felt that the employment requirements within these four areas adequately reflected the full range to be found throughout the country. Greater London and the West Midlands are predominantly urban, industrial areas, Scotland a mixture of both urban and rural, and the South West predominantly rural.

Using a rough classification of both Urban and Rural, and placing half the sample from Scotland in each of the two categories, a ratio of 4.5:1, Urban : Rural was found for the sample. The regional distribution of the partially sighted receiving or requiring special education in England and Wales is approximately the same ratio, 4.7:1 Urban to Rural; when the areas of Cumberland, Durham, Northumberland, Westmorland, Yorkshire (North Riding) in the North; Cornwall, Devon, Dorset, Gloucestershire, Isle of Scilly, Somerset and Wiltshire in the South West; Cambridgeshire and Isle of Ely, Huntingdon and Peterborough, Norfolk and Suffolk, in East Anglia, and Wales are all taken as 'Rural' and the rest; Greater London, West and East Midlands, Yorkshire and the North West and South East are taken as 'Urban'. (Committee of Enquiry 1968).

The sample was therefore considered as representative of the total population with respect to geographic distribution.

Chapter 9.

Factors Affecting The First Employment.

9.1. First Employment.

Of the total sample of 95 school leavers and young adults, 83 individuals - 53 males and 30 females - had entered full time employment on leaving school. Of the 12 individuals who had not entered full time employment, 6 had entered full time further education, 3 of whom had retained part time employment, and 3 had entered vocational training courses. The remaining 3 had been unable to obtain any form of employment in the period between leaving school and replying to the questionnaire. Of the 86 individuals in employment 39 were still in the employment which they had first entered after leaving school, and the remaining 47 had changed their employment at least once.

It would have been of value to investigate the influence of the factors affecting the employment of partially sighted school leavers in comparison to their effect on the employment of normally sighted school leavers. Factors peculiar to the partially sighted alone could thus have been determined. This was not possible as no suitable normally sighted population could be obtained. Data were, however, available on the areas of employment entered

by normally sighted school leavers. (Morton-Williams and Finch 1968).

Table 9.1 gives the number and percentages of partially sighted males and females who entered specific areas of employment, along with the percentage of normally sighted school leavers of age 15 and 16 years, who entered the same occupations.

No statistical comparison could be carried out, but differences in the areas of employment first entered after leaving school were apparent. The majority of male partially sighted school leavers had entered General Clerical Work or Shop Work, whereas the greatest proportion of male normally sighted school leavers had entered Factory Work. Within the sample of male partially sighted school leavers 28.5% had entered General Clerical Work and 21.5% had entered Shop Work, whereas of all male normally sighted school leavers only 5% had entered General Clerical Work and 8% had entered Shop Work. Only 16% of male partially sighted leavers had entered Factory Work, whereas 24% of male normally sighted leavers had entered that area of employment.

The differences between the normally sighted and partially sighted male leavers in the areas of employment

first entered after leaving school suggested that there was a general tendency for male partially sighted leavers to have been placed in the 'lighter'areas of employment. This bias toward 'lighter' employment for partially sighted males was further borne out by the fact that 28% of normally sighted males had first entered'heavy' occupations such as the Construction Trades (17%) and Engineering (11%),whereas of all partially sighted males only 2% had entered the Construction Trade and only 7% had entered Engineering.

There were differences also evident between normally sighted and partially sighted female school leavers in the areas of employment entered. Twenty eight percent of all female partially sighted school leavers had entered Shop Work, and, as was the case for male leavers, the proportion of partially sighted females who had entered shop work was greater than the proportion of normally sighted females (19%) who had entered that employment. Whilst none of the normally sighted females had taken up Nursing or a Paramedical Profession, 12% of female partially sighted leavers had entered those areas of employment. This is possibly as a result of their own special past experiences. Familiarity with the medical profession and understanding of the problems or nature of handicap perhaps leads them to be more inclined to enter occupations where they can help other individuals. The proportion of partially sighted females who had entered General Clerical Work (12%) was half the proportion of normally sighted females (24%) but a slightly greater

proportion of partially sighted females, 10% compared to 7% had entered specialist areas of employment such as Switchboard Operation, Typing or Secretarial Work.

	Partially Sighted Leavers				Normally Sighted Leavers	
	Male	M%	Female	F%	Male %	Female %
Service Occupation dealing with People						
Hairdresser	0	0	3	10	1	7
Shop Work	12	21.5	8	28	8	19
Waitress/Porter/ Messenger	3	5	2	7	1	4
Manufacturing and Engineering						
Factory Worker	5	9	1	3)		
Packer /Machinist	4	7	5	18)	24	24
Engineers/Apprentices	4	7	0	0	11	0
Construction Trade	1	2	0	0	17	0
Others/Bakers Chefs	3	5	0	0	3	1
Forestry, Farming, Fishing, Gardening	6	11	0	0	9	1
Semi Professional '(dealing with people)						
Nursing/Para-Medical	0	0	4	12	0	0
Commerce and Business	0	0	0		1	0
Semi Professional and Technical (not dealing with people)	1	2	0	0	1	2
Clerical and Office Work						
General	14	24.5	4	12	4	24
Switchboard/Typist/ Secretary	2	4	3	10	1	7
Other	1	2	0	0	19	12

Table 9.1. Areas of First Employment of Partially Sighted School Leavers and of Ordinary School Leavers (Number and Percent of Leavers)

9.2. Source of Information and Advice.

Prior to their leaving school, leavers receive advice and information about employment from many different sources. It was of value therefore, to determine if any one source was particularly effective or ineffective in directing leavers toward a suitable first employment.

A first employment was considered suitable if an individual had remained in that work since leaving school. Although there can be many different reasons for leaving employment without that employment having necessarily been unsuitable, it was considered reasonable to accept that those who had not yet left their first employment were able to carry out the work successfully and considered their employment satisfactory, at least for the time being, and therefore suitable.

The sources of information which were compared, along with the number of young adults still in their first employment and the number who had left that employment, are given in Table 9.2.

Source of Information/Advice	Still in	Left
Careers Service Careers Officer, DRO,BPRO	16	20
Schools Teacher, Head	1	6
Home Parents, Friend, Relatives	9	7
Employer	8	5
No one/other	0	5
No record	(5)	(4)
	39	47

Table 9.2. Source of Information. First Employment. (Number of Individuals).

Slightly less than half of the 77 individuals who completed this section of the questionnaire, (46.8%), gave the Careers Service as the source of information about their first employment. The information was provided by careers officers or in some cases by officers with special experience such as the Disablement Resettlement Officer (DRO) or Blind Persons Resettlement Officer (BPRO). The second most frequent source given was that via the home, 20.8%; that is parents, friends and relatives. A similar proportion but slightly less, 16.9%, obtained information about their first employment from their subsequent employer.

The proportion of leavers who had been advised on their first employment by their school was only 9.1%. This proportion was only slightly greater than the proportion who had received no advice at all; 6.5%. That only 9.1% of leavers had received advice about their first employment from the school was surprising as schools make great efforts to provide information and advice on a wide range of occupations.

Comparison of the effectivity of the different sources of information and advice emphasised further the poor record of the schools. Of the 7 individuals who had been advised of their first employment by their school, only 1 had remained in that occupation and 6 had subsequently left. Statistical analysis of the significance of the effectivity of individual sources of information was not possible because of the small numbers within individual groups. The data did, however, suggest that the most effective

source of information and advice leading to a suitable first employment appeared to be the subsequent employer. Approximately 60% of leavers who had received information or advice from their subsequent employer were at the time of investigation still in that employment. Similarly, 56% of those who had received information and advice from parents, friends or relatives, and 45% of those advised by the Careers Services were also still in their first employment. The least effective sources of information were the schools and, not surprisingly, where the leaver had received no advice; 91% had subsequently left their first employment.

Statistical investigation of the effectivity of the Careers Service as a source of information, in comparison to all other methods, was possible. Analysis using the Chi Square Test (S. Siegel 1956) showed, however, that the proportions of individuals remaining in or leaving their first employment and advised by the Careers Service were no different from the proportions advised by any other source.

	Still In.	Left.	
Careers Services	16	20	
All Other Sources	18	23	
Chi Sq.= 0.0321 :	$0.45 > p > 0.4$		Not significant

Table 9.3. Careers Service compared to all other sources of information. First Employment. (Number of Individuals).

The problem of the ability of young partially sighted individuals to understand and appreciate information and advice has already been discussed (Ch.6), but it would appear that employers are more effective as sources of information than any other individual or group. This may, however, be more as a result of the attitude of the type of employer who is prepared to take an interest in such school leavers, reflected in a more tolerant and pleasant working environment conducive to loyalty and satisfaction on the part of the young partially sighted employee. It is not known, however, whether employers advised school leavers individually, or addressed a group of leavers. In the former situation, the employer is in a position to assess the suitability of the individual for a particular employment, and in the latter he is merely a source of information. If advice had been given in the former situation, then it might be hypothesised that it is the assessment by the potential employer that is the crucial factor. The preliminary investigation indicated the difficulties that face the employer when trying to assess the employment potential of partially sighted school leavers, and also indicated some of the factors on which employers might base their assessment. The results obtained

here suggest that it would have been of great value to have examined in detail the specific criteria on which they had made their assessment, as such information would provide a useful guide of the real requirements of employers and allow in the future more appropriate vocational assessment and placement of partially sighted school leavers.

9.3. Method of Obtaining First Employment.

For the purpose of evaluating the different means utilised by school leavers to obtain their first employment, leavers who were still in their first employment were again considered as having entered a 'suitable' employment.

Statistical comparison of all methods was again not possible as a result of the small numbers within the several classifications. The data obtained (Table 9.4) showed, however, that more than half (51%) of all leavers obtained their first employment through the auspices of the careers services, and that slightly less than half of that group (48%) had remained in their first employment. There was little difference in the effectivity of the other methods utilised. In the majority of methods used, with the exception of two, approximately half the number of individuals involved had remained in their first employment. The two exceptions were, however, where the employment had been obtained either through the auspices of the school or in answer to an advertisement. In the case of the former method, all young persons had eventually left employment. In the case of the latter method 75% had left.

Method	Still In	Left	T
Careers service	21	23	44
School	0	4	4
Parents	5	6	11
Friends/relatives	3	2	5
In answer to advert.	2	6	8
Other/agency/self	8	6	14
	39	47	86

Table 9.4. Method of Obtaining First Employment. (Number of Individuals).

The results would seem to suggest that in the majority of cases the means by which employment is obtained is relatively unimportant. It was evident, however, that the majority of leavers who had obtained their first employment through the auspices of their school or in answer to an advert had obtained an unsuitable employment. It was indicated from the discussions held with teachers and heads of schools during the preliminary investigation that schools would normally only help individuals to obtain employment in cases of extreme difficulty where the individual had approached the school after having been unable t obtain employment even with the help of the careers service. This would suggest that those individuals who obtained employment through the auspices of their school were extremely difficult to place in the first instance

and provides some explanation as to why none of the individuals so placed remained in that employment.

The fact that 75% of those who had obtained their first employment in reply to an advertisement had subsequently left that work, would seem to suggest that self assessment of employment suitability is particularly unreliable. Yet 8 of the 14 individuals (57%) who had obtained their first employment by their own efforts, in the majority of cases by personal approach to ask if a place might be available, had subsequently remained in that employment.

The information obtained from the discussions held with leavers during the preliminary investigation provides a possible explanation for this anomaly. It was indicated by these leavers that seeking employment through replying to advertisements was a last resort after personal approaches to local firms had failed. Occupations obtained by this 'last resort' method were, therefore, not often the type of employment particularly desired, leading to individuals continuing actively to seek a desired occupation whilst considering their current employment as solely temporary. Thus, individuals would leave these occupations as soon as a more desirable one could be

obtained, or where a more desirable occupation could not be obtained within a reasonable period of time, individuals would still leave occupations which they felt were unsatisfactory.

9.4. Qualifications for First Employment.

The qualifications for the first employment were not considered on an academic basis, but on the basis of the reasons for which the individual was qualified to undertake the work. Table 9.5 gives the classification of qualifications, as suggested by the information obtained in the preliminary investigation.

Qualification	Still in	Left
Previous experience of the type of work (obtained in school)	2	2
Previous Part-time work experience	1	2
Special Training course run by employer	5	4
Learnt 'On the Job' (No previous experience)	27	36
Learnt at Government Training Centre	1	2
No record	(3)	(1)
	39	47

Table 9.5. Qualifications for First Employment. (Number of Individuals).

No statistical comparison could be carried out, as a consequence of the small number of individuals within each classification. The great majority of the leavers (85%) had had no previous experience or training, in any form, for the work which they first entered. The data does, however, indicate that individuals who have had

previous experience of similar work, and in particular those who have undergone special training provided by their employer, are more likely than any other individual to remain in their first employment.

9.5. Visual Difficulty.

The difficulties which young workers experienced in their first employment and which arose specifically as a result of their reduced vision were examined in order to determine the incidence of such difficulty and to examine the hypothesis that visual difficulty was a significant factor in leading to young workers leaving their first employment.

The frequency with which visual difficulty was experienced, when carrying out the first employment, was recorded under three classifications. (Table 9.6.). Approximately 43% of those who replied stated that they never had any visual difficulties when carrying out their first employment.

	Still In.	Left.
Visual Difficulty Never Experienced	12	24
Visual Difficulty Sometimes Experienced	24	16
Visual Difficulty Often Experienced	2	5
No Record	(1)	(2)

Table 9.6. Visual Difficulty in First Employment. (Number of Individuals).

Analysis using the Chi Square Test (S. Siegel 1956) indicated, paradoxically, that a significantly greater

proportion of individuals who had remained in their first employment had experienced visual difficulty, on some occasions, than was the case for individuals who had left. ($X^2 = 4.9$; $0.025 > p > 0.01$). On the other hand, the data further indicated that a greater proportion of individuals who 'often' experienced visual difficulty had left their first employment. The results suggest that visual difficulty was a significant factor leading to individuals leaving employment only when it was often experienced.

The paradoxical result that of those individuals who had occasionally experienced visual difficulty a greater proportion had remained in the employment than had left, may have arisen as a consequence of the poorer recall of those who had left, the time lapse perhaps having blurred their memory. It was considered possible that individuals who had remained in their first employment might have been more aware of, and thus better able to report, any visual difficulty which they experienced in that work. To examine this possibility, the frequency with which visual difficulty was experienced in the present or most recent employment was compared between the two groups. Table 9.7 gives the results obtained.

	Still In.	Left.
Visual Difficulty Never Experienced	12	18
Visual Difficulty Sometimes Experienced	24	22
Visual Difficulty Often Experienced	2	3
No Record	(1)	(4)

Chi Sq. = 1.367 : $0.15 > p > 0.1$

Table 9.7. Visual Difficulty in Present or Most Recent Employment for Individuals Still In, and Those who had left their First Employment. (Number of Individuals).

Analysis using the Chi Square Test showed no significant difference between the two groups. The results suggest that the reason for which individuals still in their first employment appear to have experienced more visual difficulty than those who had left, was that the latter tended to forget the difficulties which they had encountered.

Where subjects had stated that they sometimes or often experienced difficulty in their employment a description of the sort of difficulty encountered, and the consequences was requested. This was left as an 'open ended' request as it was appreciated that difficulties would be as varied as the occupations, and as the more important

consequences, such as being asked to leave were covered in other sections of the questionnaire.

The answers were as varied as expected, and ranged from 'intellectually crippling' to 'got fired' as descriptions of difficulties encountered, and the consequences arising.

A total of 39 people answered this section, and the replies were grouped approximately by similarity. The most frequently stated difficulty, arising as a result of low vision, was that of reading small print or gauges, 18 individuals having encountered this problem. Ten individuals specifically stated that reading handwriting was a particular problem. A major problem, stated by 11 individuals, was the reduced speed at which work could be carried out in comparison to normally sighted workers. A secondary problem, stated by 9 individuals, was that of making mistakes or having a high breakage rate. Two subjects stated that they had had to have assistance from workmates in order to be able to carry out the work, and a further 2 stated that they were unable to see well enough to carry out the work, even with assistance, and were subsequently dismissed.

Overall, the results indicate that although 57% of

the sample of 86 young workers had had difficulty in carrying out their first employment as a direct result of their low vision, only 10% had found such difficulty that they had had to leave that work.

9.6. Quality, Effort and Work Rate.

It was noted in the preliminary investigation that young partially sighted workers frequently found that they took much longer than their normally sighted peers to learn to carry out a new and unfamiliar task. It was also noted that even after the task had become quite familiar and the quality of output had become equally as good, the work rate of the partially sighted worker was often still much slower than that of the normally sighted worker. In many cases it was only after extensive experience had been gained that the partially sighted worker could equal the normally sighted in speed of output. In some cases the work rate was never equalled.

These factors were examined in relation to the first employment in order to determine their real effect in that employment.

The speed at which young workers were required to work, the effort that they felt they had to put in to maintain that speed, and the effort that they had to put in to attain a standard of work as good as their colleagues, were all found to be of significance. (Chi Square Test S. Siegel 1956).

The results showed that a significant number of individuals left their first employment because it was important for them to work fast and that they had to

try hard to do so. Furthermore, an even greater number left because they had to try hard for their work to be as good as their workmates. (Table 9.8).

	Left	Still In.
Work Rate		
Important to work 'fast'	24	12
Not " " "	19	21
Chi Sq. = 3.667 $0.05 > p > 0.025$ Significant.		
Effort		
Have 'to try hard' to work as fast as workmates	20	9
Do not " " "	23	22
Chi Sq. = 3.101 $0.05 > p > 0.025$ significant.		
Quality		
Have to 'try hard' for work to be as good as workmates.	22	9
Do not have to try hard for work to be as good as workmates	20	29
Chi Sq. = 4.993, $0.025 > p > 0.005$ significant.		

Table 9.8. Quality, Effort and Work Rate in First Employment. (Number of Individuals).

The results suggested that virtually any kind of employment which required a specific volume or quality of output either from the individual on his own or in

conjunction with other workers, would seem to be wholly inappropriate for young partially sighted school leavers. It has, however, been indicated (Ch. 9.4) that partially sighted individuals who undertake a special training course run by their employer, are more likely than any other to remain in their first employment.

This strongly suggests that an adequate training programme might be all that is required to ensure that a significant proportion of partially sighted young workers do not have to leave their employment because they cannot work as fast or as well as their normally sighted peers.

Employers cannot, however, be expected to fully understand the implications of partial sight such that they themselves can tailor their individual training courses to the requirements of a particular partially sighted worker. Both the employer and the partially sighted young worker could benefit, however, from advice given whilst the leaver is undergoing training. It would be of particular value if such advice was available at that time either through the auspices of such individuals as the Disablement Resettlement Officer or Blind Persons Resettlement Officer, or from an individual specifically trained to understand the particular training requirements and problems of the partially sighted. Alternatively, bearing in mind the small proportion of handicapped

young workers that the partially sighted represent, advice might be better provided by a central organisation set up to deal with the occupational requirements of the partially sighted. The latter alternative is the more appealing in that such a body could advise on, or even itself set up training programmes designed specifically for the partially sighted. Such provisions do not at present exist in any adequate form and would certainly be of great benefit to both employers and partially sighted school leavers.

9.7. Income, Responsibility and Future Prospects.

Of the entire sample of leavers who had been in full time employment, only 30% considered that they had received, or were receiving at the present time, a satisfactory wage in their first employment. Table 9.9 gives the opinion on income from those who were still in their first employment compared to that of those who had left.

Analysis using the Chi Square Test (S. Siegel 1956) showed that of those who had left their first employment a significantly greater proportion had felt that they had not received a satisfactory wage, than was the case for those who had remained in their first employment.

	Still In.	Left
Earn/earned Satisfactory Wage	17	9
Do not earn/did not earn Satisfactory Wage	13	35

Chi Sq. = 11.914 $0.0005 > p$: Significant

Table 9.9. Opinion on Income for First Employment. (Numbers of Individuals).

It was further indicated that consideration of the future financial prospects, that is pay likely to be eventually achieved, was of importance. A large

proportion, but not significant, of those who left their first employment felt that the pay would not have improved had they stayed. (Table 9.10).

	Still In.	Left.
Pay would improve if stay/stayed	25	28
Pay would not improve " "	7	13
Chi Sq= 1.437 $0.15 > p > 0.1$ Not Significant		

Table 9.10. Opinion on Financial Aspects of First Employment. (Number of Individuals).

The results showed also that a significantly greater proportion of those who had remained in their first employment had what they considered as responsible positions (Table 9.11). There was, however, no difference between the two groups in opinion as to whether they might have eventually achieved a position of responsibility in their first employment.

	Still In	Left
Had/Have a position of responsibility	12	7
Had not/Have not " "	22	38
Chi Square = 5.248 $0.025 > p > 0.01$ Significant		
Would have had /Will have responsibility	12	17
Would not have had/ will not have responsibility	11	21
Chi Square = 0.686 $0.25 > p > 0.15$ Not significant		

Table 9.11. Opinion on Responsibility and Future Prospects in First Employment (Number of Individuals).

The results showed that for young partially sighted school leavers, satisfaction with the income received in the first employment played a major and significant part in determining whether or not they remained in that employment. Not surprisingly, those who were satisfied with their wage remained in their work and those who were dissatisfied left. Similarly, where young workers felt that they had a position of responsibility, a significantly greater proportion would remain in that employment than was the case for individuals who felt that they did not have a position of responsibility.

The results showed, furthermore, that consideration of the pay likely to be obtained in the future played an appreciable but not significant part in whether individuals remained in their first employment or left. If the prospects were good for a reasonable wage to be obtained in the future, workers would tend to remain in such employment. If workers did not have a position of responsibility, the prospect of eventually obtaining such a position was of less importance than consideration of future pay and played little part in their decision to remain in or leave their first employment.

9.8. Enjoyment and Value.

Not surprisingly, the enjoyment that leavers obtained from their work was very significantly related to their remaining in their employment. A very significant proportion of individuals remained in their first employment because they enjoyed their work. (Table 9.12).

		Still In	Left
Enjoy		29	23
Do not enjoy		4	20
Chi Sq. = 11.873	0.0005 > p	Significant.	

Table 9.12. Enjoyment in First Employment. (Number of Individuals).

The contribution which the individual felt he made to the firm, and the contribution he felt he made to others outside the firm were also shown to be factors of importance.

		Left	Still In
Work of value 'Inside' firm		27	31
Work not of value " "		12	0
Chi Sq. = 9.4476	0.005 > p > 0.0005	Significant	
Work of value to others 'Outside' Firm		21	23
Work not of value " "		20	5
Chi Sq. = 8.29	0.005 > p > 0.0005	Significant.	

Table 9.13. Value of First Employment. (Number of Individuals)

All individuals who felt that their work was not of value to the firm left that work, and a significant proportion of individuals who felt their work was not of value to others outside the firm also left their first employment. (Table 9.13).

The results clearly indicate that quite apart from the personal satisfaction which partially sighted leavers obtain from their work, the contribution which they feel they make both to the firm in which they are employed, and generally to society, is of great importance.

9.9. Relationship with Employers and Other Workers.

Relationships with workmates and employers and the assistance given by these individuals were all found to be significant factors in relation to the first employment. (Table 9.14).

	Still In	Left
'Got on' with employer	29	29
Did not 'get on' with employer	2	14
Chi Sq= 8.862 $0.005 > p > 0.0005$ Significant		
Employer was 'helpful'	27	28
Employer was not 'helpful'	1	15
Chi Sq. = 11.402 $0.005 > p > 0.0005$ Significant		
'Got on' with workmates	37	37
Did not get on with workmates	1	7
Chi Sq. = 5.73 $0.01 > p > 0.005$ Significant		
Workmates were 'helpful'	32	38
Workmates were not 'helpful'	1	5
Chi Sq. = 3.265 $0.05 > p > 0.025$ Significant.		

Table 9.14. Relationships in First Employment (Number of Individuals).

A significantly greater proportion of individuals who remained in their first employment than those who left 'got on' with both employer and fellow employees, and

considered that both were 'helpful' to them. From the results it would appear that the employer was the more important figure of the two.

Comments made by the young workers interviewed during the preliminary investigation suggested that the difficulties encountered in their relationships at work stemmed from lack of understanding by their colleagues, compounded by the inexperience of the leaver in dealing with derisory or even hostile individuals. Coping with such problems can be extremely difficult for the young and often immature partially sighted school leaver and, as has been pointed out, can result in one of two extreme reactions, both of which can exacerbate their problems. Over-confidence or denial of any limitations often led to more mistakes and even greater resentment. Complete loss of confidence resulted in the leaver just giving up, convinced that he would never be able to compete in open employment.

The results from the survey suggest, however, that a crucial factor is the help or support that the workers receive from their employer. It would have been of value to know more about the attitudes of employers or immediate

supervisors in order to understand the manner in which help was provided. It was unfortunately outside the scope of this investigation to examine this in any real depth, but it is to be hoped that such investigation will be carried out in the near future, particularly if any proposed Advisory Centre for the partially sighted is to provide real advice to both future employers and partially sighted young workers.

9.10. Travel.

From the discussions held in the preliminary investigation it was also suggested that a major problem for some individuals was the distance which they were required to travel to and from their employment.

The distance travelled and the time taken were therefore examined in the major survey. Analysis using the Chi Square Test (S.Siegel 1956) showed no significant difference between individuals who had remained in their first employment and those who had left. The results did, however, suggest that individuals whose work was 2 or more miles from their home, might be more likely to leave that work, than individuals whose work was within that distance.

Distance Travelled		Still in	Left
less than 2 miles		9	9
2 miles but less than 5		11	14
5 miles and more		15	17
Chi Sq. = 5.591	$0.1 > p > 0.05$	Not significant	
Time of Travel			
30 minutes and under		23	26
Over 30 minutes up to and including 60 mins.		9	11
Over 60 minutes		5	3
Chi Sq. = 0.705	$0.7 > p > 0.5$	Not significant	

Table 9.15. Distance and Time of Travel, First Employment. (Number of Individuals).

Of the sample of 95 young people, only 2 required some special assistance in their daily travel to work. This assistance was provided by a friend, relative or workmate who could take them directly to and from work by private car. Both individuals lived in rural areas, and the comments of the leavers interviewed in the preliminary investigation indicated that limitations on travel arose more as a result of inadequacy in the public transport system rather than as a result of any inability on their part. Although the work by Korb (1970) has shown that a proportion of partially sighted individuals can be provided with visual aids such that they can both reach the visual standards required for a motor vehicle licence and become competent and safe drivers, the majority of individuals will always be dependent on public transport when travelling on their own. The results obtained here indicate, however, that the majority of partially sighted individuals, as would be expected to be the case, are not limited in their mobility to any great extent. Travel, in particular to unfamiliar areas can, however, be a daunting task, especially for the young inexperienced school leaver.

The problems which make travelling difficult are manifold. Finding out street names, bus numbers, reading timetables or small print street maps can be impossible without assistance. Many partially sighted individuals

do not like to have to ask strangers for assistance, particularly young school leavers who want to feel independent. The more mature and adjusted individual is better able to accept that there is no ignominy in asking. They are also better able to understand and deal with reactions of strangers, and know that putting up with occasionally being treated like an imbecile or being viewed with suspicion is preferable to spending an entire journey in uncertainty wondering whether or not they are going in the right direction. The majority of partially sighted persons, however, could benefit immensely and be very much more independent by the simple expedient of having with them a variety of visual aids. There are available inconspicuous telescopic aids which are ideal for reading bus numbers at a distance or street names which are placed high on walls. A powerful hand held magnifying glass could be used for quick reference to timetables or street maps. It was clear from the discussions held with school leavers during the preliminary investigation that few individuals used visual aids in this manner. It would appear that because visual aids are normally very specific in their purpose and require to be tailored to the individual, the attitude has arisen that they are of limited value and of use only for one precise task. There is, however, no good reason

why individuals should not have a range of aids so that they can be minor accessories useful in a variety of tasks, rather than the means by which only one specific task can be carried out. Benefit in ease of mobility is only one example of the improvements which could be brought about by the more general use of visual aids.

9.11. Reasons for Leaving.

In addition to investigation of specific factors affecting continuation in the first employment, young workers were requested to give their reasons for having left that employment. An 'open-ended' section was included to allow expression of any reasons not already examined, and a closed section provided for determination of the relative importance of particular aspects.

The reasons given in the open section were in the majority of cases repeated in the closed section and provided no additional information. Table 9.16 gives the frequency with which particular reasons for leaving were stated. The major reason, expressed by 44% of the group, was a desire for a better job with more money. Further important aspects were, however, evident, 41% had not wanted the type of work in which they had first been employed; 23% stated that they could not see well enough to do the work, and 21% that they made mistakes because they could not see well enough; 23% stated also that they left because their employer thought they could not see well enough, and 18% because their work was not considered good enough. Interest in the work was only slightly more important than pay, 23% stated that they had left because they had found or arranged other work with more pay, and 26% had left because they had found or arranged to enter more interesting work. A

surprisingly large proportion, 18%, had left when they had merely heard of another job, presumably before they had determined whether or not they might be accepted.

	Frequency in Percent
Wanted a better job with more money	44
Did not want to do that kind of work	41
Wanted a job with more responsibility	40
Did not get on with employer	33
Had found or arranged to go to another job with more interesting work	26
Had found or arranged to go to another job with more pay	23
Could not see well enough to do job	23
Employer thought he could not see well enough to do job	23
Work was too slow	21
Made mistakes as could not see well enough	21
Had heard of another job	18
Work was not considered good enough	18
No prospects of promotion	15
Did not get on with workmates	15
Old enough to ask for more pay	5
Redundant	3
Total number of respondents = 39	

Table 9.16. Reasons given for leaving first Employment. (Frequency in Percent).

Chapter 10.

Factors Affecting Employment Success.

10.1. The Criteria of Success.

Within the fields of both industrial psychology and vocational guidance, it has long been an aim to develop determinants that might predict vocational success. A major difficulty as well as identification of the factors which affect employment success has been the determination of an adequate definition of success. Crites (1969) considers that to date, notwithstanding a vast number of investigations throughout the past 50 years and more.....

> "the dilemma of whether vocational success is a purely personal phenomenon, which cannot be defined nomothetically, or whether it has some generality of meaning, has not been resolved."

In the majority of studies, up until the early 1950's, vocational success had been based on evaluation of individual performance or efficiency in the employment situation, determined by measures of specific criteria such as output or earnings. Dorcas and Jonas (1950) in the Handbook of Employee Selection, abstract over 500 such studies. In over two thirds of these, success had been determined on the basis of a rank or rating scale evaluation of individuals, made by supervisors or immediate superiors in comparison to other workers.

Next to rating scales, the most popular determinant of success had been measures of output or efficiency. Stott (1950; 1956) considered, however, that success could not be adequately defined solely in terms of earnings or output. He summarised vocational success as.....'the attainment of the self chosen goal'. As early as 1936, Link expressed the view that.....

> 'No matter whether a man can earn much or little, is promoted rapidly or not, is a fast or slow worker, is using his best capacities or not at all, so long as he is reasonably content, and his employer is content to keep him, then he may be regarded as a vocational success.'

Yet it is only within recent years that vocational success has come to encompass such factors as adjustment, motivation, satisfaction and aspects of personality. Davies (1950) suggested that vocational success could be determined only on the basis of multiple criteria within the physical and psychological work environment. He proposed a conceptual schema of success that included evaluation by all relevant individuals and groups of individuals such as superiors, direct and indirect, equals within and outwith the work, subordinates, external participants, wife, parents and valued friends; and took into account the individual's own assessment of himself at work. In addition, Davies introduced 'the synoptic bystander', an objective individual.....

> 'concerned not only with the adjustment of individuals and the well being of working organisations, but with the benefit accruing to the community from the optimal use of talent'.

Since that time several criteria have been used in evaluating employment success. Weitz (1961) classified these within three dimensions, 'time', 'level' and 'type'. Within the classification of 'time', Thorndike (1947) first distinguished between immediate, intermediate and ultimate criteria. Immediate criteria applied at the time the individual attempted to enter employment, the most obvious criterion of success being whether or not he gained employment. Intermediate criteria applied within the early stages of employment and might refer to a rating or score on training programmes or the length of time required to gain proficiency. Ultimate criteria were long term evaluations of performance on the job.

Level of performance as a dimension of success has received little attention in comparison to criteria of 'time' and 'type'. Weitz (1961), however, considered that the use of independent tests as predictors of job performance must take into account possible different relationships dependent on the level of performance. He noted that the relationship between predictor variables such as independent tests of speed and accuracy, and criteria of 'on the job' performance may be curvilinear, because of differential significance levels of criteria. Individuals who scored high on job performance might also score high on tests of speed and average on accuracy, whereas individuals who scored average on job performance might have exactly the opposite pattern of speed and

accuracy scores.

The criteria most frequently used for evaluation of vocational success have been those within the classification 'type'. These include such measures as quality and quantity of output, earnings, accident rates, job tenure, advancement and rating or rank scales of proficiency. Type criteria have been extensively used in Factor Analytic studies where the relationships between group factors and vocational success have been examined. In a survey of fourteen such studies Crites (1969) noted that although there were too many uncontrolled conditions and variables, and that occupational differences affected group factor criteria, a general factor of Overall Vocational Success seemed to be defined by similar factors. The areas of employment covered by these studies ranged through professional, semi-professional, skilled and unskilled occupations. The general factor, Overall Vocational Success seemed to be characterised in the majority, by group factors such as: Ability to do present job, General reputation, Job performance reputation, Technical job knowledge, Knowledge and intellectual powers, General productive behaviour, General job efficiency, Supervisory evaluation (quantity and quality) and Professional recognition of achievements.

Crites, however, considered that:.....

'it is difficult, if not impossible in certain respects, to draw any conclusions much less

definitive ones, from the results of these factor analyses of vocational success.'

It would appear therefore, from both the methodology utilised and results achieved by the many different investigations of the vocational success of normally sighted individuals, that the validity of relationships observed between predictor variables and vocational success is largely dependent on the criteria of success employed by the investigators. It has further been indicated that the use of specific criteria of success, such as earnings or output, is inadequate unless combined in multiples to give group factors and confined to single occupations. It was therefore felt that the factors affecting employment success of partially sighted school leavers and young adults could not be examined in relation to specific employment areas, as the criteria of success within occupations could not be determined with sufficient accuracy for the large number of different occupations involved.

Thorndike (1947, 1949) has, however, pointed out that criteria of success need not solely take into account performance in a specific task but can represent a general summary evaluation of a total phase over a period of time. From the point of view of those concerned with the vocational guidance and placement of the partially

sighted school leaver , determination of the influence of factors affecting general success in obtaining and holding down employment is of equal importance, if not more important than determination of the validity of predictor variables of success in specific occupations. It was considered ,therefore, that the success of partially sighted school leavers and young adults was best determined on the basis of the employment record over a period of time. Whilst evaluation of success on such a basis takes into account neither levels of efficiency or productivity, nor such criteria as the individuals own appreciation of his attainments in relation to his self chosen goals, it does provide an objective determinant that reflects ability to obtain and hold down employment.

In view of the fact that a major aim of the special education provided for partially sighted youngsters is to allow them equal opportunity in employment, in open competition with normally sighted leavers from ordinary schools, it would have been of advantage to define the criteria of vocational success on the basis of the employment histories of normally sighted leavers. The success of partially sighted school leavers could then have been determined in direct comparison, and on the basis of criteria pertaining to the population with whom they were in open competition. Unfortunately, employment

histories of normally sighted individuals who had left school during the same period as the partially sighted individuals under investigation, could not be obtained. There were many difficulties which had to be overcome in order just to obtain the sample of partially sighted school leavers. As the investigation was directly concerned with the welfare of partially sighted school leavers, local authorities were willing to allow the investigators access to confidential information pertaining to partially sighted school leavers, with the permission of those leavers. The authorities felt, that their legal and moral responsibilities as public custodians of confidential information would not allow the release of such information pertaining to normally sighted school leavers. It was further suggested that a formal application to authoritative sub-committees, requesting permission to approach a small number of normally sighted school leavers in order just to obtain their consent for information to be released, might jeapordise the release of information on partially sighted school leavers. Consequently this objective was not pursued and no comparable group of normally sighted school leavers was obtained.

In order, therefore, to determine criteria defining the vocational success of partially sighted school leavers, the employment history was examined for every individual within the sample of partially sighted school leavers and young adults.

Out of the total sample of 95 individuals 6 had entered directly into and were still undergoing full time further education, and 3 were similarly engaged in further training. It being considered that these were desirable courses of action for which there would be stiff competition, these 9 individuals were classified as successful. Three individuals, all over the age of 21, had never obtained any form of employment since they had left school and were therefore classified as unsuccessful. The remaining 83 individuals, some of whom had undertaken further education or training with varying success, had all entered at least one full time employment since leaving school. To determine a criterion of employment success these 83 individuals were allotted to one of three distinct groups. Group A included all individuals who had been available for employment over a period not exceeding three years since leaving school. Group B included all individuals available for a period exceeding 3 years but less than 5 years, and Group C included all individuals available for employment over a period of 5 years or more. By utilising the classification of availability for employment and not classifying by age groups, additional years spent in school beyond the age of 16 years, or spent in further

education, could be taken into account and did not count as a period of unemployment. As the groups were nothomogeneous with respect to the total time available for employment, actual length of time unemployed was not directly comparable within each group, nor could a meaningful average be obtained. The time unemployed was therefore calculated as a proportion of the total time available for employment.

Table 10.1. gives the number of individuals in each group, by sex and percentage of time unemployed.

Unemployment as % of time available for employment	Group A 3 yrs		Group B 3 5 yrs		Group C 5+ yrs	
	M	F	M	F	M	F
0 - 10	1	3	3	3	20	7
11 - 20	2	0	3	0	1	1
21 - 30	5	0	0	2	3	1
31 - 40	0	0	1	0	2	1
41 - 50	1	0	0	1	0	1
51 +	6	6	3	2	4	0

Table 10.1. Time Unemployed (Numbers of Individuals)

Within groups there was extensive variation between individuals in the proportion of time which each individual had spent unemployed. Every individual fell within three standard deviations of the mean 'time unemployed'. The maximum limits of 'time unemployed' expected for the total population could not therefore be used to define limits of success or failure. It was, however, quite evident that for each of the three groups there was a fairly definite division between groups of individuals in the proportion of time that had been spent without employment. (Fig. 10.1).

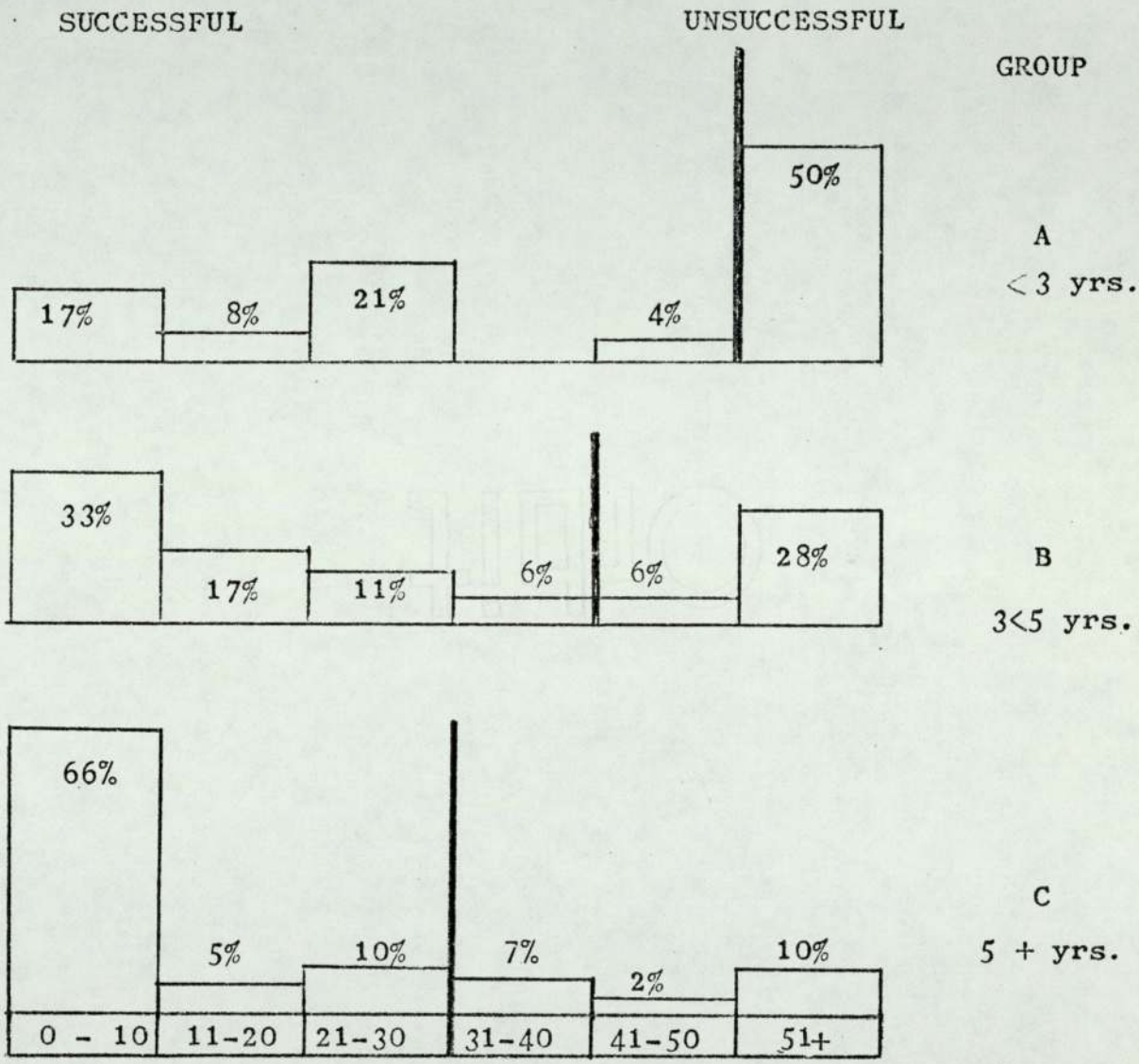


Figure 10.1. Time Unemployed (Numbers of Individuals, Percent of each group).

In group A, as many as half the total number of individuals had been unemployed for a period of time representing more than 51% of their time available for employment. The remainder, with the exception of 1 individual, had spent at least 70% of their time in full employment. In group B, the major proportion had been in employment for at least 70% of the time available, and in Group C the major proportion had been in employment for 90% of the time available. These divisions were used to differentiate between success and failure in employment.

In order to ensure that the classification of employment failure would include only those individuals who were at, or outside, the most extreme levels of unemployment observed in each distribution, the divisions indicated were interpreted leniently.

In Group A, all individuals who had spent more than 50% of their time unemployed were considered unsuccessful. In Group B, all individuals who had spent more than 40% of their time unemployed were considered unsuccessful, and for Group C all individuals who had been unemployed for more than 30% of the available time were considered unsuccessful. From a total of 24 individuals in Group A,

6 males and 6 females were considered unsuccessful in employment. From a total of 18 individuals in Group B and 41 individuals in Group C; 3 males, 3 females and 6 males, 2 females were unsuccessful within each group respectively. Thus the number of unsuccessful individuals out of the 83 was 26, and the number of successful individuals was 57. Taking into account the 12 other individuals, for the entire sample of 95 partially sighted school leavers, the final number of successful individuals was 66, representing approximately 69% of the sample, and the number of unsuccessful individuals was 29.

Just over 25% of the sample, 23 individuals in all, were unemployed at the time of replying to the questionnaire. Providing that they had held more than one employment, these individuals were requested to supply details of their most recent employment for the section on 'Present Employment'. A total of 13 individuals did not complete the section on Present Employment. Of these 13 individuals, 7 were in full time education or training, 1 had not been employed since leaving full time education, 3 had never held any employment and 2 gave insufficient information. Consequently, for the purpose of analysis of factors

affecting the most recent or present employment, the total usable sample was 82 (95 - 13) individuals. Of these 82 individuals, on the basis of their employment history, 59 were considered successful, 40 males and 19 females, and 23 were considered unsuccessful, 14 males and 9 females.

For the purpose of investigation of factors affecting employment success, the total sample of 66 successful individuals and 29 unsuccessful individuals was utilised. In many sections, however, several respondents did not provide any answers. In order that investigation of differences between successful and unsuccessful individuals could be undertaken and in some cases to allow investigation of the direction of differences, the numbers of individuals who did not respond were omitted from the analysis. Inclusion of a category for non-respondents would in many instances have made any analysis impossible because of the small numbers involved. Because the number of non-respondents was small in most instances, it was considered that the results would not be invalidated by their omission. As discussed before (Ch. 7.), because factors have been examined as though the sample for each was independent of all others, the results cannot be considered as absolute

determinants of influence or lack of influence of factors, but can be considered only as the best indications which would be obtained from the available data.

10.2. Present Employment.

Table 10.2 gives the major areas of occupation undertaken by the two groups. Of the 14 unsuccessful males 64% were at present employed or had last been employed in Manufacturing or Engineering occupations, 44% of the unsuccessful females were employed in or had last been employed in Service Occupations. The majority of successful females, 42%, were in General Clerical and Office work, and the majority of successful males in either Manufacturing or Service Occupations. No clear differences could be determined between the two groups of workers and thus no indication derived of any particular employment area that might lead to 'success' for partially sighted workers.

Service Occupations	Successful M	%	F	%	Unsuccessful M	%	F	%
(dealing with people)								
Hairdressing/Shop Work Waitress/Porter/Messenger	12	30	5	26	1	7	4	44
Manufacturing and Engineering Occupations								
Factory Worker/Packer/Machinist Engineers/Apprentices/Bakers	15	37	3	16	9	64	3	33
Forestry Farming Fishing Animals								
Horticulture/agriculture	4	10	0	0	1	7	0	0
Semi Professional								
Nursing/Para Medical. Business Commerce	2	5	3	16	1	7	0	0
General Clerical and Officer Work								
Clerk/Typist/Secretarial Switchboards	7	17.5	8	42	2	15	2	23
	40	100	19	100	14	100	9	100

Table 10.2. Present or Most Recent Employment of Successful and Unsuccessful Leavers. (Numbers of Individuals and Percent of Totals).

10.3. Source of Information or Advice.

It was shown that there was no one particular source of information which was more effective than any other in leading to a suitable first employment for partially sighted school leavers. (Ch. 9). In order to examine the relationship between sources of information and subsequent employment success, the various sources for successful young adults were compared to those for unsuccessful young adults. Table 10.3. gives the number of young persons who received advice about their present or most recent employment for each of the sources examined.

	Successful	Unsuccessful
Careers Service CO/DRO/BPRO	25	14
School Teachers/Head	1	0
Home Parents/Friend/Relative	10	4
Employer	3	0
Other/Agency	1	0
No One/Self	19	5

Table 10.3. Sources of Information, Present or Most Recent Employment. Number of Successful and Unsuccessful Individuals.

As had been the case for the first employment, it was found that the largest single group of young adults had received information or advice about their present employment from the Careers Services, 47%. The next largest group, 29% had, however, not received information from any individual or organisation, but had made their own decision. The average age of the sample was, however, 20.5 years, and it was not unexpected that a proportion would have gained in experience and maturity since leaving school, sufficient to make their own evaluation of their aptitude and suitability for specific employment.

Inspection of Table 10.3 further showed that the 5 individuals who had been advised by their school, employer or through an agency, were all successful in their most recent employment. As no unsuccessful workers had been advised by any of these sources, an overall statistical comparison was not feasible. It was, however, possible using the Chi Square Test, (S. Siegel 1956) to compare each of the three main sources to all others. (Table 10.4).

	Successful	Unsuccessful
Source of Information		
Careers Service	25	14
All other	34	9
Chi Sq. 0.166	0.35 > p > 0.25	Not Significant
Home (Parents, Friends, Relations)	10	4
All other	49	19
Chi Sq= 0.077	0.40 > p > 0.35	Not Significant
No one	19	5
All other	40	18
Chi Sq= 1.47	0.15 > p > 0.1	Not Significant

Table 10.4. Source of Information on Present Employment. (Number of Successful and Unsuccessful Individuals).

The results showed that neither the Careers Services, parents, friends and relatives, nor individual evaluation were significantly better than any other source of information in leading to employment success. They indicated, however, that a large proportion of those individuals who made their own evaluation were successful in their subsequent employment.

10.4. Method of Obtaining Employment.

Analysis of the differences between methods of obtaining employment was possible only by combining the categories shown in Table 10.5. Analysis using the Chi Square test for 'k' independent samples (S. Siegel 1956) showed that there was no significant difference in the proportions of successful and unsuccessful individuals, between any of the methods which had been used to obtain the most recent or present employment (Chi.Sq. = 1.062 df = 3, $0.7 > p > 0.5$).

Method of Obtaining Employment	Successful	Unsuccessful
Careers Service	26	13
School	0	0
Parents	4	1
Friends and Relations	7	2
Advert.	7	4
Other/Self/Employer	15	3

Table 10.5. Method of Obtaining Present Employment. Number of Successful and Unsuccessful Individuals.

The results did, however, indicate that a large proportion of young adults who had obtained their employment by their own efforts, that is, by going

directly to a firm or employer and asking if they might be suitable, were successful in that employment. Between 65 to 75% of young workers who obtained their employment through the auspices of their parents, friends or relatives or through the careers services were also successful in that work. The least effective means of obtaining satisfactory employment would appear to have been in answer to an advert.

10.5. Unemployment.

The length of time which young school leavers had spent without employment between leaving school and obtaining their first occupation was found to be significantly associated with their subsequent employment success. Individuals who had obtained their first employment within three months of leaving school were more frequently successful than those who were without employment for a longer period of time. (Chi Square = 27.8; $p < 0.0005$).

A six point scale, dividing the first year after school into 5 discrete classifications of 'time unemployed', with one further classification for over one year was initially used in the Questionnaire. The numbers within each classification were, however, too small to allow analysis without combining categories. The categories used for analysis are shown in Table 10.6.

Time Unemployed between School and First Employment	Successful	Unsuccessful
3 months and over	8	18
Less than 3 months	58	11
Chi Sq. = 27.8	$p < 0.0005$	

Table 10.6. Time Unemployed Between Leaving School and First Employment. Number of Successful and Unsuccessful Individuals.

It must be noted that the length of time unemployed was used as a determinant of success or failure, and the result could therefore be an artefact. The significance level is, however, very high and taking into account the criteria used to determine success, the results suggest that it can be expected that approximately 70% of those individuals who do not obtain employment within three months of leaving school will continue in the future to have an unacceptably high level of unemployment.

This particular result emphasises a real and unpleasant consequence of ineffective vocational guidance and placement during the period of transition from school to work. It would seem to suggest that the ability of the partially sighted school leaver to achieve success in subsequent employment is so closely linked to his immediate experiences during that critical phase that any failure at that time will, for a very large number of individuals, lead to subsequent failure in employment for a very long period after.

The result therefore suggests that as many as 40% of all people at present leaving school and who are likely to be unsuccessful in subsequent employment, for whatever reason, could be assisted towards subsequent success by ensuring that adequate employment is available to them within a short period of time after they leave school.

10.6. Qualifications: Academic, Further Education and Vocational Training.

The academic qualifications attained by successful and unsuccessful leavers, when they were still in school, are shown in Table 10.7. The numbers within each category were too small to allow overall statistical analysis of differences in employment outcome for individuals with different qualifications. The results were, however, self-explanatory. Of all 29 young school leavers who had been unsuccessful in employment only 2 had obtained any kind of academic qualification, whilst of the 66 leavers who had been successful in employment 32 (approx. 49%) had achieved at least Certificate of School Education standard in one or more subjects before leaving school.

Qualification	Successful	Unsuccessful
'A' level	1	0
'O' level	11	1
CSE, others	20	1
None	34	27

Table 10.7. Academic Qualifications. Number of Successful and Unsuccessful Individuals.

Using combined categories, analysis showed that a significantly greater proportion of successful school leavers than unsuccessful leavers had obtained some kind of academic qualification. (Chi Sq. = 17.02; $p < 0.0005$).

It is possible that it was not the fact that the individual had attained an academic qualification which led to employment success, but that individuals who were successful in employment had a greater overall ability which was reflected by the fact that they had attained more academic qualifications than unsuccessful individuals. Intelligence Quotient(IQ) scores had been obtained from records for 23 of the successful individuals and 15 of the unsuccessful individuals. As the scores had been arrived at by the use of several different tests they were not strictly comparable. Individuals were, therefore, classified as Dull (50 - 84), Average (85 - 115) and Gifted (115+). Table 10.8).

	Successful	Unsuccessful
Dull	1	3
Average	21	11
Gifted	1	1

Table 10.8. Intelligence Classification: Dull, Average and Gifted. Numbers of Successful and Unsuccessful Individuals.

Analysis could not be undertaken as a result of the

small numbers of individuals within the classifications, Dull and Gifted. The scores were therefore reclassified into two categories; Average and above (100+) and Below average (99 and less) (Table 10.9).

	Successful	Unsuccessful
99 and less	16	11
100 and above	7	4
Chi Sq. = 0.3	$0.35 > p > 0.25$	

Table 10.9. Intelligence Classification. Average and Above (100 & above) Below Average (99 & less). Numbers of Successful and Unsuccessful Individuals.

Analysis using the Chi Square Test showed that there was no significant difference in intelligence between the two groups. ($0.35 > p > 0.25$).

Although the data are suspect, the results would seem to suggest that as there is no overall difference in ability between the two groups, success in employment is dependent to some extent on having attained some kind of academic qualification. It would seem reasonable to assume that it is not the actual qualification itself which leads to success, but that individuals with a

qualification may well have far less difficulty in obtaining entry to employment than individuals without qualifications.

The value of qualifications is further emphasised by the results observed for the employment outcome of individuals who had undertaken vocational courses or further education. Of the 57 successful young adults who had gone directly into employment after leaving school, 18 had subsequently left that employment to undertake vocational courses or further education; only 5 of the 26 unsuccessful young adults who had gone directly into employment had subsequently attended such courses. (Table 10.10).

	Successful	Unsuccessful
Undertook Vocational Course/Further Education	18	5
Did not undertake Vocational Course/Further Education	39	21
Chi Square = 2.04	$0.1 > p > 0.05$	

Table 10.10. Further Education and Vocational Courses Undertaken. Number of Successful and Unsuccessful Individuals.

The data show that of individuals who had attended Further Education courses, a greater proportion was successful in employment than was the case for those who had not attended such courses. Analysis using the Chi Square test showed that the difference between the two groups was just less than significant. ($0.1 > p > 0.05$).

As was indicated from the results obtained in the preliminary investigation, an important qualification for employment from the point of view of both employer and potential employee, was some form of proof of ability to carry out the work. Proof of ability could, however, be furnished by virtue of the individual having had previous experience of similar work or having attended a special training course.

In order to examine the influence of vocational training on employment outcome, respondents were requested to give details of the training which they had received for their present or most recent employment. (Table 10.11).

	Successful	Unsuccessful
Previous experience of similar employment	7	4
Government Training Centre	4	4
Special Training Course run by Employer	6	1
Other Training	4	0
No Special Training	36	17

Table 10.11. Vocational Training for Present or Most Recent Employment (Number of Successful and Unsuccessful Individuals).

As a result of the small numbers within separate categories it was not possible to carry out an overall statistical analysis. It was, however, possible to examine the employment outcome for individuals who had undergone some form of vocational training in comparison to those who had no vocational training. Analysis using the Chi Square test showed a result just less than significant at the 0.05 level. Of those individuals who were successful, a greater proportion than of those who were unsuccessful had undergone a Special Training course run by their employer. (Chi Sq. = 2.1, $0.10 > p > 0.05$). Further analysis showed no significant difference in employment outcome between individuals who had had previous experience of similar employment (Chi Sq. = 0.0001, $0.5 > p > 0.45$); individuals who had attended a Government Training Centre (Chi Sq. = 0.6, $0.25 > p > 0.15$) and individuals who had no form of training at all.

Overall, the results indicated that although a greater proportion of successful individuals than unsuccessful individuals had received some form of vocational training the difference between the two groups was not significant (Chi Sq.= 0.19. $0.35 > p > 0.25$). This result is somewhat surprising in view of the suggestion, arising from the preliminary investigation, that individuals who had had previous experience or training had found it easier to obtain employment than was the

case for those without any training. The comments of those individuals interviewed during the preliminary investigation did, however, suggest a possible reason which might explain why more individuals who had been trained were not successful. It was suggested by these leavers that individuals who had difficulty in obtaining employment would attend any available training course, whether or not it was in the area of employment which they desired to enter, just in order to have some constructive means of passing the time during periods of unemployment. Consequently the training which they had received might bear no relevance to the employment subsequently undertaken, with the ultimate result that all the problems and difficulties which it might be hoped would be removed by appropriate training were still manifest and could still lead to failure.

10.7. Visual Difficulty.

The sample used for investigation of the incidence of visual difficulties experienced in employment, and the influence of such difficulties in employment outcome included 2 successful individuals in part time employment, in addition to the 57 successful individuals who had entered full time employment. The number of unsuccessful individuals (26) remained the same.

The results showed that for successful individuals, 30.5% had never experienced any visual difficulty in their employment, 64.4% had sometimes experienced visual difficulty and only 5.1% had often experienced visual difficulty. For unsuccessful individuals, it was found that as many as 57.7% had never experienced any difficulty, and only 30.8% had sometimes experienced visual difficulty. It was found, however, that the proportion of unsuccessful individuals who had stated that they often experienced visual difficulty was 11.5%; more than double the proportion of successful individuals who had often experienced difficulty.

Due to the small numbers within the category of 'often experienced visual difficulty', analysis could not be undertaken without combining categories to those shown in Table 10.12.

Visual Difficulty	Successful	Unsuccessful
Never Experienced	18	15
Sometimes/Often	41	11
Chi Sq. = 6.8	$0.005 > p > 0.0005$	

Table 10.12. Visual Difficulty. Numbers of Successful and Unsuccessful Individuals.

Analysis using the Chi Square test showed that a significantly greater proportion of unsuccessful than successful individuals never experienced any visual difficulty. This is in fact the same paradoxical result as was observed in relation to the first employment obtained after leaving school. It cannot be considered, however, that the differences between successful and unsuccessful individuals can also be attributed to some process of selective memory.

In view of the reports which indicate that maladjustment and extremes of reaction can arise as a result of persistent failure (Van Den Bergh, 1964), it would appear that a possible explanation for the paradoxical difference observed between successful and unsuccessful individuals is that the latter might tend to reject, or are unable to recognise the fact that their partial sight does place some limitations on their capabilities. It cannot, however, be determined from the

data obtained whether this attitude leads to employment failure or is as a result of employment failure.

This apparent refusal amongst unsuccessful individuals to accept that there are limitations imposed by their visual condition was further borne out by the differences observed between successful and unsuccessful young workers in the proportions of individuals who stated that they never experienced any kind of difficulty. (Table 10.13).

Any Difficulty	Successful	Unsuccessful
Never Experienced	22	14
Sometimes, Often	37	12
Chi Sq. = 2.76	$0.05 > p > 0.025$	

Table 10.13. Any Difficulty Experienced. Number of Successful and Unsuccessful Individuals.

Analysis using the Chi Square test showed that again a significantly greater proportion of unsuccessful individuals than successful individuals stated that they had never experienced any kind of difficulty in their employment.

10.8. Income and Responsibility

The net weekly income from the present or last employment was compared between successful and unsuccessful young adults, and examined in relation to whether or not the individual had remained in the first employment entered after leaving school.

The results, given in Table 10.14, indicate that individuals, both male and female, who remained in their first employment earned on average slightly more than individuals who, within the same period of time, had changed their job. The differences observed were, however, not significant. (Randomisation test, S.Siegel 1956).

	Less than 3 yrs. after School	3-6 yrs. after School	7 yrs. and more after School
Males			
Still in 1st Employment	£11.50	£17.00	£22.00
Left 1st "	£ 9.50	£16.00	£20.00
Females			
Still in 1st Employment	£10.25	£12.50	£16.00
Left 1st "	-	£11.50	£15.50
Males			
Successful	£11.00	£16.50	£21.00
Unsuccessful	£ 8.00	£17.00(15.00)	£21.00
	$0.02 > p > 0.01$	$p > 0.05$	$p > 0.05$
Females			
Successful	£ 7.00	£12.00	£15.00
Unsuccessful	£14.50	£12.00	£10.00

Table 10.14. Average net weekly income, successful and unsuccessful leavers. Individuals still in first employment. Individuals who had left first employment.

With respect to successful and unsuccessful individuals, beyond a period of 3 years after leaving school there was no difference in the level of income achieved by males in either group. Within a period of 3 years, however, successful males earned significantly more than unsuccessful males. The similarity in average income observed for the two older groups,was as a result of one unsuccessful male having reported a remarkably high income form his last job. It could not be ascertained whether this figure was an error, but on removing that figure, the average income for successful males, was reduced by £2 to £15.00 per week, an average significantly less than that observed for successful males.

Analysis of the net weekly income of successful and unsuccessful females, could not be carried out due to the small numbers within each of the groups. Furthermore, the average calculated for unsuccessful females appeared to be skewed in completely the wrong direction, the younger less experienced girls having earned a great deal more than the older more experienced girls. Two individuals in the less experienced group had, however, reported a very high income from the employment which they had eventually left. It was possible that these individuals misunderstood the instructions and reported gross weekly income as opposed to net 'take home' pay, but correction by such a factor still resulted in a

figure for average income of unsuccessful females that was very much higher than was the case for successful females within a period of three years after leaving school.

Overall, the results suggest that within a period of three years after school, unsuccessful males who had been unemployed for at least 50% of the time available, were able only to obtain poorly paid employment. After a period of 3 years, whilst unsuccessful males received on average a lower income than successful males, lengthy periods of unemployment did not seem to affect significantly the level of income that could be achieved. Indeed over 7 years after school, the level of income was no different between individuals who had been fully employed and those who had been unemployed for anywhere between $2\frac{1}{2}$ and 6 years.

The lack of relationship between income and success was emphasised by the opinions reported by the individuals toward their income. (Table 10.15). Almost exactly equal proportions in each group held similar views. Approximately 46% of the successful young workers felt that they earned at present, or had earned in their most recent employment, a satisfactory wage, whilst 44% felt that they did not earn, or had not earned a satisfactory wage. In the group of unsuccessful young workers the proportions

were exactly equal; 35% considered that their present or previous wages were satisfactory . 35% considered that they were not satisfactory and the remainder did not reply. For respondents, there was no significant difference between successful and unsuccessful individuals in their opinions on income.

	Successful	Unsuccessful
Earn Satisfactory Wage	27	9
Do not earn Satisfactory Wage	26	9
Chi Sq. = 0.117	$0.4 > p > 0.35$	

	Successful	Unsuccessful
Will earn satisfactory wage if stay	35	11
Will not earn satisfactory wage if stay	17	8
Chi Sq. = 1.032	$0.15 > p > 0.1$	

Table 10.15. Opinion on Income and Future Financial Prospects (Number of Respondents)

A difference between the two groups was indicated in opinion on future prospects. Amongst successful individuals a larger proportion than amongst unsuccessful individuals felt that they would eventually earn a satisfactory wage if they stayed in their present work.

The difference between the two groups was not, however, significant.

With respect to the responsibility attained by leavers the results indicated that a greater proportion of successful young adults than unsuccessful young adults felt that they held a position of responsibility. The difference observed between the two groups was only just short of significant. (Table 10.16.)

	Successful	Unsuccessful
Have responsibility	19	5
Do not have responsibility	35	16
Chi Sq. = 1.737	0.1 > p > 0.05	
Will have responsibility if stay	19	5
Will not have responsibility if stay	22	6
Chi Sq. = 0.08	0.4 > p > 0.35	
Want a position of responsibility	30	11
Do not " "	3	5
Chi Sq. = 0.15	p = 0.35	

Table 10.16. Resonsibility (Number of Respondents)

A surprisingly large proportion of respondents, approximately 55%, felt that even if they continued in their present employment they were unlikely to attain a responsible position. Only 8 individuals stated that they did not want a position of responsibility. With respect to these two aspects, there was no difference between successful and unsuccessful individuals.

These results would seem to suggest that it is relatively important to partially sighted young adults to feel that they have some degree of responsibility in their work, and that those who are able to maintain reasonably full employment are more likely to feel that their current or last occupation satisfied that requirement.

10.9. Quality, Effort and Work Rate.

It was found that work rate, and the effort required to maintain that work rate, were significant factors in relation to success or failure in employment. (Table 10.17).

A significantly larger proportion of unsuccessful individuals, than successful individuals, stated that it was important for them to work fast and they had to try hard to do so. The results showed also that a greater proportion of successful individuals, than unsuccessful individuals, did not have to try hard for their work to be as good as that of their normally sighted workmates. This trend was, however, not significant.

	Successful	Unsuccessful
Important to work as fast	16	13
Not important to work as fast	36	7
Chi Sq. = 11.37	0.0005 > p	Significant
Have to try hard to work as fast	12	7
Do not have to try hard to work as fast	38	13
Chi Sq. = 2.831	0.05 > p > 0.025	
Have to try hard for work to be as good	18	6
Do not have to try hard for work to be as good	32	15
Chi Sq. = 0.9655	0.25 > p > 0.15	

Table 10.17. Quality, Effort and Work Rate. (Number of Respondents).

The results indicate that the effort required to produce an output of quality equal to that of normally sighted workers was not of as much importance as that required to be equally as fast. They show also that for the unsuccessful individual it was not too great an effort to produce work of equal quality, but it was more difficult to work at the requisite speed. Some workers were therefore being penalised, and thus becoming unsuccessful, not because they were inherently incapable of carrying out the work, but because they simply could not carry it out at an adequate rate.

These results further emphasise the value and benefits that could be derived from the establishment of a Rehabilitation and Training Centre designed solely to meet the needs of the partially sighted. An inherent incapability in an individual cannot be overcome but an adequate standard of skill could well be achieved by appropriate training or modification of existing work procedures. Individuals who at present have to leave occupations because they cannot maintain an adequate standard,or in which they might continue with little hope of advancement,could be retrained for more appropriate occupations or assisted in their present occupation by experts specially trained to deal with the occupational problems of the partially sighted.

10.10. Value, Enjoyment and Satisfaction.

A significantly greater proportion of successful individuals than unsuccessful individuals stated that they enjoyed their work, but there was no difference between the two groups in attitude towards the contribution that they felt they made either to the firm or to others outside the firm. In both groups approximately 75% of respondents felt that their work made a real contribution to others outside the firm. (Table 10.18).

	Successful	Unsuccessful
Work is of value to firm	44	18
Work is not of value to firm	4	3
Chi Sq. = 1.4	$0.15 > p > 0.1$	
Work is of value to others outside the firm	34	15
Work is not of value to others outside the firm	11	4
Chi Sq. = 0.2	$0.35 > p > 0.25$	
Enjoy work	46	13
Do not enjoy work	7	8
Chi Sq. = 7.404	$0.005 > p > 0.0005$	

Table 10 18. Value and Enjoyment. (Number of Respondents)

With respect to the opinion on the satisfaction they achieved from their work there was no difference between successful and unsuccessful individuals. (Table 10.19)

	Successful	Unsuccessful
Satisfied with work	37	14
Dissatisfied with work	17	6
Chi Sq. = 0.16	$0.35 > p > 0.25$	

Table 10.19. Satisfaction. (Number of Respondents).

An open ended section was provided for respondents to state reasons for satisfaction or dissatisfaction. (Table 10.20).

	Successful	Unsuccessful
Reasons for Satisfaction		
Enjoy Work/Interesting/ Responsible	16	3
Good Pay, Prospects and Experience	6	3
Get on well with others/ others helpful	5	6
Near Home	1	1
A job after long unemployment	1	1
Reasons for Dissatisfaction		
No scope for ability/could do better	0	2
Too far from home	1	1
Boring/no responsibility/too difficult	4	1
Poor pay/prospects	8	0

Table 10.20. Reasons for Satisfaction, Dissatisfaction. (Number of Respondents).

A total of 60 individuals gave reasons of satisfaction or dissatisfaction with their present or most recent employment. Statistical analysis of differences between successful and unsuccessful individuals could not be carried out due to the small numbers of individuals in each category. The results suggest, however, that for successful individuals the major criteria of satisfaction

were the enjoyment, interest and responsibility afforded by the work, whilst the major criteria for dissatisfaction were poor pay or prospects. For unsuccessful individuals satisfaction would appear to be related to the good relationships achieved with other workmates, and dissatisfaction related to the work being less than commensurate with the individuals own appreciation of his abilities.

10.11. Relationships.

Investigation of the relationships between partially sighted young adults and both their workmates and their employer, showed that the vast majority of both successful and unsuccessful young workers felt that their employer and workmates were helpful and friendly. (Table 10.21).

	Successful	Unsuccessful	
Did not 'get on' with workmates	3	2	
Did 'get on' with workmates	56	20	
Chi Sq. = 1.4	0.15 > p > 0.1	Not Significant	
Did not find workmates helpful	2	3	
Did find workmates helpful	53	18	
Chi Sq. 1.5	0.15 > p > 0.1	Not Significant	
Did not 'get on' with Employer	8	4	
Did 'get on' with Employer	44	16	
Chi Sq= 0.678	0.25 > p > 0.15	Not Significant	
Did not find Employer helpful	8	4	
Did find Employer helpful	44	16	
Chi Sq.= 0.678	0.25 > p > 0.15	Not significant	

Table 10.21. Relationship with Workmates and Employer. (Numbers of Respondents).

Analysis using the Chi Square test showed that there was no significant difference in the proportions of successful and unsuccessful young adults who had found their workmates and employer helpful, get on well with them, and those who had not. This result is in direct contrast with that observed for relationships in the first employment entered on leaving school (Ch. 9..) A significant number of young school leavers left that particular employment because they were unable to get on with either their employer or their workmates, and because neither was helpful to them.

The difference between these two results suggests that for the majority of partially sighted young adults difficulties in relationships with other individuals, no matter what the possible cause, are eventually overcome with experience, and do not have any lasting effect on subsequent employment success.

The length of time required or the form of experience necessary cannot be determined from the data that was obtained. As the average age of the sample of successful and unsuccessful individuals was 20.5 years and the age of school leavers was between 16 and 17 at the time of the first employment, then certainly within 3 to 4 years of leaving school it would appear that problems in relationships have been relatively successfully overcome.

Three or four years, however, is an extremely long period of time and simply because these difficulties seem to eventually disappear for the majority of partially sighted young adults does not mean that either their cause or effect can be ignored. A clear example of the importance of good adjustment and the effects of maladjustment was observed in the preliminary investigation.

A young man, aged 25 years, working in an engineering firm, and now a well adjusted individual, had when he left school wanted to become a skilled engineer. In pursuit of this objective he undertook a full time further education course. He found, however, that having had no experience of working with or even just mixing with normally sighted people of his own age, he felt 'different' and was unable to get on with his colleagues or lecturers. Nor was he able to ask for their assistance, which he badly needed as he could not see the blackboard during lectures and could not keep up in note taking. As a result he left the course and had to undertake many different unskilled occupations during which he gained sufficiently in experience and maturity to allow him some 9 years later, and with the assistance of his present employer, to once again attempt to undertake further education in his chosen occupation. Although he now understands that his problems when he left school stemmed from his own inexperience and

immaturity and were virtually all of his own making he stated that when he left the course he thought that his difficulties were due to other people not being able to or not wanting to understand or help. Similar comments were made by many of the partially sighted school leavers interviewed during the preliminary investigation.

It is clear that although the young man is now well adjusted and on route to achieving his ambitions, had he had some psychological assistance and support when he left school he most certainly would not have had to spend some four to five years of frustration, disappointment and confusion.

The importance of such psychological support has been recognized within recent years in America (Mehr 1970). Small group therapy and psychological counselling programmes have been introduced in order to try and help partially sighted school leavers overcome the psychological problems which can arise when they first enter the world of employment. (Mehr et al. 1972). Although these programmes have only been introduced within recent years, the preliminary reports would seem to suggest that school leavers derive great benefit from such assistance. (Mehr 1972). In view of the number of school leavers which it has been suggested might suffer from difficulties in adjustment (Ch. 9.) and in view also of the suggestion that the consequences can be far reaching in the long term, it would seem that the introduction of group

counselling programmes might assist a large proportion of partially sighted school leavers to achieve vocational ambitions which they might otherwise never have attained; or at the very least, sooner than they might otherwise have done, and with far less distress.

10.12. Expectations.

In order to try and gain further understanding of the expectations of partially sighted young adults and to examine the limitations which they felt their handicap placed upon them, respondents were asked specific questions about their hopes for the future.

When asked if they intended to continue in their present employment, 47 (65%) of the 72 individuals in full time employment, stated that they would wish to do so. Analysis using the Chi Square test showed that there was no significant difference between successful or unsuccessful individuals in their intention of either continuing in or leaving their present employment.
Table 10.22.

	Successful	Unsuccessful
Will continue in present employment	34	13
Will not " " "	19	7
Chi Sq.= 0.04	0.45 > p > 0.4	Not Significant

Table 10.22. Intentions of Continuation in Present Employment. (Number of Respondents)

The reasons given for intending to leave were very similar to those given for leaving the first employment. The majority did not like or enjoy the actual work, or

wanted a better, different job with more money. The two most important single factors were consideration of pay and future prospects. The reasons given for intending to continue did, however, provide additional information. Whilst for the majority, the reasons given were positive, for approximately 19% of the group the reasons for continuing in their present employment were definitely negative.

The positive reasons were almost exactly similar to those expressed by the individuals satisfied with their work, but with a slightly greater emphasis on the social aspects. The reason most frequently put forward for continuing was because of the close relationships and friendships which had been attained with fellow workmates. The enjoyment achieved and the interest provided were the next most important reasons along with the good prospects that seemed likely in pay and advancement. Several other factors were mentioned by a few individuals, these being the proximity of the work to their home, the experience they felt they were gaining from that particular employment and the ease with which they could carry out the work.

The negative reasons centred around one particular aspect. These individuals felt that although they did not like their present job, or the pay and prospects were not what they would want, it seemed unlikely to

them that they would be able to obtain another job, or even have the opportunity to obtain the skills or training required for a desired employment. The reasons given fell roughly into two categories. Approximately one half of the group considered that they did not have the necessary skills or ability to undertake any other form of employment. The remainder considered that even if they were able to undertake alternative employment, and the jobs were available, their previous experience seemed to indicate that the majority of employers would be unwilling to give them the opportunity, mainly because of the employer's attitude and lack of understanding of partial sight. One individual in particular stated that he could not risk the guaranteed security he had achieved through becoming proficient in his present employment, even for better work or more pay.

Both of these factors were covered by further questions in the survey. All respondents were asked if there was a particular job which they would like to have, and if they felt that there was any reason which might prevent them from eventually having such a job.

Of the 95 respondents, 48 (50.5%) stated that there was a particular job that they wished one day to enter. Just under 70% of that group felt that there was a specific reason which prevented them from obtaining that

job. Comparison of successful and unsuccessful individuals showed no significant difference between these two groups. A strong trend was, however, indicated, that a greater proportion of unsuccessful individuals had the unrealistic attitude that there was no reason which could prevent them from obtaining their desired employment. (Table 10.23).

	Successful	Unsuccessful
Reason to Prevent	24	9
No Reason to Prevent	9	6
Chi Sq. = 1.483	$0.15 > p > 0.1$	Not Significant

Table 10.23. Expectations. Number of Respondents.

The reason given by the majority (57.5%) was simply that they felt that their vision was not good enough for the desired employment. Three stated specifically that the work they desired would involve small print which they would not be able to read. Two stated that their inability to drive a vehicle was the main barrier. Twenty-four percent, the next largest group, felt that they did not have adequate qualifications or that they would be unable to obtain training for the work; 9.25% felt that employers did not

understand the meaning of partial sight and consequently would not employ them, and the remainder gave various reasons ranging from not being in a position to give up their present security to not being 'clever enough'.

With respect to employment in general, as opposed to specific employment that was particularly desired, of the entire sample of 95 leavers, 42% felt that their partial sight prevented them from obtaining only some or very few jobs, whilst 30% felt that it prevented them from obtaining most, if not all alternative employment. Again, a larger proportion of unsuccessful individuals than successful individuals felt that their partial sight prevented them from obtaining most if not all available employment. The difference was only just short of significant. (Table 10.24).

	Successful	Unsuccessful
Partial Sight Prevents Obtaining		
All/most jobs	18	11
Some/Very few	30	10
Chi Sq. = 2.009	$0.1 > p > 0.05$	Not Significant

Table 10.24. Consequence of Partial Sight in Obtaining Employment. (Number of Respondents).

In contrast, only 17% of the sample felt that their partial sight prevented them from carrying out all or most types of employment. The majority, 53% felt that their vision prevented them from being able to carry out only some or very few jobs. In this case there was no difference between successful and unsuccessful individuals. (Table 10.25).

Partial Sight Prevents Carrying Out:	Successful	Unsuccessful
All/Most Jobs	12	4
Some/Very Few	35	15
Chi Sq. = 0.03	$0.4 > p > 0.35$	Not Significant

Table 10.25. Consequences of Partial Sight on Carrying Out Employment. Numbers of Respondents.

It is evident that the majority of partially sighted young adults consider that whilst their vision might limit their ability to carry out some occupations, it does, however, present a major barrier that prevents them obtaining most of the occupations which they might wish to enter. It is also evident from the reasons given, that much more could be done to assist these individuals to obtain and successfully carry out their desired employment. Of the 48 individuals who had a particular employment which they specifically desired, 21 felt that their vision would probably not be adequate.

Yet, almost certainly, the vast majority could attain the visual requirements by the use of a low vision aid designed specifically for the special requirements of their desired occupation. Studies of the use of low vision aids in employment have shown success rates of between 69% and 76%. (Beckett 1962, Barrett 1970, Rosenbloom 1970). Given that it would take some time to introduce provisions designed specifically for the partially sighted, the problem of their being unable to obtain the necessary assistance could be alleviated to some extent almost immediately by providing more places within the special training establishments currently provided for all handicapped individuals. It would also be of benefit if access to establishments provided for the blind was made possible for all partially sighted individuals and not just those individuals endorsed under Section C4 of the BD 8.

10.13. Registration as a Disabled Person.

Information on registration as a disabled person was provided by 89 individuals. Of this group 45 (approximately 51%) had registered as disabled persons. A significantly greater proportion of unsuccessful individuals, than successful individuals, were registered as disabled persons. (Table 10.26).

Registered as Disabled.		Successful	Unsuccessful
Yes		28	17
No		35	9
Chi Sq. = 4.12	$0.02 > p > 0.01$	Significant	

Table 10.26. Registration as Disabled. Numbers of Successful and Unsuccessful Individuals.

Of the 45 registered individuals only 5 were of the opinion that registration had eased their difficulties in employment. Two individuals stated that as a result of registration they had obtained special training and subsequent entry to an occupation which they particularly wanted, two others stated that they had gained entry to an occupation which they considered they would otherwise not have been able to enter, and the fifth individual stated that his registration gave him security. Twelve of the 45 respondents felt unable to judge whether or not their registration had been of any advantage, but the

remaining 28 individuals considered that it had been of no advantage at all. The majority (20 individuals) had found it no less difficult to obtain employment than when they had not been registered. The remaning 8 individuals considered that their registration was a positive disadvantage. In the experience of these 8 individuals employers were unwilling to take on registered disabled persons because it was believed that registration was synonymous with incapability or because employers felt that handicapped individuals were a burden and responsibility which they did not want.

Of the 44 individuals who had not registered as disabled persons 16 gave no reasons. Of the remaining 28, however, the vast majority (17) stated categorically that they did not consider themselves as handicapped or disabled persons. Indeed 5 of these individuals felt that registration was a label of inferiority which they could well do without. A further 4 individuals considered that there was little point in registering as they could see no advantages which might be gained. One individual in particular pointed out that although firms with more than 20 employees were required by law to employ registered disabled persons, the law was unenforceable and therefore provided little advantage. Disabled individuals need only be described by the employer as hazards to themselves or others, in which

case the employer would be entitled to fill the vacancy with an able bodied worker. The remaining 7 individuals had not registered as disabled because they had never been advised that they were eligible to do so and indeed knew nothing of the services that were available to them.

Although the special facilities and services provided for registered disabled persons as well as those provided for the blind, are open to partially sighted individuals, it would seem apparent from the results obtained that there can be no substitute for provision of a Rehabilitation and Training Centre designed specifically to meet the special needs of the partially sighted. Expert staff trained to deal with their special occupational problems could provide advice and information to potential employers, such that they could have a better understanding of the capabilities and limitation of the partially sighted applicant. Employers would undoubtedly be more willing to employ partially sighted individuals if they felt that both they and their employees could obtain expert advice and guidance before problems arose, and real practical help if and when any subsequent difficulties did arise.

The results also indicate that if training and rehabilitation facilities were available in conjunction

with an advisory and assessment centre, many more partially sighted school leavers and young adults, than is at present the case, could be assessed, trained and placed in employment which was genuinely commensurate with their abilities. Unless some such provision is made the results show that at least 70% of all partially sighted school leavers will fail to gain entry to the employment which they desire, employment which the vast majority have the capability of carrying out successfully and in which they could make a real and satisfying contribution to society.

Chapter 11.

Ophthalmic Condition and Employment Success.

11.1. Ophthalmic Condition.

The influence of ophthalmic condition on employment proficiency has been examined previously in relation only to individuals supplied with low vision aids. Although the results of earlier investigations (Weiss 1963, Bier 1960) seemed to indicate that specific types of condition were likely to give rise to greater problems than others, the results of more recent investigations (Krieger 1967, Rosenbloom 1970, Barrett 1970, Brazelton et al. 1970) indicate that there is no association between success and pathologic type. (Ch. 11.8).

No investigations have, however, examined the relationship between pathologic type and proficiency in employment for individuals from within the general partially sighted population.

It was hoped therefore that the information obtained from the major study would allow investigation of pathologic type in relation to employment outcome. The preliminary investigation had, however, indicated that as a result of the large number of conditions present in the partially sighted population, it would

be extremely unlikely that any adequate investigation could be carried out without obtaining information for a very large number of individuals. As the sample numbered only 95 individuals, for whom pathologic type was known in only 70 cases, it was not expected that any analysis could be undertaken. Nevertheless, the employment outcome for individuals of specific pathologic type was compared.

To ensure that the sample was reasonably representative of the total population of partially sighted school leavers, the incidence of conditions observed in the sample was compared to that determined by Fine (1968). The survey by Fine covered 1,374 children in schools for the partially sighted, born in the period, 1951-1955 and the period 1956-1960. The former period, 1951-1955, is approximately that within which the major proportion of respondents had been born. Table 11.1 gives the incidence of particular ophthalmic conditions observed for the 70 individuals for whom data was available, in comparison to the incidence observed by Fine in the 1951-55 group. The only obvious difference is in relation to myopia, the incidence being 7.1% in the sample group, whereas Fine found 14.0%. The incidence found for the sample group is in fact much closer to the 9.0% found by Fine for the group born 1956-60. There is no obvious explanation for this difference. The incidences for all other conditions do not differ by any significant amount from those found by Fine.

Ophthalmic Condition	Male	Female	Total	%	Fine%
Cataract	12	8	20	28.6	27.1
Optic Atrophy	6	4	10	14.3	12.0
Developmental Defects/ Glaucoma	4	4	8	11.4	7.8
Albinism	7	0	7	10.0	9.7
Nystagmus	6	0	6	8.6	11.2
Myopia	4	1	5	7.1	14.0
Retrolental Fibroplasia	2	3	5	7.1	6.0
Retinitis Pigmentosa/	3	0	3)	4.3	8.7
Macular Degeneration	2	1	3)	4.3	
Keratitis/Corneal Lesions	1	1	2	2.9	0.9
Cone Blindness/Other	1	0	1	1.4	2.6
	48	22	70	100.0	100.0
Not Known	14	11	25		
	62	33	95		

Table 11.1. Incidence of Ophthalmic Condition Sample Group Compared with Fine 1968.

With respect to ophthalmic condition, the sample was considered as being reasonably representative of the total population.

Table 11.2 gives the incidence of ophthalmic condition for both successful and unsuccessful males and females.

	Successful			Unsuccessful		
	M	F	T	M	F	T
Cataract	7	4	11	5	4	9
Optic Atrophy	4	3	7	2	1	3
Glaucoma/ Developmental Defects	4	3	7	0	1	1
Albinism	7	0	7	0	0	0
Nystagmus	4	0	4	2	0	2
Myopia	4	1	5	0	0	0
Retrolental Fibroplasia	1	2	3	1	1	2
Retinitis Pigmentosa	1	0	1	2	0	2
Macular Degeneration/ Dystrophy	1	1	2	1	0	1
Keratitis/Corneal Lesions	0	0	0	1	1	2
Cone Blindness	0	0	0	1	0	1
	33	14	47	15	8	23
Not Known	11	8	19	3	3	6
	44	22	66	18	11	29

Table 11.2. Incidence of Ophthalmic Condition. Numbers of Successful and Unsuccessful Males and Females.

As expected the small numbers of individuals within each classification of ophthalmic condition did not allow statistical investigation of differences in employment outcome between conditions. Classifications could not of course be meaningfully combined.

Inspection of Table 11.2 does, however, indicate that individuals with visual defects as a consequence of Myopia, Albinism, Nystagmus, Optic Atrophy, Developmental Defects and Glaucoma were more likely to achieve success in employment than was the case for individuals whose partial sight was as a consequence of Keratitis, Cone Blindness, Retrolental Fibroplasia, Retinitis Pigmentosa, Macular Degeneration and Cataract.

In view of both the small numbers involved and the range of variation within any one individual ophthalmic condition the indications given by these results can not be considered as indicative in any way, of the likely employment outcome for a particular pathologic type.

11.2. Prognosis.

The preliminary investigation had indicated that investigation of the relationship between employment outcome and the course of an ophthalmic condition would be subject to inaccuracy if the prognosis, that is, the expected course of the condition, were to be used as the source of information on the actual course of the condition. (Ch.4.4).

Determination of whether or not the condition had deteriorated during the period in which respondents had been available for employment was not possible, however, without undertaking examination of all respondents and comparing the findings to those obtained at the time they left school. For the number of respondents involved such examinations were not feasible.

The investigation was, however, concerned not only with determining the factors which affect employment outcome but with obtaining means by which the likely employment outcome for a particular individual might be predicted. The Prognosis of the condition, with all its attributed inaccuracies, was at least information available at the time of assessing employment potential. If it was the case that individuals in whom the condition was expected to deteriorate, or where the prognosis was uncertain, were in fact found to be more often unsuccessful than those whose condition was

expected not to change, such information would be of some value in determining an appropriate course of action.

Prognosis was classified in three groups: 'Stable', 'Degenerative' and 'Uncertain'. For the purpose of analysis the latter two classifications were combined.

Prognosis	Successful	Unsuccessful
Stable	35	13
Degenerative/Uncertain	12	10
Chi Sq. = 3.216	$p < 0.05$	Significant

Table 11.3. Prognosis. Number of Successful and Unsuccessful Individuals.

Analysis showed that the stability of the condition was significantly related to employment success. A significantly greater proportion of individuals with a stable condition were successful in employment than was the case for individuals with a degenerative or uncertain condition. Further investigation will be required in order to determine the mechanism by which an unstable condition can lead to employment failure. Employers may be unwilling to retain employees whose efficiency fluctuates with their ability to cope with changes in resolution or

who may require intermittent hospitalisation. Alternatively, intermittent hospitalisation at an early age allied with a fluctuating visual condition may interfere with development of the ability to use residual vision or even affect social and emotional adjustment in later years. Regardless of the mechanism involved, it is clear that individuals whose ophthalmic condition is unstable require particular attention if they are to attain satisfactory employment.

Within the provisions at present available, partially sighted individuals whose vision has deteriorated such that they are unable to continue in their chosen occupation can obtain training for new or alternative skills through courses designed and run for the blind. These courses make the assumption that the remaining residual vision is of little or no practical use to the individual, and are thus wholly inappropriate for the individual whose vision is still sufficiently adequate for him to successfully undertake alternative work. Provision of suitable retraining services and facilities, sufficiently flexible to aid, teach and advise on how lost efficiency might be regained, and in a position to maintain close contact and provide support over a period of years, would be of immediate and immense benefit to these individuals in particular.

11.3. Age of Onset.

The onset of a visual condition which brings about a reduction in visual acuity is unquestionably a traumatic experience for the individual who has previously been used to acute vision, and can initially appear to them as an insurmountable handicap. For these individuals, used to leading a full life dependent on normal vision, learning to develop new skills and techniques to overcome the handicap is invariably a lengthy and difficult process.

It was therefore considered that for partially sighted school leavers, the age of onset of partial sight might have some bearing on their ability to develop the new skills and techniques necessary when first introduced into an unfamiliar employment. It was hypothesised that individuals whose early developmental years had been spent with a normal visual acuity might have far greater difficulty than those who had been visually handicapped from birth, and that this might be reflected in their subsequent employment success after leaving school.

Of the entire sample of 95 young adults there was no record of the age of onset of the condition in 30 cases. Of the remaining 65 individuals for whom details were available, the vast majority, 92%, had been visually handicapped at birth or within the first five years of life,

and only approximately 8% had become partially sighted at some time between the ages of 5 and 11 years. (Table 11.4).

Age of Onset	Males	Females	Total	%
Birth	38	18	56	86.15
After birth- under 5 years of age	3	1	4	6.15
5 years of age and over	2	3	5	7.70
			65	100.00

Table 11.4. Age of Onset of Ophthalmic Condition. Numbers of Individuals and Percent of Sample.

Of the 5 individuals who had become partially sighted between the ages of 5 and 11 years, all had been successful in employment after school. The number of individuals within this group was, however, too small to allow any general conclusions about onset and employment success to be drawn. It is almost certainly the case that of children in schools for the partially sighted a greater proportion than only 7.7% became partially sighted between the ages of 5 and 15 years. Sorsby (1960) found 78% in that age group. The discrepancy between the results obtained in the sample group and those ..

observed by Sorsby suggests that the classification used in this study might have been misinterpreted by those completing the record forms. A more useful record would, however, have been obtained had details been requested of the age at which, in the consultant's opinion, the visual acuity would have been such that the person would have benefited from special education.

Whilst an understanding of how the congenitally visually handicapped individual copes with limited visual information is essential, an understanding of the problems posed for the individual who previously has been used to better vision, and particularly how the developing child deals with these aspects, is even more essential if these individuals are to be adequately helped to overcome their difficulties.

11.4. Visual Acuity.

The visual acuity of respondents was obtained from their most recent ophthalmic record in order to examine any relationship which might exist between employment outcome and specific levels of Visual Acuity.

Table 11.5 gives the Distance visual acuity of both successful and unsuccessful males and females. Overall statistical investigation of all levels of visual acuity recorded could not be undertaken because of the small numbers within each classification.

Dist. Acuity	Successful			Unsuccessful		
	M	F	T	M	F	T
6/9	-	2	2	1	2	3
6/12	2	3	5	-	1	1
6/18	7	1	8	1	-	1
6/24	8	3	11	2	1	3
6/36	5	1	6	5	1	6
6/60	7	4	11	4	-	4
3/60	2	-	2	-	-	-
2/60>	2	0	2	2	3	5
	33	14	47	15	8	23

Table 11.5. Distribution of Distance Visual Acuity, Number of Successful and Unsuccessful Individuals.

This data could, however, be meaningfully combined to allow investigation of the relationship between individual levels of visual acuity and employment success.

Analysis of both males and females with visual acuity of $\frac{6}{36}$ and better, compared to males and females of visual acuity $\frac{6}{60}$ and worse, showed no significant difference in employment outcome between the two groups. (Table 11.6).

	Successful	Unsuccessful
$^{6}/_{36}$ and better	32	14
$^{6}/_{60}$ and worse	15	9
Chi Sq. = 0.75	$0.25 > p > 0.15$	Not Significant

Table 11.6. Distance Visual Acuity. $\frac{6}{36}$ and better compared to $\frac{6}{60}$ and worse. Number of Successful and Unsuccessful Individuals.

A trend was, however, indicated for a greater proportion of individuals with acuity of $\frac{6}{36}$ or better to have been successful in employment than was the case for individuals with acuity of $\frac{6}{60}$ or worse.

Analysis of the success of individuals with visual acuity of $\frac{6}{24}$ or better compared to those with acuity of $\frac{6}{36}$ or worse, showed in fact that there was a significant difference between the two groups. (Table 11.7).

	Successful	Unsuccessful
$^{6}/_{24}$ and better	26	8
$^{6}/_{36}$ and worse	21	15
Chi Sq. = 3.49	0.05 > p > 0.025	Significant

Table 11.7. Distance Visual Acuity $\frac{6}{24}$ and better compared to $\frac{6}{36}$ and worse. Number of Successful and Unsuccessful Individuals.

A significantly greater proportion of individuals with acuity of $\frac{6}{24}$ or better had been successful in employment than had been the case for individuals with poorer visual acuity.

Further analysis, showed, paradoxically, that there was no significant difference in outcome between individuals with acuity $\frac{6}{18}$ or better and individuals with acuity of $\frac{6}{24}$ or worse.

	Successful	Unsuccessful
$^{6}/_{18}$ and better	15	5
$^{6}/_{24}$ and worse	32	18
Chi Sq. = 1.36	0.15 > p > 0.1	Not Significant

Table 11.8. Distance Visual Acuity $\frac{6}{18}$ and better compared to $\frac{6}{24}$ and worse. Number of Successful and Unsuccessful Individuals.

Inspection of the distribution of visual acuity showed, however, that this result was due to a relatively high number of females with visual acuity of $\frac{6}{9}$ having been unsuccessful.

The results were re-analysed for males and females separately.

	Males		Females	
	Successful	Unsuccessful	Successful	Unsuc.
$\frac{6}{24}$ and better	17	4	9	4
$\frac{6}{36}$ and worse	16	11	5	4
Chi Sq. = 4.54			Fisher Exact Probability	
$0.025 > p > 0.01$			$p > 0.05$	

Table 11.9. Visual Acuity and Employment Success, Males and Females. (Number of Individuals).

Re-analysis indicated that there was no significant relationship between visual acuity and employment success for females, but that the association was significant in males.

Further analysis was carried out of the employment success in relation to the best near visual acuity.

Table 11.10 gives the distribution of near visual acuity for successful and unsuccessful individuals, for whom data were available.

	Successful	Unsuccessful
N5	21	12
N6	7	1
N8	2	4
N10	3	-
N12	2	-
N14	2	1
N16	1	-
N18	1	-
N24 and worse	1	2
	40	20

Table 11.10. Distribution of Near Visual Acuity. Number of Successful and Unsuccessful Individuals.

Categories had again to be combined to allow analysis. Employment outcome was thus compared for individuals with a near visual acuity of N6 or better and for those with near acuity of N8 or worse. (Table 11.11).

	Successful	Unsuccessful
N6 or better	28	13
N8 or worse	12	7
Chi Sq. = 0.472	$0.237 > p > 0.15$	Not Significant

Table 11.11. Near Visual Acuity. N6 or better compared to N8 or worse. (Numbers of Individuals).

The analysis indicated that there was no significant difference between these two groups and that therefore employment success was to a large extent independent of the near visual acuity. It should be noted, however, that for all individuals for whom data on near visual acuity was available, a very large proportion, approximately 55%, had a best near acuity of N5 or better. Indeed almost 80% of the group had near acuity of N8 or better; easily sufficient to read most typescript.

In contrast, the distribution of distance visual acuity was more widely spread. The categories $\frac{6}{24}$, $\frac{6}{36}$ and $\frac{6}{60}$, accounted for almost 58% of the entire sample in relatively similar proportions.

Overall, the results indicate that for males, employment success is associated only with a distance visual acuity of $\frac{6}{24}$ or better and for both males and females is independent of the best near visual acuity. In effect the results support the observation of teachers and careers officers that for many partially sighted individuals employment success or failure is not wholly dependent on their level of visual acuity.

11.5. Visual Field.

As with all the ophthalmic data, details of the visual field of each individual were provided by the respondents' own ophthalmic practitioner or consultant, and where this was not possible were obtained from either the hospital case notes or the ophthalmic information contained in the records of the careers services.

A classification of Good, Restricted or Poor was utilised, along with a section in which full details were requested. Extent of the field in degrees, the presence, size, and position of any scotoma and other aspects such as the presence of hemianopia were all requested. In a very large number of cases, these latter details and in particular the actual extent of the field were not completed or were not detailed in the records. It was therefore not possible to examine the effect of visual field loss in any detail. From the few cases where details were provided, it would appear that fields were classified as 'restricted', where there was a loss of at least half the normal peripheral field, and were classified as 'poor' where there remained only a small central portion or where there was a central scotoma. It would have been of assistance to the development of a description of the functional field if more detail had been available. The classification used, however, provided an assessment of visual field which was suitable

for analysis, was relatively simple, and therefore potentially useful as a predictor.

Table 11.12 gives the number of individuals within each classification.

Visual Field	Successful	Unsuccessful
Good	28	5
Restricted	8	7
Poor	4	5

Table 11.12. Visual Field and Employment Outcome. Number of Individuals.

The numbers within each classification were, however, too small to allow analysis without combining categories.

Analysis of the success of individuals with a 'good' visual field, compared to individuals with a restricted or poor visual field, showed that employment success was directly dependent on a 'good' visual field.

Visual Field	Successful	Unsuccessful
Good	28	5
Restricted/poor	12	12
Chi Sq. = 9.81, $0.005 > p > 0.0005$		Significant

The results showed that a significantly greater proportion of successful individuals had a 'good' visual field, than was the case for unsuccessful individuals. It was therefore indicated that where, in the consultant's opinion the visual field was less than 'good', a fair proportion of such individuals had been unable to remain in employment for any reasonable proportion of their time. Further investigation will be required to determine those specific aspects of field loss which interfere with employment success, and little practical vocational advice can be given to such people until this information is known. It is to be hoped that future studies might follow up school leavers and examine their employment and vision in sufficient detail to provide this information.

11.6. Nystagmus.

To examine the relationship between employment outcome and nystagmus, the success of individuals with nystagmus was compared to those in whom the condition was not present.

The data on individuals in whom nystagmus was not present was to some extent suspect. In the preliminary investigation, presence or absence of nystagmus had been recorded as a separate category from 'Ophthalmic Condition'. In every case, however, where nystagmus was present, this information had been duplicated, along with details of the visual defect, in the section on Ophthalmic Condition. A separate category for presence or absence of nystagmus was therefore not utilised in the main survey. This meant that there could be no real certainty that nystagmus was not present in individuals where no details had been given under the section 'Details of Ophthalmic Condition'. It was considered reasonable, however, to assume that where no details had been given then nystagmus was not present, as it was unlikely that such a relevant factor would be omitted in cases where the condition was present.

Table 11.13 gives the frequency with which nystagmus was present or absent in successful and unsuccessful individuals.

	Successful	Unsuccessful
Nystagmus Absent	22	14
Nystagmus Present	35	9
Chi Sq. = 0.71	$0.25 \geq p \geq 0.15$	Not Significant

Table 11.13. Nystagmus and Employment Outcome (Numbers of Individuals).

Analysis showed that there was no significant difference between the two groups, and that nystagmus therefore was not a significant factor in employment success or failure.

11.7. Colour Vision.

In many ophthalmic conditions and particularly those which directly affect the retina, colour discrimination can be defective. Yet remarkably, out of all the individuals for whom ophthalmic data was obtained, in not one case had details of the colour vision been recorded, nor an indication given that it had ever been examined.

The incidence of colour deficiency amongst the partially sighted population is completely unknown. No investigation has undertaken to examine this particular aspect. The form B.D.8, 'Examination for admission to the register of partially sighted persons' does not specifically request details of colour vision, but does provide space for details of any special investigation or tests. It is very likely that colour vision is not examined in the majority of school age admissions, principally because the examiner is more concerned with assessing suitability for special education in terms of the condition, prognosis, visual acuity and visual field.

Precisely what the incidence of colour deficiency might be within the partially sighted school population is very difficult to even assess. In the preliminary investigation, of the 11 individuals examined, 2 were found to be colour defective. The sample was, of

course, far too small to be indicative of the incidence in the population of partially sighted school leavers as a whole.

It was hoped that in the main survey, not only could the relationship between employment success and colour vision be examined, but that the results would also provide an indication of the incidence of colour deficiency in the partially sighted population as a whole. The complete lack of data, unfortunately, leaves this question still unanswered.

The apparent tendency to ignore the colour vision of partially sighted school leavers might, however, be a disguised advantage. In many occupations normal colour vision is a pre-requisite. Undoubtedly an individual known to be colour defective would be automatically excluded. The majority of colour defective individuals can, however, discriminate between colours. Although they might confuse two particular colours, considering them to be of the same group, they can frequently discriminate between the two by their relative contrast. As is the case in the normally sighted population, many partially sighted colour defectives are almost certainly quite adequately carrying out occupations from which they would be excluded were their colour deficiency known.

In order not to present any additional barriers to the employment of partially sighted individuals, it might well be advisable to allow this to continue for the time being and hope that employers continue to carry out their own tests and assessments where adequate colour discrimination is essential to safety. It would, however, be of far greater value if the suitability of the partially sighted employee could be determined in advance of his employment and the employer assured of his capability.

11.8. The Use of Low Vision Aids.

The extent and use of low vision aids amongst partially sighted young workers was of special interest in view of the improvement in resolution that can be gained from the use of an appropriate optical aid. For many partially sighted individuals optical aids can provide an increase in resolution which can allow them to carry out quite detailed visual tasks. There are many different types of aid designed for a wide range of use. There is, therefore, much scope for the practitioner to prescribe an effective aid, or even combination of aids appropriate for a patient's specific circumstances. An appropriate aid can allow a patient either to resume an employment in which as a result of a reduction in resolution he was previously unable to continue, or alternatively, can fit the patient so that he is able to carry out some new form of employment, which he would otherwise not have been able to carry out. The extent to which visual aids can improve vision, and expand the range of activities open to partially sighted individuals, has been aptly demonstrated by the results of a study and fitting programme for visually handicapped persons who failed to meet the visual acuity requirements of motor vehicle operation in America. (Korb 1970). Of 67 subjects examined, 32 were considered suitable for telescopic lenses. Twelve were considered unsuitable because the

visual loss was recent or the condition unstable, 7 because the visual acuity with the aid was less than 20/40, 9 because they were unable to adapt to the use of the aid, even after several training sessions, and the remainder as a result of either an unacceptable or inappropriate attitude. Of the remaining 32 suitable subjects, 26 subsequently obtained motor vehicle licences and compiled approximately 32 man years of driving without incident whilst wearing a binocular telescopic aid. Although 38.8% of the original total sample achieved immense success with their visual aid, it is unlikely that more than a small fraction of the total population of partially sighted persons could be corrected to such a level. The results,do, however, demonstrate the extent of improvement that can be obtained using low vision aids.

The wide range of aids available, their construction, design, fitting procedure and relative advantages and distdvantages are fully detailed in the literature (Bier 1960, Fonda 1970) and do not require further discussion here.

There have been several studies in which the factors affecting the use of visual aids have been examined, and the success of use evaluated. Freudenberger and Robbins (1959) found that the personality pattern of

the low vision patient was correlated with the successful use of an aid. Optimistic, active, industrious and self accepting patients tended to use aids but hostile, indolent and self denying patients would usually reject them. In describing the problems of providing aids for children, Moffat (1956) considered that there was a real need for psychological training before the patient used an acceptable aid. Weiss (1963) reported that children and young adults made the best candidates for visual assistance because their motivation was better than that of older patients.

Jose and Springer (1973) state that the major factors to be taken into consideration, and which affect successful use, are changes in vocation, changes in the visual condition, unmet vision needs, motivation, the type of visual error and aid, and the training given. They consider that the ultimate key to success is 'communication and co-operation' between patient and practitioner. In a follow up study of 25 patients who had received aids during a vocational rehabilitation programme, they found that 17 were still using their aid successfully after 41 months. They concluded that when an optical aid programme incorporated an effective training programme and follow up scheme, the factors which affect the use of aids become less significant hindrances to their successful utilisation.

It has been suggested also that the successful use of aids is dependent on the type of ophthalmic condition. Weiss (1963) obtained the most favourable results in cases with depressed macular function and the poorest results in advanced glaucoma, optic atrophy and retinitis pigmentosa. Fonda (1970) classified specific conditions as favourable or unfavourable for low vision correction (Table 11.4). The conditions considered least favourable are all associated with field loss.

	Favourable		Unfavourable
1.	Achromatopsia	1.	Choroideraemia
2.	Albinism	2.	Advanced Diabetic Retinopathy
3.	Aniridia	3.	Visual Field Defects
4.	Cataract	4.	Advanced Glaucoma
5.	Coloboma of Retina, Choroid and Optic Nerve	5.	Optic Atrophy associated with severe constriction of visual field
6.	Kerataconus	6.	Retinitis Pigmentosa
7.	Macular Aphasia		
8.	Heredo-degeneration of Macula		
9.	Pathological Myopia		
10.	Surgical Aphakia		
11.	Retrolental Fibroplasia		

Table 11.14. Conditions Favourable and Unfavourable for Low Vision Correction (Fonda 1970).

Krieger (1967) contended that the extent and

location of the pathology was a more important prognosticator of successful treatment than the type of pathology.

To study this concept Krieger examined 917 patients who were divided into two pathological groups: anterior segment pathology and posterior segment pathology. The first group included patients who had densities or irregularities of the refractive media, whilst the second group was composed of cases with decreased chorioretinal function or impaired optic nerve conductivity. Krieger found, however,that there was no significant difference between the two groups in the number of aids prescribed. Approximately half of each group received a visual aid. Nor was there any difference in the success rate for each group. A follow up study of 250 cases showed that 58.8% of the anterior segment group and 55.1% of the posterior segment group found that their visual aid met their needs.

The success rate for conditions favourable and unfavourable for low vision correction was also examined. Favourable conditions were albinism, macular degeneration (senile and juvenile) post cataract aphakia, corneal opacities, severe myopia, congenital nystagmus, retrolental fibroplasia, and diabetic retinopathy without haemorrhage or proliferans. Conditions unfavourable for correction were retinitis pigmentosa,

advanced glaucoma, advanced optic atrophy, retinal detachment, diabetic retinopathy with haemorrhage or proliferans, homonymous hemianopia, hypertensive and arteriolar sclerotic retinopathy with irreversable changes. Amongst the favourable conditions Krieger found a high rate of success; in nystagmus and albinism in particular. It was found, however, that even amongst the unfavourable conditions the results were relatively successful. Most individuals regardless of the pathology were successful . though more than 83.3% of all patients with hypertensive arteriolar sclerotic retinopathy found that their aid did not meet their needs.

Rosenbloom (1970), in a study of a smaple of 276 patients drawn at random from a 1000 cases who had attended a low vision programme, found results similar to those of Krieger. His results indicated that the most important factors determining the success of use of low vision aids were the amount of residual vision and the functional field of vision available, regardless of pathologic type. A careful review of the relationship between the type of ocular pathology and the degree of vision loss failed to show a significant pattern. Rosenbloom concluded that only those patients with less than $^{3}/_{200}$ visual acuity or with markedly restricted peripheral fields of vision

related to progressive types of ocular pathology were unlikely to benefit from low vision aids.

These results are in close agreement with those of Barrett (1970) who found in a study of 100 cases in Wales that the least successful group were individuals with visual acuity of less than $\frac{3}{60}$. In the studies by Barrett (1970), Rosenbloom (1970), and Brazelton et al. (1970) the success ratesfor partially sighted individuals who had been provided with low vision aids were 69%,75% and 89.1% respectively. The samples were, however, drawn from preselected populations who had attended special clinics and give no indication of the use and success of aids amongst the total working population. Krieger's (1967) results, suggest that only 50% of the total population might be suitable for aids, but in his sample over 70% of the cases were over 45 years of age.

The number of partially sighted school leavers and young workers who used low vision aids to assist them in their employment was therefore of great interest, as the sample was representative of the young working population. This population in particular is most able and most likely to benefit from low vision aids. It was hoped also that factors such as the type of aid, pathologic type, extent of visual field, visual acuity,

types of employment and success could be examined and provide direction for prescribing for future leavers.

It was therefore a great disappointment and indeed, a surprise in view of the benefits than can be obtained from visual aids, when the results showed that out of 70 respondents only 8 individuals (11.4%) used a low vision aid in their work. Detailed investigation of the factors affecting the use of low vision aids could not therefore be carried out.

Analysis showed, however, that there was no significant difference between successful and unsuccessful individuals in the proportion using a low vision aid in their employment. (Table 11.15).

	Successful	Unsuccessful
Uses L.V.A.	5	3
No L.V.A.	42	20
Chi Sq. = 0.49	$0.25 > p > 0.15$	Not Significant.

Table 11.15. Use of Low Vision Aids in Employment. (Numbers of Successful and Unsuccessful Individuals).

Of the 8 individuals who had a low vision aid, all used them quite frequently in their employment. Only 6 had, however, had the aid prescribed for their particular current needs. Two had found that they were unable to carry out their work without some form of magnification and had themselves bought hand magnifiers.

In view of the proportion of individuals who could benefit from a low vision aid, as indicated by the success rate and continuing usage found in studies of individuals who have been provided with aids, the fact that only 8.6% of the sample were found to have had an aid prescribed specifically for use in their employment. seems to indicate that those concerned with the vocational guidance and placement of partially sighted school leavers and young adults have failed to recognise or appreciate the potential benefits of low vision aids.

The results clearly indicate the need for greater attention to be paid to the provision of aids. Whilst provision is made for aids to be obtained under the National Health Service, via the ophthalmic departments in hospitals, there is clearly a need for assessment and provision of aids to be undertaken in conjunction with assessment for employment. It is almost certainly the case that the range of employment for which individuals might be suitable could be vastly expanded were it possible for them to be assessed for and prescribed visual aids appropriate to the different tasks.

11.9. Additional Handicap.

The problems arising from the presence of additional handicap have within recent years become a cause for concern amongst those dealing with partially sighted school children (Committee of Enquiry 1968). Inevitably, the difficulties involved in vocational assessment and placement are even more complex. The influence of an additional handicap on employment success was therefore a matter of some importance.

Of the group of 70 respondents for whom data were available 12 (17%) had an additional handicap. This proportion is far smaller than the 41% found by Fine (1968). It is possible that some of the difference between these results can be accounted for by differences in methods of data collection. In the study by Fine information was not only available from current ophthalmic and medical records, but also from direct examination of the children themselves and from discussion with their teachers. The data reported here were however compiled by various individuals from a variety of sources and were not under the control of the investigator. It is probable that in some instances information on the presence of additional handicaps, particularly those such as Maladjustment, and Speech and Language difficulty, was not

contained within the sources utilised.

The additional handicaps reported in the group were Physical Disability (10 cases), Severe Epilepsy (1 case) and Diabetes (1 case). The incidence of Physical Disability (14.3%) is in fact almost exactly the same as that found by Fine (14.8%), and again suggests that the less obvious handicaps were not noted in the source material utilised. No one ophthalmic condition could be related to a particular additional handicap, although Cataract was present in two cases of Muscular Dystrophy, and Optic Atrophy was present in two cases in association with spasticity where cerebral tumour had given rise to the overall condition.

Notwithstanding the probable inaccuracy of the data, analysis of the employment outcome of those known to have an additional handicap showed that employment failure is significantly related to the presence of an additional handicap. (Table 11.16). Nine of the 12 additionally handicapped respondents were unsuccessful in employment.

	Successful	Unsuccessful
Additional Handicap	3	9
No Additional Handicap	44	14
Chi sq. = 14.1	0.0005 > p	

Table 11.16. Employment Success and Additional Handicap. Number of Successful and Unsuccessful Individuals.

The results clearly indicate that special attention must be paid to individuals who have an additional handicap.

Chapter 12.

Demographic Aspects.

12.1. Family Size.

Data on Family size was obtained for 86 individuals from the sample of 95 partially sighted school leavers and young adults. The average size of families was 3.68 children with a standard deviation of ± 2 children. Table 12.1 gives the family size in relation to the frequency of response and shows that the largest single group of respondents came from families with 4 children. The next largest group of respondents came from families with 2 children. In descending order of frequency, the remaining respondents came from families of 3,5, 1, 9 and 7 children.

Family Size (Number of Children)	1	2	3	4	5	6	7	8	9
Frequency of Response (Number of Respondents)	8	17	15	22	12	3	1	0	5
Percent of Sample	10	20	18	27	14	4	1	0	6

Table 12.1 Family Size (Number of Children) Frequency of Response. (Number of Respondents).

In order to examine if any relationship might exist between family size and the first employment obtained after leaving school the number of individuals in specific

categories of family size, who had remained in their first employment was compared to the number of individuals who had left after their first employment. (Table 12.2).

Family Size (Number of Children)	Still In.	Left.
1 - 2	7	18
3 - 4	21	18
5 - 6	8	7
7 +	3	4

Chi Square = 5.53 df = 3 $0.1 > p > 0.05$

Table 12.2 Family Size and First Employment. (Number of Individuals who had left First Employment and who had Remained in First Employment.)

Analysis, using the Chi Square test for 'k' independent samples, showed that there was no significant difference between children from different sizes of family in the proportion of those who had remained in their present employment and those who had left. The data did, however, indicate that a slightly greater proportion of children who came from families of 3 to 6 children remained in their first employment than children from families of 1 or 2 children.

In order to examine if any relationship might exist

between family size and subsequent employment success, the number of individuals, in specific categories of family size, who had been successful in employment was compared to the numbers who had been unsuccessful in employment. (Table 12 .3).

Family Size (Number of Children)	Successful	Unsuccessful
1 - 2	18	7
3 - 4	28	11
5 - 6	11	4
7 +	4	3

Chi Square = 0.3 df = 2 $0.45 > p > 0.4$

Table 12.3. Family size and Employment Outcome. Numbers of Successful and Unsuccessful Individuals.

Analysis using the Chi Square test showed no significant differences in family size between successful and unsuccessful individuals.

12.2. Position in Family.

Data on position in the family was obtained for 86 individuals. The largest proportion of the sample (36%) were first born children. (Table 12.4).

Position in Family	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
No. of Individuals	31	17	16	10	4	4	2	0	2

Table 12.4 Position in Family. Number of Individuals.

Analysis using the Chi Square test showed no significant difference in family position between individuals who had remained in their first employment and individuals who had left that employment. Table (12.5).

Position in Family	Still in 1st Employment	Left 1st Employment.
1st and 2nd	18	30
3rd and 4th	15	11
5th and over	6	6

Chi Square = 2.9, df = 2, $0.3 > p > 0.2$

Position in Family	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Nos. still in 1st Employment	11	7	10	5	3	3	0	0	0
Numbers left 1st Employment	20	10	6	5	1	1	2	0	2

Table 12.5 Position in Family. Numbers of Individuals who remained in 1st Employment and who left 1st Employment.

Analysis using the Chi Square test also showed no significant difference between successful and unsuccessful individuals in position in the family. (Table 12.6).

Position in Family	Successful	Unsuccessful
1st and 2nd	35	13
3rd and 4th	18	8
5th and above	8	4

Chi Sq. = 0.22; df = 2 $0.9 > p > 0.8$.

Position in Family	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Successful	23	12	12	6	2	4	1	0	1
Unsuccessful	8	5	4	4	2	0	1	0	1

Table 12.6 Position in Family. Numbers of Successful and Unsuccessful Individuals.

The results therefore indicate that there is no relationship between position in the family and either tenure of the first employment or subsequent employment outcome.

12.3. Children of Visually Handicapped Parents.

Of the 83 families in the sample, 16 (19.3%) had both or one parent who was visually handicapped. For the purpose of the investigation the term visually handicapped was used to denote either partially sighted or blind. In 6 of the families (7.2%), both the Mother and Father were visually handicapped, in 4 (4.8%) only the Father was visually handicapped and in the remaining 6 only the Mother was visually handicapped. A total of 18 respondents had parents who were visually handicapped.

Analysis using the Chi Square test showed that there was no significant difference between children of visually handicapped parents and children of normally sighted parents in the proportions of individuals who remained in their first employment and those who left their first employment. (Table 12.7).

Parents	Still In	Left
Normally Sighted	30	38
Visually handicapped	9	9
Chi Sq. = 0.5.	$0.25 > p > 0.15$.	

Table 12.7. Children of Visually Handicapped and Normally Sighted Parents. (Numbers of Individuals Still in First Employment and Left First Employment).

Analysis using the Chi Square test showed that there was no significant difference in employment outcome between children of parents who were visually handicapped and children of parents who were normally sighted. (Table 12.8).

Parents	Successful	Unsuccessful
Normally Sighted	48	20
Visually Handicapped	13	5
Chi Square = 0.18;	$0.35 > p > 0.25$	

Table 12.8. Children of Visually Handicapped and Normally Sighted Parents. Numbers of Successful and Unsuccessful Individuals.

The results therefore indicated that visual handicap in parents appeared to have neither beneficial nor detrimental consequences for the subsequent employment of their partially sighted children.

12.4. School leavers with Visually Handicapped siblings

A total of 28 partially sighted young adults from 26 of the 83 families had siblings who were also visually handicapped. It had been suggested, during the preliminary discussion held with parents of partially sighted children, that the second or younger partially sighted children presented less of a problem when seeking to obtain employment because of the experience gained by the eldest child. It would have been of value to have been able to examine if this was in fact the case, but unfortunately position of visually handicapped siblings relative to each other was not recorded. No investigation of the effect in employment outcome of having an older visually handicapped brother or sister could therefore be carried out. It was, however, possible to investigate differences in employment outcome between individuals who had visually handicapped siblings and those who had none. (Table 12 .9).

	Still In	Left
Visually Handicapped Siblings	16	12
No Visually Handicapped Siblings	23	35
Chi Sq. = 2.33	0.1 > p > 0.05	
	Successful	Unsuccessful
Visually Handicapped Siblings	19	9
No " " "	42	16
Chi Sq. = 0.03	0.45 > p > 0.4	

Table 12 .9. Respondents with Visually Handicapped Siblings and those without Visually Handicapped Siblings. . Numbers of Individuals.

Analysis using the Chi Square test showed that there was no difference in subsequent employment success between individuals with visually handicapped siblings and those without. The data indicated, however, that individuals with visually handicapped siblings were more likely to remain in their first employment, than those who were the only partially sighted child in the family. The difference was just less than significant.

On the assumption that individuals who remain in their first employment have done so because they have found that employment suitable, the results would seem to suggest then that school leavers who are the only partially sighted child in the family have greater difficulty in finding a suitable first employment than is the case for individuals who have visually handicapped brothers of sisters. The results also show, however, that not having any visually handicapped siblings has no bearing on subsequent employment success or failure.

12.5. Parental Employment.

To investigate if any relationship might exist between the Parental Employment and the subsequent employment of partially sighted school leavers, the type of employment held by the Father or Guardian was requested. A large proportion of the sample declined to complete the closed section on the employment of the Father or Guardian (70%), and of those who did complete the section the majority were all within the one classification of 'other employee'. The classification utilised: 'Self Employed', 'Manager', 'Foreman', and 'other employee' was the same as that which had been used by the National Childrens' Bureau (1971) in their investigation of the employment of all handicapped school leavers in England and Wales. Investigation of relationship between the class of the fathers employment and the subsequent employment outcome of partially sighted school leavers could not be carried out because of the insufficient number of individuals within the three other categories.

In an open section, however, respondents were requested to give details of their Father's employment. This information was provided in 59 cases and the type of employment was reclassified into two groups: Non Manual/ Skilled Manual and Semi-Skilled Manual/Unskilled Manual. (Table 12.10).

Father's/Guardian's Employment	Still In	Left
Non Manual/Skilled Manual	7	11
Semi Skilled Manual/Unskilled Manual	18	13

Chi Sq. = 1.89 $0.1 > p > 0.05$

	Successful	Unsuccessful
Non Manual/Skilled Manual	15	3
Semi Skilled Manual/Unskilled Manual	25	6

Chi Sq. = 1.67 $0.2 > p > 0.1$

(one tail test)

Table 12.10. Parental Employment, Numbers of Individuals, Successful, Unsuccessful, Still in First Employment, Left First Employment.

Analysis using the Chi Square Test showed that, although a greater proportion of individuals who remained in their first employment than those who left their first employment were the children of Semi Skilled or Unskilled workers, the difference was not quite significant. Analysis using the Chi Square test (one tail) also showed that there was no significant difference in employment outcome between children of Non Manual and Skilled workers or children of Semi Skilled Manual and Unskilled Manual workers.

12.6. Geographic Area.

Of the sample of 95 school leavers, 76 lived in an Urban area and 19 in a Rural area.

Although the data showed that for the individuals from an Urban area, a slightly greater proportion was successful in employment than was the case for individuals from a Rural area, analysis using the Chi Square test showed that the difference was not significant. (Table 12.11).

Area	Successful	Unsuccessful
Urban	54	22
Rural	12	7
Chi Square = 0.89	$0.25 > p > 0.15$	

Table 12.11. Geographic Area, Numbers of Successful and Unsuccessful Individuals.

The data also showed that of the individuals from a Rural area, a greater proportion had remained in their first employment, than was the case for individuals from an Urban area. Analysis, again using the Chi Square test, showed that the difference was not significant. (Table 12.12).

Area	Still In First Employment	Left First Employment
Urban	29	39
Rural	10	8
Chi Square = 1.54		0.15 > p > 0.1

Table 12.12. Geographic Area, Number of Individuals Still in First Employment and who Left First Employment.

Although individuals from Urban communities might be expected to have a wider range of employment from which to choose, and more opportunity than is the case for individuals from a Rural community, the results show that the area within which individuals live has no significant bearing on subsequent employment success. The results suggest, however, although the proportion is not quite significant, that for individuals from Rural communities, in which employment might be less readily available, fewer individuals do, in fact, leave their first employment than is the case for individuals from Urban communities.

SECTION IV.

Visual Ability.

Chapter 13.

Rationale and Development of Measures of Visual Ability.

13.1. Rationale.

From the outset of the investigation the major aim was not only to provide information on the factors which affect the employment of partially sighted school leavers but to provide a method of assessment by which these young people could be better placed in employment commensurate with their abilities.

The individuals who pressed for the instigation of this study were aware that studies of the employment of the normally sighted school leaver had shown that many different factors, social and psychological, affected subsequent employment success, and that the influence of these factors on the employment of partially sighted school leavers had not been investigated and was consequently an unknown quantity. It was their contention, however,

based on their experience, that regardless of the extent of the influence of such factors, a major aspect which affected employment outcome was that some individuals were better able than others to make more effective use of their residual vision. It was therefore suggested that if the ability to make effective use of residual vision could be quantified and the relationship between a measure and employment outcome be determined, such a measure, if relatively easy to obtain and interpret, would provide an invaluable tool for use in the vocational assessment of partially sighted school leavers and young adults.

Development of a measure of the visual ability of partially sighted individuals was complicated, however, by the fact that the ability of the normally sighted individual to recognise complex patterns and to make subtle discriminations has yet to be explained (Dodwell 1970). Two approaches to the problem were therefore considered. One approach was to attempt to construct a visual task on the basis of theoretical models of visual perception (Dodwell 1970, Hebb 1949, Lashley 1952, Niesser 1967) and electro-physiological and behavioural evidence on the neurological factors involved in the processing of visual information (Hubel and Wiesel 1968, Sutherland 1968). It was hoped that a task could be

designed such that the constituents would identify, in partially sighted individuals, errors or failures in the processing of visual information. The other approach considered was to ignore the possible mechanisms by which information is processed by the visual system and just measure performance in a visual task. The former approach was subsequently abandoned, as the design and construction of appropriate stimuli and the experimental procedures required to determine if response could be elicited at separate stages in the visual system were particularly complex and required sophisticated electronic measuring equipment. Sophisticated equipment and techniques were inappropriate as it was desired that the test should be able to be operated and interpreted by unskilled individuals. The more simple technique of measuring performance in a complex visual task was that which was ultimately utilised. The tasks used were designed to take into account the factors indicated as being relevant to partially sighted observers, from the results obtained from the tests examined during the preliminary investigation, and based on the aspects shown to be relevant to visual search by the results of studies of normally sighted observers.

The two simple tests of visual performance examined during the preliminary investigation (Ch. 5) indicated

that the procedures adopted might provide an adequate basis for development of a test of visual ability as the results differentiated between individuals who had been classified as successful in employment and those who had been classified as unsuccessful. The results also indicated that the measures were independent of visual acuity. Both tests were, however, unsatisfactory in that the groups examined were small in number and different variables in each task were uncontrolled. In the Reading Task, display complexity and material content were uncontrolled, whilst in the Dynamic Sorting Task discrimination levels were uncontrolled and weighting of errors was arbitrary. The results suggested that the characteristics of most importance within the tests were movement of stimuli, requiring adequate dynamic discrimination, and complexity of the display, demanding accurate visual search.

Dynamic visual acuity has been shown to be significantly related to the performance of normally sighted subjects in activities such as ball games (Burg and Slade 1961). More recently, very accurate predictions of performance in basketball shooting have been determined using functions obtained by principal component analysis of the visual characteristics of dynamic visual acuity, depth perception and size constancy (Beals et al 1971).

It was felt therefore that it would be of value to incorporate movement of stimuli into the visual ability test.

The major characteristics of the tasks were, however, that they required an accurate visual search within a complex display. Visual search in the normally sighted individual has been extensively investigated and several determinants isolated. The competition determinant (Gottsdanker 1960), refers to the situation in which the target is clearly distinguishable from its immediate background, but is difficult to detect because it can be confused with other non-target stimuli also present in the search area. Studies of this situation have shown that an increase in the search time, the time taken to locate and identify the target stimulus, is produced by an increase in the non-target number (Eriksen 1955, Erickson 1964, Smith 1962, McGill 1960). The increase in search time occurs whether the target stimulus is different in shape from the non-target stimuli (Brody et al. 1960, and Johnston 1965) or is a different digit in a display of different numbers, or is a letter pair in amongst other letter pairs (Ciskova 1967). Eriksen (1953) also showed that when stimuli of varying colour, shape, size and contrast were used as non-targets, the time taken to locate the target stimulus increased

as the heterogeneity of the non-target stimuli increased. Bloomfield (1970) suggested that for targets most different in size from non-targets, the time required to locate the target was largely dependent on response determinants; the extent of the difference between the characteristics identifying target from non-target. For targets close in size to non-targets, Bloomfield suggested that the time taken to locate the target stimulus was largely dependent on search determinants; display area, numerosity, density and search strategy. Howarth and Bloomfield (1968, 1969) showed that response time was related to a function of the characteristics of target and non-target stimuli, but they found that predictions of the probability of locating a target in a specific time, for specific different characteristics, were not as accurate as had been expected. It was suggested that inaccuracy in prediction was possibly as a result of the very short response times involved.

Although these studies show that accurate predictions of the response of normally sighted individuals are difficult to obtain, it was considered that given the longer response times observed in the preliminary tests using partially sighted individuals, the function from which such predictions are derived and which describes the relationship between display characteristics and the

visual response might well differentiate between the visually more able and the visually less able partially sighted observer. It was hypothesised that for a target set in a complex display of numerous non-targets, the response of the visually more able partially sighted individual might be more efficient than that of the visually less able partially sighted individual; and that as display complexity (i.e. numerosity) increased, the response of the visually less able individual might degrade at a greater rate than that of the visually more able individual. It was considered that if this were shown to be the case, a test of visual ability based on these principles might usefully provide an assessment of vocational potential if the measures obtained could be shown to be associated with employment outcome.

It was therefore proposed to develop a test of visual ability on these principles and examine its validity as a predictor of employment outcome using a sample of successful and unsuccessful young adults drawn from among respondents to the questionnaire.

13.2. Hypotheses.

The proposals for the test of visual ability, derived from the results of the studies of visual search situation and the results observed during the preliminary investigation were, however, purely speculative. Consequently for the purpose of providing a basis for development of such a test several hypotheses were constructed in order to examine, in a pilot investigation, the factors that affect response to a target in a complex visual display.

Two main hypotheses required investigation:

1) That the gradient of the function relating response time to display complexity is greater for partially sighted observers than is the case for normally sighted observers.
2) That partially sighted observers have a greater total error score than normally sighted observers.

If no real difference in response could be determined between normally sighted and partially sighted observers then there would be little point in pursuing this technique as the basis of a measure of visual ability. If, however, a significant

difference was observed both the results and the experience obtained would provide a basis for development of a technique which could be subsequently examined in greater detail and on a larger scale.

As the characteristic which differentiates between target and non target has been shown to affect response (Bloomfield 1970), as does target orientation (Rock et al. 1957, Ogilvie et al. 1958) and position in the display (Drew 1940, Adams et al. 1964), further sub hypotheses were constructed as a basis for investigation of individual effects, and the relationship between response and visual acuity:-

3) That for partially sighted observers the gradient of the function relating response time and display complexity is independent of visual acuity.
4) That for partially sighted observers total error scores are independent of visual acuity.
5) That for both normally sighted and partially sighted observers error scores are dependent on display complexity.
6) That there is a difference between partially sighted and normally sighted observers in the

gradient of the function relating response time and target conspicuity.

7) That in non target displays the gradient of the function relating response time to display complexity is greater for partially sighted observers than is the case for normally sighted observers.

8) That for partially sighted observers the gradient of the function relating response time to display complexity in non target displays is independent of visual acuity.

9) That for both partially sighted and normally sighted observers there is no difference in response time to targets of vertical, horizontal and oblique orientation.

10) That for both partially sighted and normally sighted observers there is no difference in response time to targets of central, intermediate and peripheral position.

In order to examine these hypotheses a visual search task was constructed from which response time could be measured, and errors recorded, for target stimuli of specific resolution, position and orientation set within displays of differing non target numerosity. The effect of movement of stimuli was excluded from this task as its inclusion made test procedures excessively complex and lengthy. The contribution of movement of stimuli was examined in a separate kinetic, three dimensional task.

13.3. Test Displays and Apparatus.

The test displays utilised consisted of a target stimulus set within a number of non target background stimuli positioned in a 5x5 matrix. Both target and non target stimuli were black and the general background was white.

A great deal of consideration was given to the characteristics of target and non target stimuli. It was essential that target stimuli could be differentiated from non target stimuli by a factor which could be described in terms of resolution (degrees of arc) in order that the relationship between target conspicuity and response time could be examined. It was also necessary that any other visual clues which might differentiate between target and non target should be controlled. Target and non target stimuli therefore had to be the same overall size.

Several different types of stimuli were constructed and their relative merits examined. Figure 13.1 gives an example of two pairs of target and non-target stimuli considered. In each pair the difference between target and non target could be varied and specified in terms of degrees of arc. In stimulus pair A, however, it was found that when viewed as a slightly blurred image

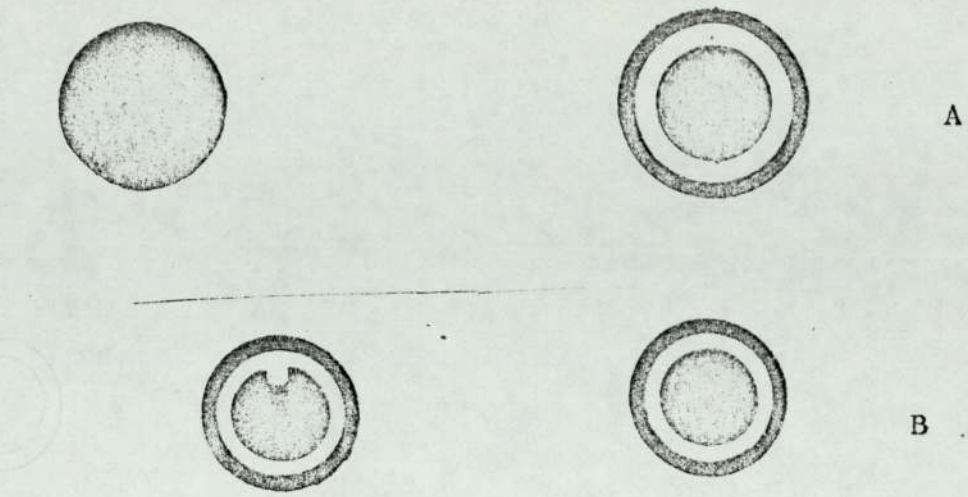


Figure 13.1. Stimulus Pairs A and B.

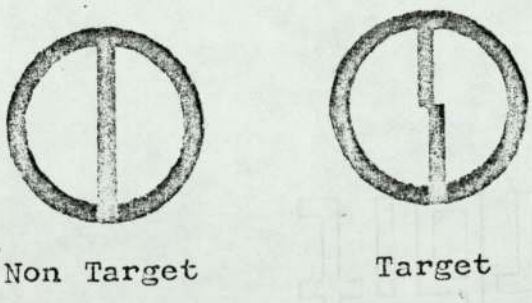


Figure 13.2. Target and Non Target Stimuli used in initial tests.

through a strong positive lens, the contrast of the outer ring was reduced in the diffused image such that differentiation between stimulus and non stimulus was undertaken by comparison of the relative size of the central dark area. As it was not desired that judgement should be based on size discrimination these stimuli were rejected. A similar but slightly less noticeable effect was observed with stimulus pair B. In this latter pair the target stimulus was also orientation specific, with no similar variation in the non target stimulus.

The target and non target stimuli, ultimately used in the test series, are given in Figure 13.2. Target stimuli consisted of an annulus of the same size and thickness as in non-target stimuli, but with the two halves of the central line offset at the centre. The offset in the central lines within the target stimulus could be varied to give different levels of vernier resolution. When viewed as a blurred image, both target and non target stimuli were indistinguishable except when there was a very large disparity of the target offset. Both target and non-target stimuli were orientation specific, but it was felt that random orientation of non-target stimuli would add to the

complexity of the display, and that any effect on response time introduced by specific orientation of the target stumulus could be readily quantified.

In order to ensure that test targets could be presented at set levels above the threshold of resolution of individuals who had widely different levels of visual acuity, the test displays were constructed photographically as slides for projection. Agfa Dia Direct film was used to give the maximum contrast, and displays were projected by a Kodak projector. The projector was linked electronically to a specially built digital time clock, which itself drove a Facit Printer.

Initiation of presentation of displays was actuated remotely by the examiner using either of two hand held buttons linked to both projector and Facit printer. The digital time clock was started automatically by the projector when the shutter was fully retracted and the entire display uncovered. The time taken for full retraction of the shutter was 0.25 secs. The electronic time clock was automatically stopped by the subject using a remote hand held button. The time taken by the subject to observe the full display and reach a decision was then printed out by the Facit Printer, driven by the electronic clock. When the subject had reported his

decision, the examiner could check whether or not the subject was correct in his observation. If correct, the information '+' could be recorded automatically by pressing the appropriate hand held button linked to the Facit Printer. If the subject was incorrect, the information '-' was initiated by the other button and, as before, was printed alongside the time recorded for the observation. Recording the accuracy of the response automatically initiated projection of the next display.

Throughout the entire test series, response time and accuracy for each display was thus automatically and permanently recorded on paper tape.

The initial test design was constructed to allow representation of every test target variable within seven levels of display complexity. This, however, required a total of 504 displays, in order that throughout the series the probability of occurrence of a target was equal to the probability of non occurrence. An early experimental run with 350 displays, and using normally sighted observers, indicated that the task was extremely fatiguing, and took at least one hour to complete. Not only was this inappropriate for use with partially sighted individuals, but as it had been shown that fatigue

was an important factor in vigilance performance (Mast and Heimstra 1964), an experimental design was required in order to control these effects. Neither repeated runs in opposite directions, nor splitting test runs into small discrete sessions to be undertaken throughout an extended period was considered desirable in an investigation which was effectively only a pilot study undertaken for the purpose of providing a basis for development of possible measures of visual ability.

For these reasons the test series was reduced to 64 displays. Thirty-two displays contained no target stimulus and within these displays the number of non target stimuli was varied to give 4 groups each containing 3,7,11 and 15 non target stimuli. Each group was represented 8 times and throughout each display the position and orientation of non target stimuli was varied randomly. In the 32 displays which contained one target stimulus, each display was varied to provide four levels of vernier resolution; three levels of position within the display: central, intermediate and peripheral; and finally three levels of orientation; vertical, horizontal and oblique. Target stimuli were presented in displays containing 2,6,10 and 14 non targets, the orientation and position of which was varied randomly.

The test thus allowed investigation of response

to a target stimulus of specific resolution, position and orientation within four levels of display complexity.

13.4. Subject Characteristics.

Ten partially sighted subjects, 3 females and 7 males, aged between 15 and 16 years, took part in the pilot investigation. The subjects were pupils of the West of England School for the Partially Sighted, and were due to leave school for employment at the end of the summer term. Table 13.1, gives the details of the visual acuity and ophthalmic condition of the subjects.

S	Sex	Best Dist. V.A.	Ophthalmic Condition
1	F	6/18	Optic Atrophy
2	F	6/24	Congenital Cataract
3	F	6/60	Microphthalmos, Nystagmus
4	M	6/24	Cataract, Nystagmus
5	M	6/36	Optic Atrophy, Nystagmus
6	M	6/60	Colobama of Choroid and Iris
7	M	6/9	Cataract
8	M	6/60	High Myopia, Nystagmus
9	M	6/60	Congenital Nystagmus
10	M	6/9	Albinism, Nystagmus

Table 13.1. Visual Acuity, Ophthalmic Condition and Sex of Partially Sighted Subjects.

With respect to ophthalmic condition all subjects had conditions which were frequent in occurrence in the total partially sighted population. With respect to visual acuity, the full range was represented in approximately the same proportions as found in the total population, but with the exception of two individuals who had unusually good visual acuity of $\frac{6}{9}$. It had been noted in the preliminary investigation that measures of visual acuity recorded by the investigators were often in many cases superior to that recorded in the original BD8 registration form. The precise reason for this was uncertain. In some cases the difference was undoubtedly as a result of a genuine change having taken place in the ophthalmic condition during the fairly lengthy period since registration. In other cases it may have been as a consequence of the subjects having made a particular effort to co-operate, having been aware that they were taking part in an experimental investigation.

It was considered, therefore, that the subjects utilised were representative with respect to ophthalmic condition, but that the better levels of visual acuity may be represented more than was the case in the general partially sighted population.

Six normally sighted subjects, 2 females and 4 males were utilised in the pilot investigation. The

normally sighted subjects were drawn from amongst the staff and students of the Department of Ophthalmic Optics in the University of Aston. The subjects were aged between 18 and 28 years, and had no ocular abnormalities as determined by a full clinical ophthalmic examination. All normally sighted subjects had a visual acuity of $\frac{6}{6}$ or better when corrected.

13.5. Procedure.

Normally sighted subjects were presented with a display measuring 75 x 50 cms., viewed from a distance of 6 metres. The smallest vernier target therefore required a minimum vernier acuity of 0.5 minutes of arc, which was just above the threshold of resolution of the subjects.

Partially sighted subjects were presented with a display measuring 135 x 90 cms., viewed from whatever distance was required by the subject in order that he could resolve the vernier break in the smallest test target. Determination of threshold for partially sighted subjects was achieved by presentation of a display containing one test target and two non targets, and indicating to the subject the characteristics of the test target. The subject was then instructed to stand at a distance from which he could not distinguish between the test target and non target, and asked to move forward to a position where he felt that he could distinguish between the two stimuli. The subject was then seated at this position.

All subjects were instructed that they would be presented with a series of displays containing different numbers of targets. Some displays would contain one test target, the characteristics of which had been demonstrated, and their task was to decide whether or not each display contained such a 'test'

target. When they had made their decision they were to report 'Yes' or 'No', and simultaneously press the recording button. The subjects were requested to press the hand held recording button, at the same time as they reported their decision, in order to prevent individuals claiming to have made a decision and then taking further time to verify or change the decision before reporting it. Subjects were further instructed to make their decision as quickly as possible, but to take care to be as accurate as possible.

A test run of 10 displays, 7 containing test targets, and 3 containing only non targets, was carried out to acquaint the subject with the procedure, and to allow subjects, if they wished, to move closer to the display. The full series was then run, with knowledge of results given for the first ten displays. It is known that knowledge of results improves performance in vigilance tasks (Johnson and Payne 1966) but it was felt that young partially sighted subjects would need some encouragement in the unfamiliar and strange circumstances of an experimental investigation.

Chapter 14.

Initial Test Results.

14.1. Response Time and Display Complexity.

The hypothesis that the gradient of the function relating response time with display complexity is greater for partially sighted observers than is the case for normally sighted observers was examined in order to determine whether or not the test differentiated between normally sighted and partially sighted observers.

The results from the normally sighted observers were used to determine the mean and standard deviation of the response time of the normal observer for a target stimulus within a series of displays containing 3,7,11 and 15 stimuli. The vernier break in the central line of the target stimulus was set such that it was approximately 0.1 log unit above the threshold of resolution of each normally sighted observer. The results were calculated for correct responses from 7 observations of targets within displays containing 2 and 6 non targets and from 9 observations of targets within displays containing 10 and 14 targets. The odd numbers of observations were as a result of having

reduced the length of the test series to 64 displays from the 504 required in the original design.

For all correct observations made by normally sighted observers, the Product Moment Correlation Coefficient (S.Siegal 1956) was calculated. The results showed that within the range of displays used, the relationship between response time and display complexity was linear. (0.99).

For all observations the regression equation which describes the relationship between response time and display complexity, was calculated using the method of least squares. (Moroney 1968). The gradient of the regression equation for each observer was also obtained, and using Tchebycheff's Inequality (Hayes 1969) the maximum and minimum limits were calculated (Table 14.1).

		Display Complexity Level			
		3	7	11	15
Average Response Time		1.05	1.58	2.19	3.07
Standard Deviation	±	0.74	0.45	0.65	1.00
Regression Equation	Y =	0.17x	+	0.6	
Average Gradient	=	0.17			
Standard Deviation	= ±	0.07			
For 93% of Normal Population. (Tchebycheff's Inequality)		Minimum Gradient = -0.01 Maximum Gradient = +0.35			

Table 14.1. Average Response Times for each level of Display Complexity. Average, Minimum and Maximum Gradient of function relating response time and display complexity. Normally sighted observers.

Figure 14.1. gives the gradient for the average normally sighted observer and the maximum and minimum limits within which the gradient of 93% of all normally sighted observers might be expected to be found. The gradient of the regression line describes the increase in response time produced by an increase in display complexity. The results showed that if display complexity was increased by a factor of 7 times, then in the normal population, the response time would, on average, be increased by a factor of 4.09 times, and that the greatest increase that could be expected for 93% of the normal population would be a factor of 6.15 times.

For the ten partially sighted observers the average response time for each of the four levels of display complexity was calculated from all correct observations. Due to the partially sighted subejcts having made a large number of errors in their observations, the results obtained were insufficient for use in calculating the function relating response time and display complexity by means of the method of least squares. Consequently the gradient of the function relating response time with display complexity was calculated from the equation describing the straight line joining the average response time for each of the two extreme levels of display complexity; level 3, and level 15. (Figures 14.1 ; 14.2;14.3 and Table 14.2).

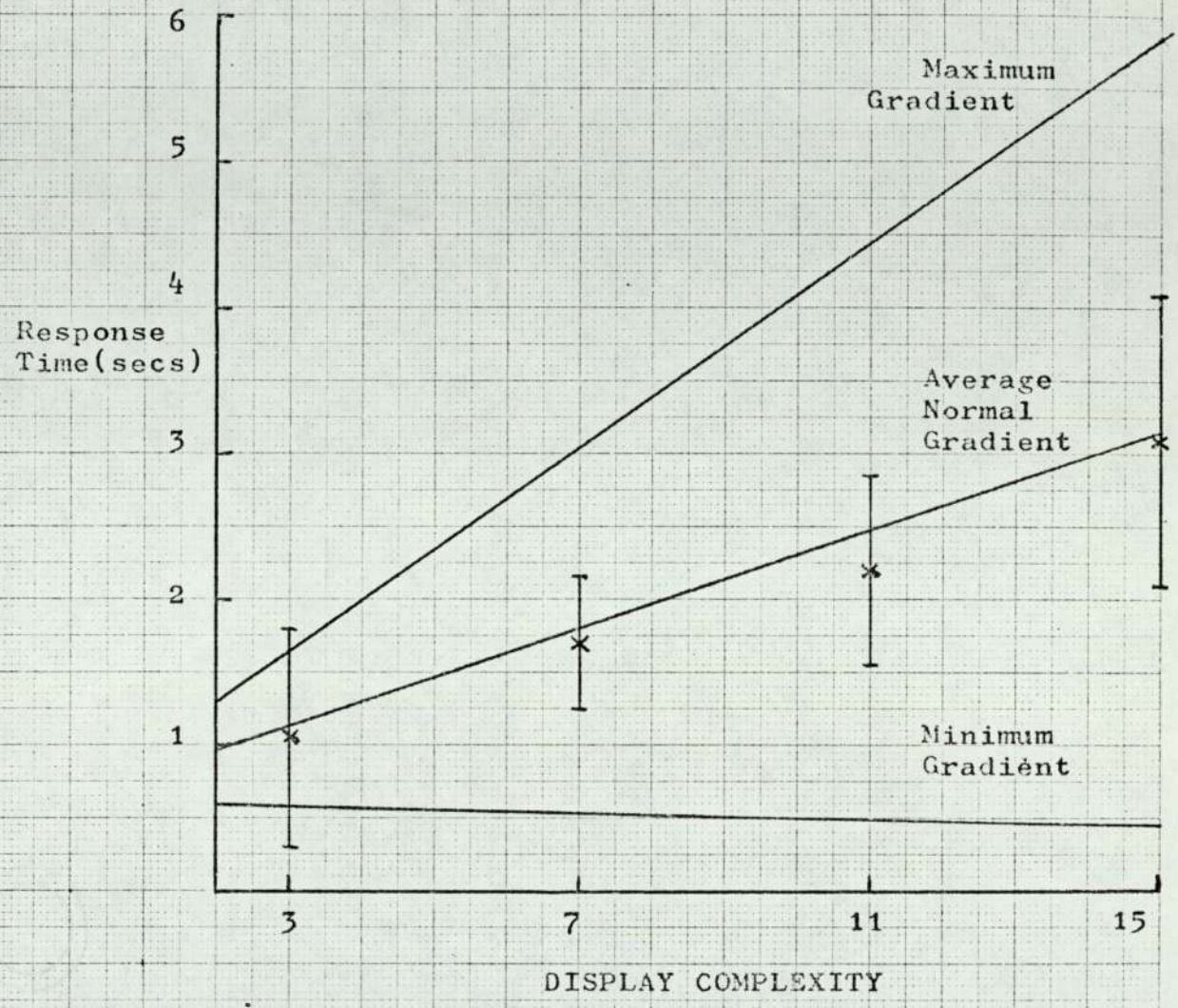


Figure 14.1 Average, Maximum, Minimum Gradient of function relating response time with display complexity. Normally sighted observers.

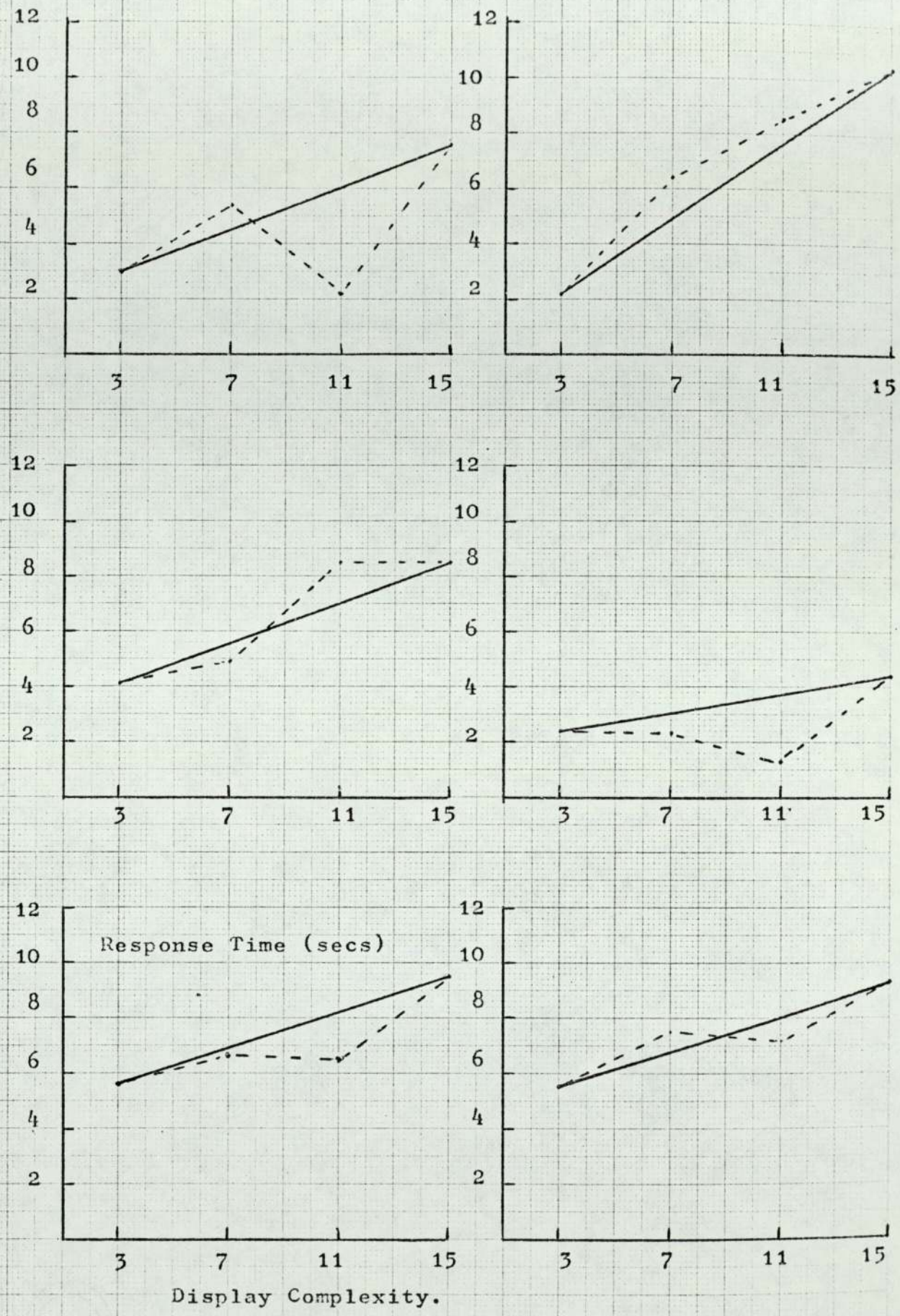


Figure 14.2. Gradient of Function relating response time(secs) with display complexity. Partially Sighted Observers Nos. 1-6.

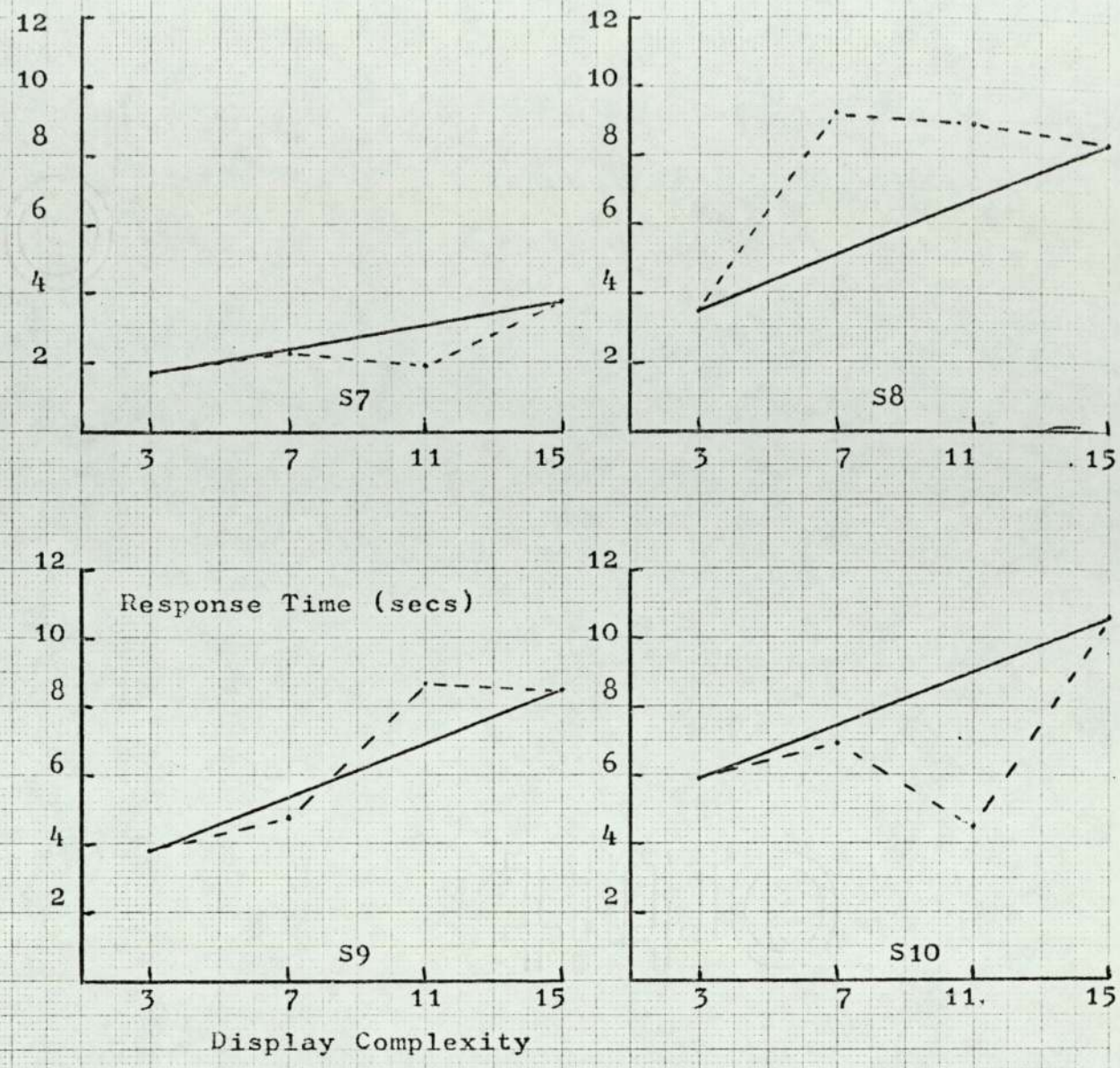


Figure 14.3 Gradient of function Relating response time (secs) with Display Complexity. Partially sighted observers Nos.7-10.

	Display Complexity Level			
	3	7	11	15
1	3.0	5.4	2.2	7.6
2	2.2	6.4	8.5	10.4
3	4.1	4.9	8.5	8.5
4	2.4	2.3	1.3	4.4
5	5.6	6.6	6.5	9.5
6	5.5	7.5	7.2	9.3
7	1.7	2.2	1.9	3.8
8	3.5	9.2	8.9	8.4
9	3.8	4.8	8.7	8.5
10	5.9	6.9	4.5	10.6

Table 14.2. Average Response Time (Seconds) for 4 levels of Display Complexity. Partially Sighted Subjects.

Analysis using the Mann Whitney 'U' Test (S.Siegel 1956) showed that for partially sighted subjects, the gradient of the function relating response time with display complexity was significantly greater than was the case for normally sighted observers ($0.01 > p > 0.001$).

The results obtained showed that 4 partially sighted subjects, Nos. 2,3,8 and 9 had response time

gradients outside the maximum expected for the normally sighted population. Four other subjects, Nos. 1,5,6 and 10, were just within the maximum limit, and the remaining two subjects, Nos. 4 and 7, were close to the normal average. (Table 14.3).

Partially Sighted Subjects:					
	1	2	3	4	5
Response Gradients:	0.32	0.69	0.37	0.15	0.32
	6	7	8	9	10
Response Gradients:	0.32	0.19	0.41	0.38	0.32

Average Normal Gradient 0.17; Maximum Normal 0.35.

Table 14.3. Response Gradients. Partially Sighted Observers.

Analysis of the relationship between the gradient of response time and the visual acuity of partially sighted subjects, using the Spearmann Rank Correlation Coefficient (S. Siegel 1956) showed that the two factors were not significantly associated. (Table 14.4).

Subject	1	2	3	4	5
Response Gradient	0.32	0.69	0.37	0.15	0.32
Visual Acuity	6/18	6/24	6/60	6/24	6/36

Subject	6	7	8	9	10
Response Gradient	0.32	0.19	0.41	0.38	0.32
Visual Acuity	6/60	6/9	6/60	6/60	6/9

$r = 0.5$; $t = 1.633$, $df = 8$ $0.1 > p > 0.05$

Table 14.4. Response Time Gradient and Visual Acuity, Partially Sighted Observers.

The results did, however, suggest that there might be some association between visual acuity and response, and indicated that individuals with a poor visual acuity might have greater difficulty in seeking a target stimulus in a complex display than was the case for individuals with better visual acuity.

14.2. Error Scores for Target Displays.

In order to determine if the test technique differentiated between normally sighted and partially sighted observers, the hypothesis that partially sighted observers have a greater error score than normally sighted observers was examined.

Analysis, using the Mann Whitney 'U' Test, of the results obtained for the two groups (Table 14.5) showed that partially sighted observers made significantly more errors than normally sighted observers. ($p = 0.001$).

Total Error Rate (Percentage).	
Normally Sighted.	Partially Sighted.
1. 9.375	1. 21.875
2. 25.00	2. 37.5
3. 9.375	3. 40.6
4. 12.5	4. 25.0
5. 12.5	5. 34.75
6. 21.875	6. 62.5
	7. 25.0
	8. 34.375
	9. 25.0

Mann Whitney 'U' Test $U = 3$. $p = 0.001$

Table 14.5. Total Error Scores (Percent.) Partially Sighted and Normally Sighted Observers.

Analysis of the errors recorded at each level of display complexity, using the Friedmann Two Way Analysis of Variance (S. Siegel 1956), showed that for normal observers, error scores increased significantly with an increase in display complexity. (Table 14.6).

	Display Complexity Level			
Subject	3	7	11	15
1	0	0	2	1
2	1	2	2	3
3	0	1	0	2
4	0	0	1	3
5	0	0	2	2
6	0	0	2	5

Friedman Two Way Anova.

$X^2r = 82.75$ df = 3 $p < 0.001$ Significant.

Table 14.6. Errors at each level of Display Complexity. Normal Observers.

The error scores for partially sighted observers were also significantly related to display complexity. (Table 14.7).

Subject	Display Complexity Level			
	3	7	11	15
1	2	0	2	3
2	4	2	2	4
3	5	2	2	4
4	1	2	1	4
5	3	3	3	2
6	6	3	3	8
7	2	1	2	3
8	4	2	1	4
9	5	3	2	7
10	4	1	1	2

Friedmann Two Way Anova.

$X^2r = 14.7$ df = 3 $0.01 > p > 0.001$ Significant.

Table 14.7. Errors at each level of Display Complexity. Partially Sighted Observers.

Further investigation of the total number of errors recorded by normals, showed that the average error rate was 12.09% with a standard deviation of ± 5.51%. Again using Tchebycheff's inequality, the maximum error rate for 93% of all normals was calculated and found to be 26.27%. Table 14.8, gives the Total Error Rate for partially sighted observers and shows that only 4 of the 10 partially sighted subjects were within the maximum

error rate expected for the normal population. Two of these four subjects, numbers 4 and 7, also had gradients which were within normal limits.

Subject	Visual Acuity	Total Number of Errors.	Error Rate %
1	6/18	7	21.87
2	6/24	12	37.5
3	6/10	13	40.6
4	6/24	8	20.0
5	6/36	11	34.7
6	6/60	20	62.5
7	6/9	8	20.0
8	6/60	11	34.37
9	6/60	17	53.12
10	6/9	8	20.0
Maximum Error Rate for Normals = 26.27%			

Table 14.8. Total Error Rate for Partially Sighted Subjects.

Analysis using the Spearmann Rank Correlation Coefficient, of the total number of errors made by individual partially sighted observers, showed that errors were significantly associated with visual acuity ($X^2r = 0.82$; $t = 5.46$ $0.005 > p$); the poorer the visual acuity the greater the number of errors.

A similar analysis of the association between the total number of errors made by partially sighted observers and their response time gradient showed that there was no significant relationship between the two measures ($X^2r = 0.52$ $t = 1.72$ $p > 0.05$). The result was, however, only just outwith the 0.05 level, and suggests that there was a strong possibility of some association.

The results therefore indicate that, irrespective of the time taken to carry out a visual search task, there is in the normal population, a relationship between response time and display complexity, and also between errors and display complexity. The results further indicate that for the majority of partially sighted observers, the relationships between response time and display complexity is outwith that which would be expected in 93% of the normal population, and that in the partially sighted group this relationship is not wholly dependent on their visual acuity. With respect to error rates, the results also indicate that the majority of partially sighted individuals make a greater number of errors than would be expected for normal observers; but that errors would seem to be associated with visual acuity.

14.3. Search Times in Non Target Displays.

In the series of displays, the number of displays which contained a test target was equal to the number of displays which contained no test target. The series was designed in this manner in order to ensure that the probability of subjects guessing correctly was equal to that of guessing incorrectly. For the displays containing no test target, the response time recorded was therefore the time required to carry out a complete search of the entire display. As non target displays were in every other respect identical to target displays, it was possible to determine if the same relationship as had been determined for response time held true for search times.

The regression equation which describes the function relating search time with display complexity in displays containing only non target stimuli was calculated for all partially sighted observers and compared to that expected for the normally sighted population. (Figures 14.4, 5 and 6, and Table 14.9).

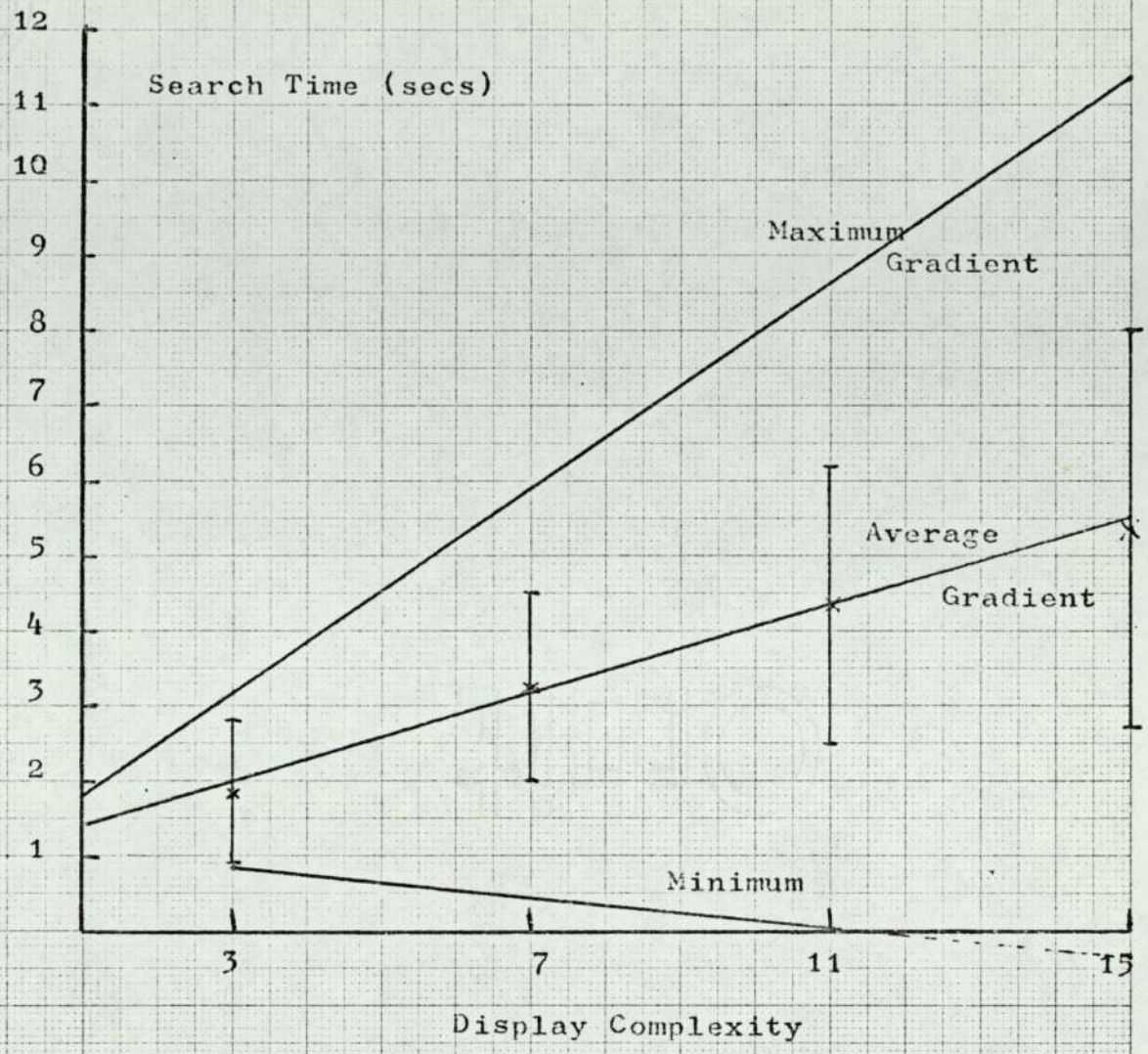


Figure 14.4 Average, Maximum and Minimum Gradient of function relating search time with Display complexity. Normally sighted observers.

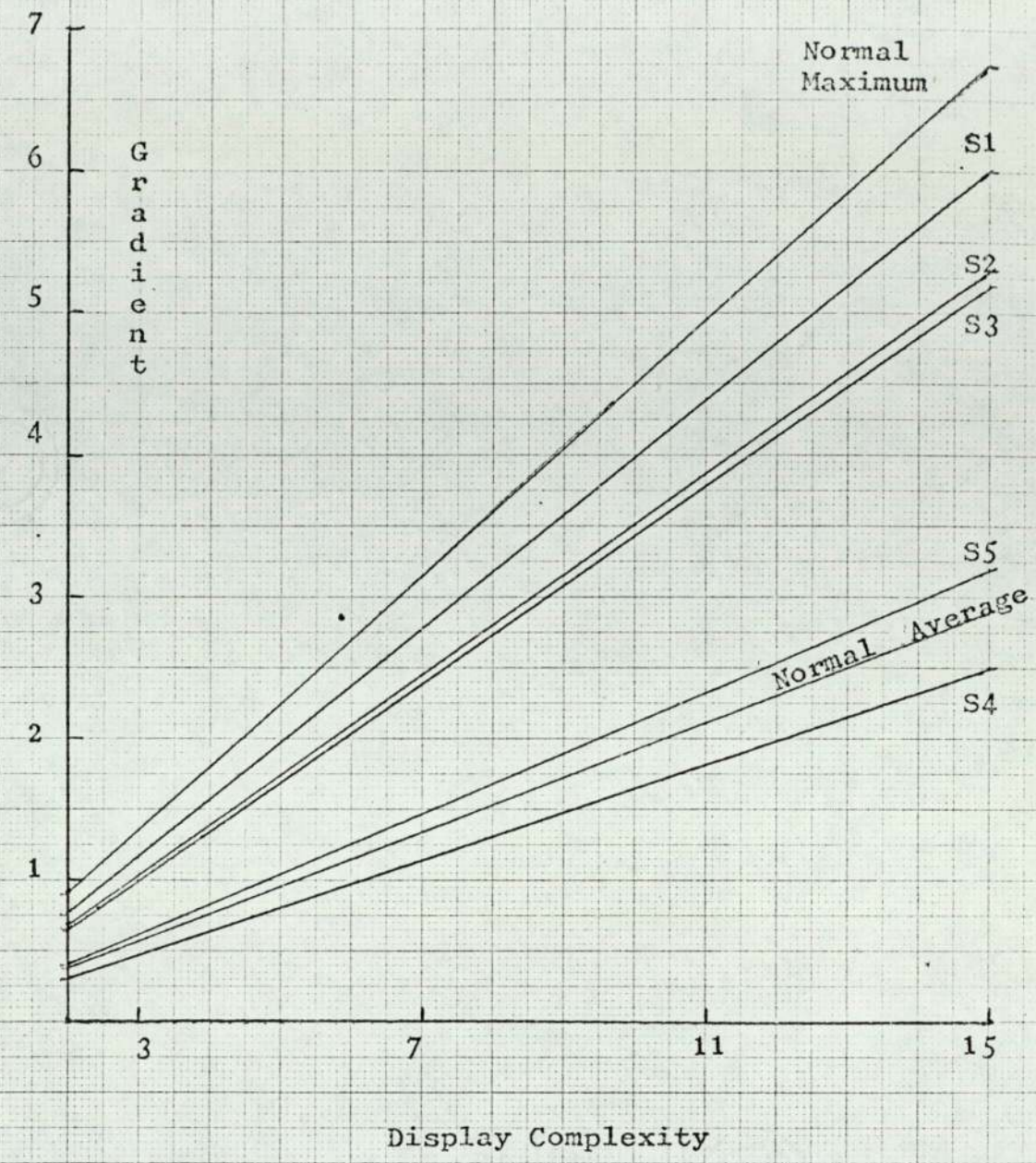


Figure 14.5. Search Gradient of Partially Sighted Subjects 1-5, Averages and Maximum Search Gradient of Normally Sighted Observers.

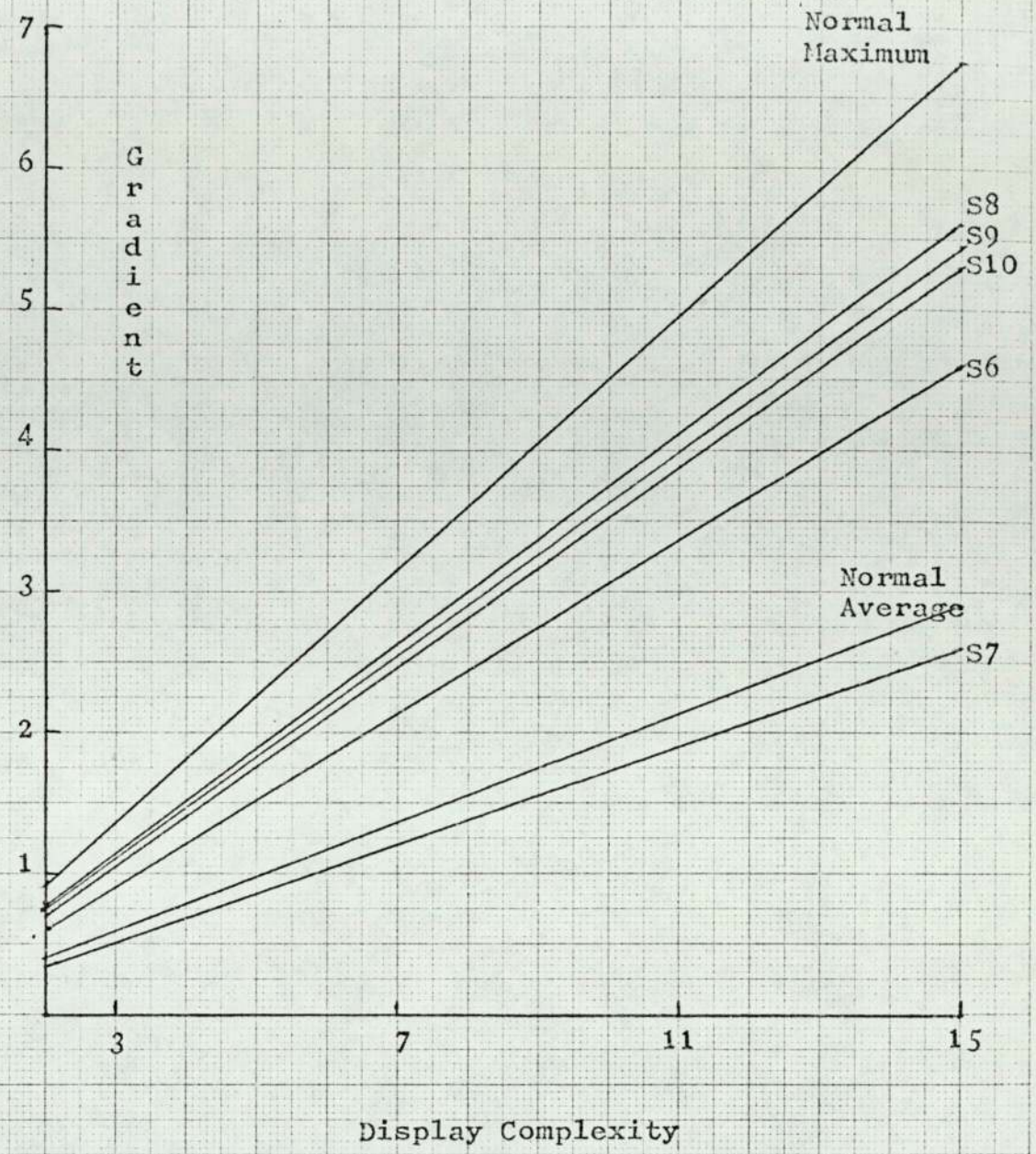


Figure 14.6. Search Gradient of Partially Sighted Subjects 6-10, Average and Maximum for Normally Sighted Observers.

Display Complexity	3	7	11	15
Search Time	1.82	3.42	3.42	5.35
Standard Deviation ±	0.92	1.25	1.87	2.6

Regression Equation · $y = 0.29x + 1.14$

Average Gradient = 0.29 Maximum Gradient = 0.68

Standard Deviation ± 0.15 Minimum Gradient = -0.1

Table 14.9. Search Time, Average, maximum, and minimum Gradients of function relating response time and display complexity. Normally Sighted Observers.

Only three partially sighted subjects, numbers 4, 5 and 7, of visual acuity 6/24, 6/36 and 6/9 respectively, were within one standard deviation of the average search gradient of normally sighted observers. The remainder were close to, but within the maximum limit expected for the normally sighted population.

Analysis using the Mann Whitney 'U' Test showed that for partially sighted observers the gradient of the function relating search time to display complexity was significantly greater than that for normally sighted observers. (Table 14.10).

Normally Sighted		Partially Sighted		
	Gradient		Gradient	and Visual Acuity
1	0.16	1	0.6	6/18
2	0.23	2	0.53	6/24
3	0.6	3	0.52	6/60
4	0.3	4	0.25	6/24
5	0.3	0	0.32	6/36
6	0.19	6	0.46	6/60
Normal Average Gradient = 0.29		7	0.26	6/9
		8	0.56	6/60
Normal Maximum Gradient = 0.68		9	0.55	6/60
(93% of Population)		10	0.53	6/9
Mann Whitney 'U' Test,	U = 13.5	$0.05 > p > 0.025$		

Table 14.10. Gradient for Non Target Displays, Partially Sighted and Normally Sighted Observers.

The results therefore show that for a display containing only non target stimuli, the time required to carry out a complete visual search may vary widely amongst both partially sighted and normally sighted observers,but that when display complexity is increased, the increase in search time demonstrated by partially sighted observers is significantly greater than that demonstrated by normally sighted observers.

Further analysis, using the Spearmann Rank Correlation Coefficient, showed that for partially sighted observers, the gradient of the function of response time and display complexity was independent of the level of visual acuity.
($R_s = 0.175$, $t=0.5$, $df=8$ $p = 0.2$ Not Significant)

The stimuli within non target displays did not however require an acute level of resolution and it was therefore not unexpected that response times for a full search by partially sighted individuals were independent of their visual acuity. For the same reason, the number of errors made by both partially sighted and normally sighted observers was extremely low on non target displays and insufficient for analysis.

14.4. Target Conspicuity.

Four levels of target conspicuity were utilised in order to determine the most appropriate target stimulus for use in subsequent tests, and to examine differences between partially sighted and normally sighted observers in the gradient of the function relating response time and target conspicuity.

For normally sighted observers, vernier level 1 corresponded to 0.5 minutes of arc of resolution, effectively just above the threshold of resolution, and the three other levels 2, 3 and 4 corresponded to 1,2 and 3 minutes of arc respectively.

The average of all correct observations within each vernier level, for targets in a background of 12 and 14 non-targets, was calculated for each normal observer. Analysis using the Friedmann Two Way Analysis of Variance Test (S. Siegel 1956) indicated a strong trend for response to the more conspicuous targets to be faster than response to targets closer to the threshold of resolution. (Table 14.11).

S	Vernier 1	Vernier 2	Vernier 3	Vernier 4
1	3.83	2.49	1.84	2.15
2	4.69	3.26	1.53	0.8
3	7.45	1.75	4.07	0.91
4	2.8	2.4	3.09	0.61
5	3.61	1.49	1.22	0.95
6	3.64	1.1	2.05	0.54
Mean	4.33	2.08	2.3	0.99
St.Dev.	±1.49	± 0.71	± 0.98	± 0.53

Background non-targets Nos. 12 and 14; Position and Orientation Random. 5 observations per individual.
Friedman Two Way Anova. $Xr^2 = 7.2$; df = 3.
$0.1 > p > 0.05$ Not Significant.

Table 14.11. Target Conspicuity, Average 'correct' response time. Normal Observers.

Figure 14.7 gives the regression line, fitted by the method of least squares (Moroney 1968), describing the relationship between response and target distinctness for the normal observer. The maximum and minimum values of m, the gradient of the function, are also shown and were calculated by applying Tchebycheffs Inequality (Hayes 1969) to the gradients obtained from each individual observer. These limits describe the

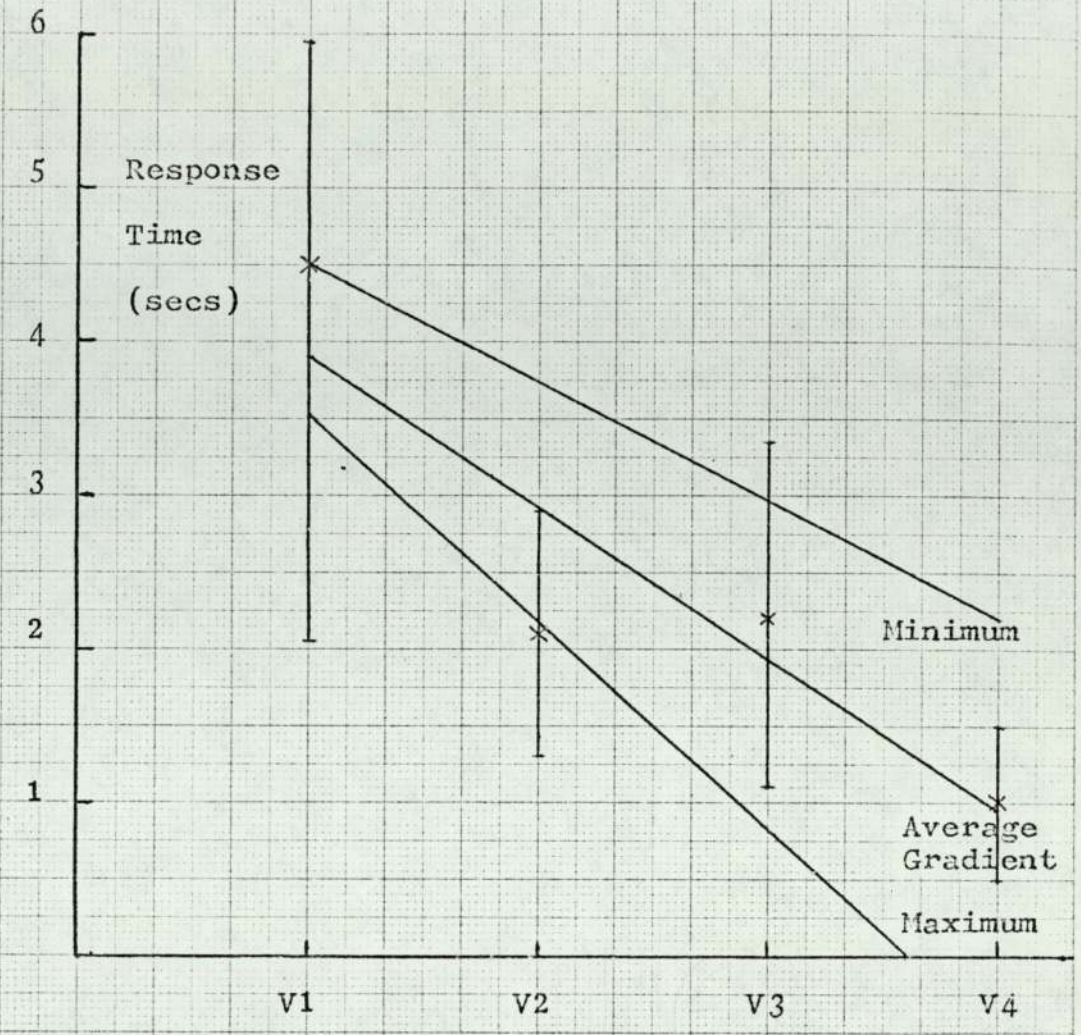


Figure 14.7. Average, Minimum and Maximum Gradients of function of response time and target conspicuity. Normally Sighted Observers.

gradient expected for 93% of a normal population, and define the relationship between response and target distinctness independent of the actual time taken. The results show that in the normal observer the response to a target of 3 minutes of arc is on average approximately 4 times faster than the response to a target of 0.5 minutes of arc. The regression line does, however, rapidly approach zero beyond targets of size, 3 minutes of arc, and indicates that the relationship must in reality be non-linear levelling out beyond approximately 1.1 log units above threshold.

The results obtained for the partially sighted subjects showed no consistent pattern in many cases. (Table 14.12). This was as a result of partially sighted individuals making large numbers of errors. Straight lines could not be fitted to the data for each individual subject. Comparison of gradients with that for the normally sighted observer was not therefore carried out due to the unreliability of the measures.

The results did show, however that, as for normally sighted observers, response to the more conspicuous targets was generally faster than that for the less conspicuous targets. As target V2 had a relatively long response time which was desirable in order to reduce errors of measurement in any subsequent test procedure, and had a relatively low error term, it was considered the most

appropriate for use in a modified display series.

	V1	V2	V3	V4
1	11.49	9.7	1.74	5.34
2	10.22	11.21	7.98	13.72
3	14.72	7.24	9.5	8.22
4	6.13	7.29	2.06	1.6
5	13.26	16.87	4.06	6.95
6	17.08	16.87	5.76	13.63
7	6.01	15.68	0.95	5.03
8	9.96	13.62	10.61	9.89
9	25.07	16.48	4.9	24.58
10.	17.17	10.10	8.47	14.82

Table 14.12. Target Conspicuity. Average Correct Response Time. (Secs.). Partially Sighted Observers.

14.5. Target Orientation and Position.

It has been shown that response to stimuli is affected by the orientation of the stimulus and by its position in a display. Visual acuity is best for straight contours that are orientated vertically and horizontally (Rock and Heimer 1957, Ogilvie and Taylor 1958) and peripheral stimuli tend to be ignored or responded to more slowly than centrally located stimuli (Drew 1940, Davis 1948, Adams and Boulter 1964).

Using the Friedman Two Way Analysis of Variance (S. Siegel 1956), analysis of the response times of both partially sighted and normal observers for target stimuli of horizontal, vertical and oblique orientation showed that response was not affected in either case by the orientation of the target stimulus. (Table 14.13).

Normally Sighted Subjects.	1	2	3	4	5	6
Response Time:						
Vertical	2.47	4.18	9.75	4.12	0.95	4.42
Horizontal	4.10	3.64	3.31	3.95	5.54	8.54
Oblique	4.37	4.63	9.08	1.11	5.79	4.60

Friedman Two Way Anova:-

$X^2r = 1.$ df = 2, p = 0.74 Not Significant.

Partially Sighted Subjects.	1	2	3	4	5	6
Vertical	9.7	11.21	7.24	7.29	16.87	20.22
Horizontal	5.88	7.13	10.21	4.19	10.21	22.55
Oblique	4.37	14.49	9.55	2.87	9.90	13.81

	7	8	9	10
Vertical	15.68	13.62	16.48	10.10
Horizontal	1.51	11.32	13.86	14.14
Oblique	3.3	10.62	10.95	10.17

Friedmann Two-Way Anova:-

$X^2r = 1.4$ df = 2 $0.5 > p > 0.3$ Not Significant.

Table 14.13. Response Time and Target Orientation. Normal and Partially Sighted Subjects.

Analysis of the response times for target stimuli of central, intermediate and peripheral location showed that although response was not

significantly affected by the target position, for partially sighted observers, response to peripheral stimuli was on the whole slower than that for central or intermediate target stimuli. (Table 14.14).

Stimulus Position			Normally Sighted Subjects			
	1	2	3	4	5	6
Central	4.10	3.64	3.31	3.95	4.54	8.54
Intermediate	5.4	1.43	4.84	4.89	7.18	7.44
Peripheral	4.15	3.12	3.62	5.50	10.01	7.67

Friedmann Two Way Anova:-

$X^2r = 1.$ df = 2. p = 0.74. Not Significant.

			Partially Sighted Subjects			
	1	2	3	4	5	6
Central	5.88	7.13	10.37	4.19	10.21	22.55
Intermediate	4.36	7.99	7.92	1.90	10.19	14.43
Peripheral	5.46	12.53	13.61	5.85	6.99	15.26
	7	8	9	10		
Central	1.51	11.32	13.86	14.14		
Intermediate	1.70	6.42	2.07	16.11		
Peripheral	5.31	10.98	17.07	15.77		

Friedmann Two Way Anova:-

$X^2r = 4.2$, df = 2. $0.2 > p > 0.1$ Not Significant.

Table 14.14. Target Position. Normally Sighted and Partially Sighted Subjects. Response Time.

In the investigation of the differences between response to targets of different orientation and position, the results could only be utilised from displays in which the other variables of vernier level and display complexity were all the same. The initial test design had allowed for 10 such observations by each individual for each of the target characteristics, but the reduced version of the test finally utilised allowed for only 2 observations for each of the characteristics. This number of observations was inadequate for determination of small effects of stimulus characteristics, but was sufficient to indicate that no gross effects arose. In view, however, of the significant small effects of target orientation and position, reported in the more detailed studies, it was considered that in any modifications of the test technique the effect of these factors should continue to be taken into account and controlled by ensuring that position and orientation were distributed randomly.

Chapter 15.

Employment Success and Visual Ability.

15.1. Implications of the Initial Test Results.

The results of the initial test showed that although the time required to identify correctly the existence of a target stimulus, set in a display of non target stimuli, may vary widely between partially sighted and normally sighted observers, when display complexity was increased, the increase in time taken by partially sighted observers was significantly greater than that taken by normally sighted observers. The results also showed that the number of errors made by partially sighted observers was significantly greater than that made by normally sighted observers, and that for the former group neither the increase in response time for the more complex displays, nor error scores, were significantly related to the level of visual acuity of the observer.

It was considered, therefore, that as the test technique essentially measured the ability of the individual to identify correctly a target stimulus set amongst confusion stimuli, and did differentiate between normally sighted and partially sighted observers, the procedure formed an adequate basis for development of

a test which might usefully be applied in the vocational assessment of partially sighted school leavers.

The test of visual ability was, however, both too lengthy and complex for use by unskilled individuals. As the aim of the project was to develop a test which could be operated and interpreted by teachers and careers officers and which was applicable to both young as well as the more mature partially sighted individual, modifications to the procedure were required before investigation could be undertaken of the validity of the test as a predictor of employment outcome.

15.2. Modification to the Initial Test Design.

In the initial test design non target stimuli consisted of an annulus containing an unbroken diameter, and target stimuli consisted of a similarly sized annulus with a broken diameter. In each display, only one stimulus required resolution and a positive decision, and all other non target stimuli required no resolution. The test recorded the response latency of the observer; that is, the time required by an observer to identify the presence of a target stimulus set within a display containing numerous non target stimuli.

The test had been constructed in this manner in order that response latency should be dependent on display complexity; in the hope that the relationship between these two factors would prove, for partially sighted observers, to be significantly different from that for normally sighted observers. The results of the initial test investigation had shown that between these two groups the relationship was significantly different, but several disadvantages arising from the test design were apparent.

As a consequence of having to include as many displays in which no target stimulus was present, as the number in which a target stimulus was present, in order

that a guessed response had an equal probability of being correct as being incorrect, the test series was too lengthy. The number of observations required for displays containing a target stimulus was also excessive, but was in fact the minimum required in order to minimise variance arising as a consequence of target position and the search strategy. The test, furthermore, required relatively sophisticated timing equipment in order to record responses.

Reduction in the total number of displays could, however, be brought about by including more than one target stimulus in each display, thus removing the requirement of an equal number of non target displays. Differences between displays could be maintained by varying the number of target stimuli in each presentation. The time taken to identify correctly a target stimulus for such displays would, however, not be measures of response time, but would be measures of the total search time required for each entire display.

It had been shown, however, that the relationship between display complexity and search time for non target displays was similar to the relationship between display complexity and response times for target displays (Chapter 14). In both cases, for partially sighted

observers the gradients of the function of each relationship were significantly different from those obtained by normally sighted observers.

It was therefore considered that the gradient of the function relating search time with display complexity would be as adequate a measure of visual ability as that obtained using the gradient of the function relating response time with display complexity. The test was thus redesigned on this principle. This technique is not dissimilar to that devised by Weston (1945) which was subsequently used to determine appropriate illumination levels for particular occupational environments and requirements (Weston 1961).

Utilising the same stimuli, the display series was modified to include only 42 displays, as opposed to the 64 previously used. In the hope that search times could be increased to a level whereby they might be measured relatively accurately without sophisticated electronic timing equipment, display complexity (the number of non-target stimuli) was increased for each display. Seven distinct groups, containing a total of 10, 15, 20, 25, 30, 40 and 50 stimuli were utilised. Within each group, 1, 2, 3, 4 and 5 target stimuli were distributed randomly within the display. One display in each of the seven

groups contained no target stimulus. Throughout all displays, the orientation and position of both target and non-target stimuli were distributed randomly. The size of the vernier break within the target stimulus was equivalent to one minute of arc when the display was projected from and viewed from 6 metres. The thickness of the annulus and diameter of the stimulus was, as before, equivalent to two minutes of arc.

In the initial test design, for displays which contained only non-targets, each of which required no critical resolution, errors in discrimination were rare for both normally sighted and partially sighted subjects. It was considered that if non-targets had required critical discrimination then the error rate might well have been much greater and in itself provide a score of accuracy, suitable as a measure of visual ability. In order to examine this aspect a second test was constructed in which non-target stimuli contained a vernier break, the reverse of the original design. Figure 15.1 is an example of the most complex display in the second test, designated Test 'A'. Figure 15.2. is an example of the same level of complexity in Test 'B', which has the same target and non-target characteristics as in the original design.

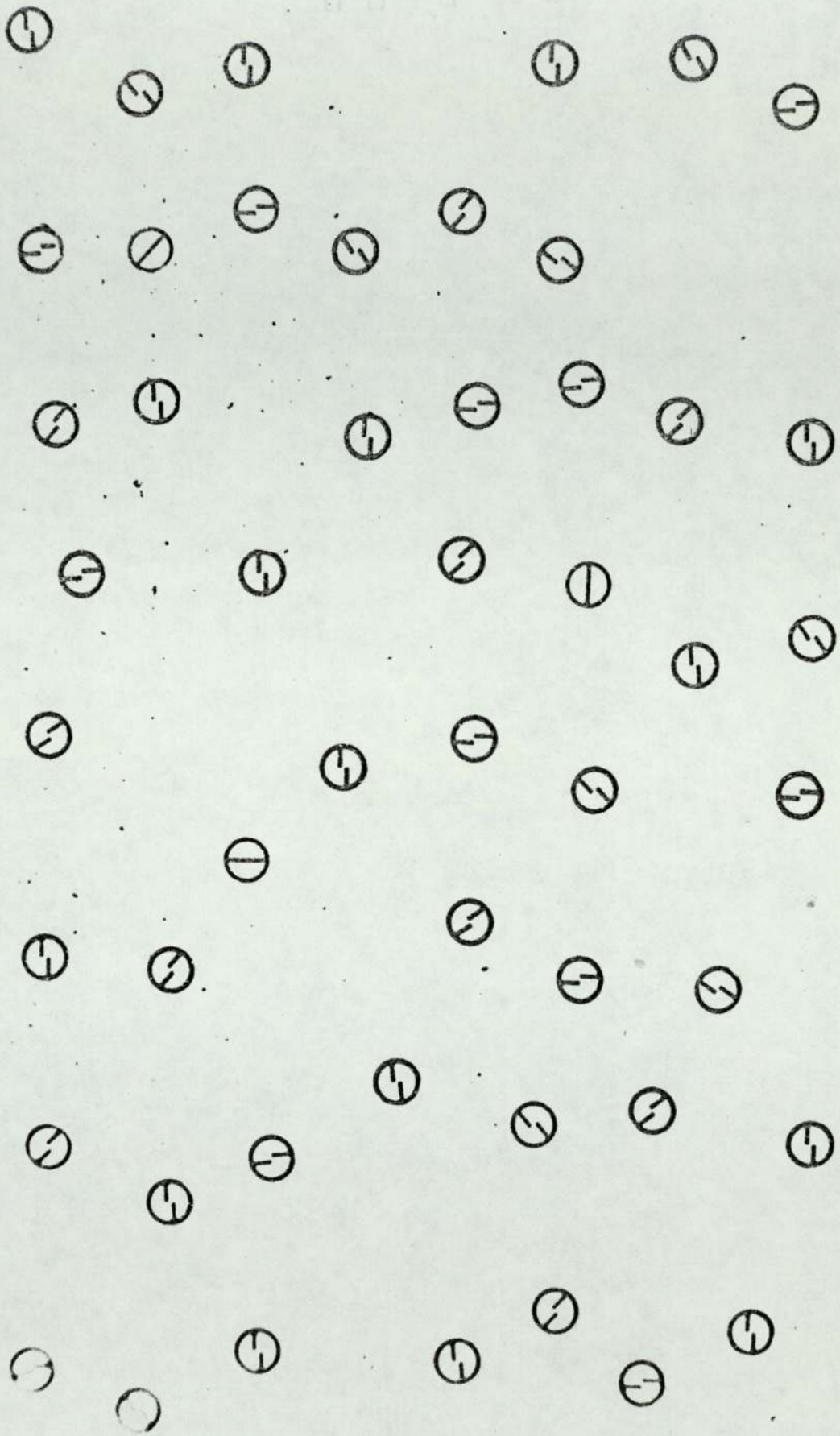


Figure 15.1. Example of test display Test. 'A'.

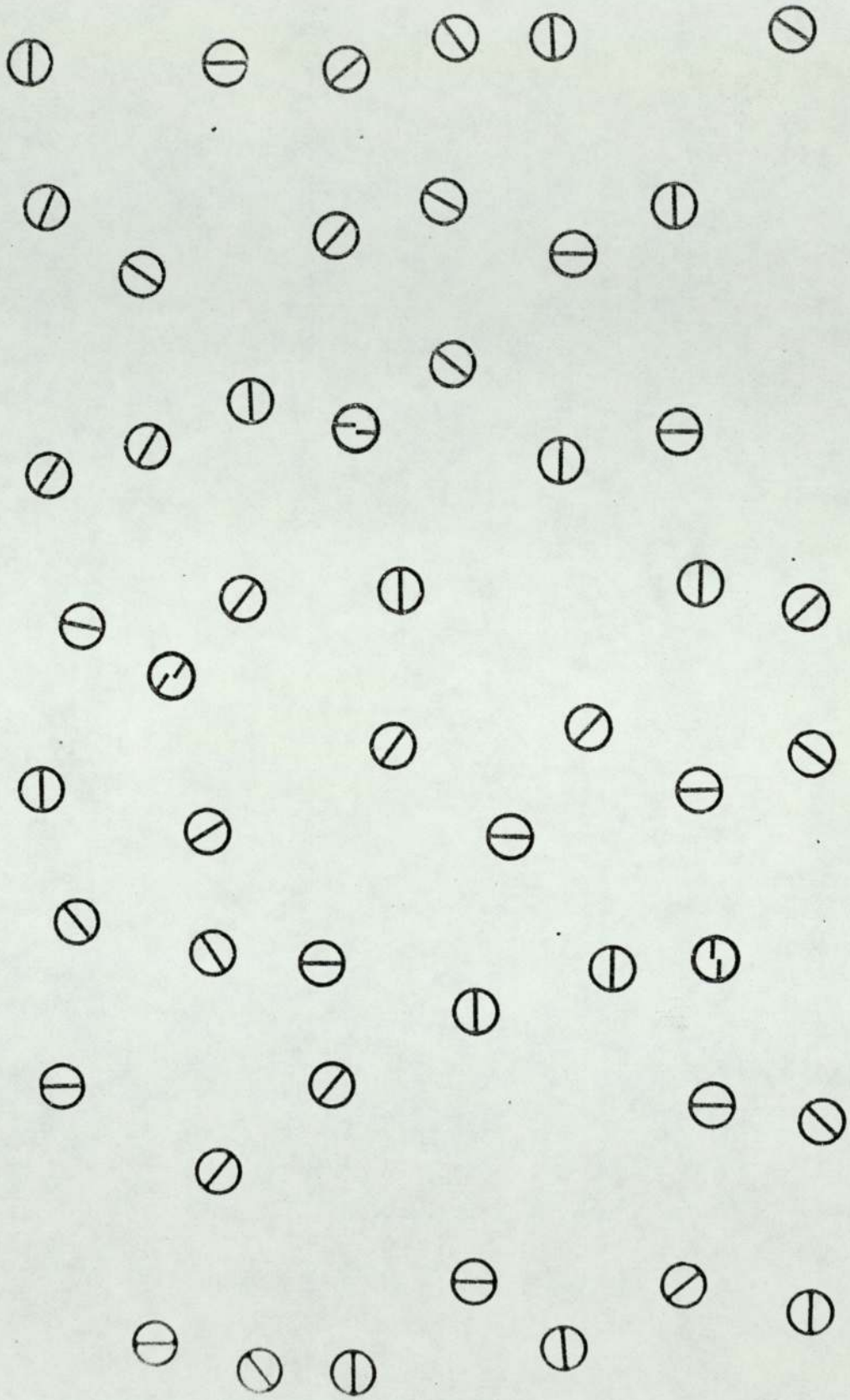


Figure 15.2. Example of test display. Test 'B'.

15.3. A Kinetic Three Dimensional Task.

From the outset of the investigation it was hoped that it would be possible to develop a test of visual ability which simulated the full range of visual demands common to the employment situation. Towards this end, the dynamic task examined during the preliminary investigation had incorporated three-dimensional moving stimuli. The results of that investigation had indicated that the differences observed between successful and unsuccessful subjects were most likely as a result of differences in their ability to locate and identify target stimuli set within complex displays. The variables of solidity and movement of stimuli were most probably only secondary to complexity. It was therefore considered that development of an appropriate test of visual ability should proceed on the basis of investigation of the factors which affect visual response to stimuli within complex displays. The secondary variables raised questions, the answers to which could not readily be determined in an experimental design appropriate to a development programme. Before aspects of movement of stimuli could be incorporated in a test it would have been necessary first of all to determine the range and type of movement which was appropriate. Several questions needed to be answered. How far should

stimuli be moved? What would be the effect of different rates of movement? What effect would direction of movement have? Should stimuli themselves be moved, or the entire display? With respect to characteristics of three dimensional stimuli, further questions needed to be answered. How were target stimuli to be differentiated from non target stimuli? Should they be different shapes, or the same shape but of different size? What size or shape difference was appropriate? Finally, how could performance be scored and the contribution of these variables be determined?

As it was considered that these variables were secondary factors, it was felt that a working two dimensional test should be developed before attempting to answer these other questions. It was hoped that the effect of movement and solidity of stimuli could be thoroughly investigated following development of a two dimensional test and determination that it did in fact differentiate between successful and unsuccessful individuals. The appropriate ranges and type of movement, and form and size of stimuli could then be determined and subsequently incorporated in a three dimensional moving test, thus providing a test which

was not only a useful simulation of the employment situation but which was also capable of fulfilling its intended purpose, that is, determining the effectiveness with which partially sighted individuals could use their residual vision.

It became clear, however, that as a result of the length of time which it had taken to develop a two dimensional static test and obtain a sample for use in determining its effectiveness, it would not be possible in the remaining time to construct, on the same principles, a three dimensional moving test and also undertake investigation of the contribution of these additional variables. Nor would it be possible to undertake determination of the effectivenes of such a test.

In order, however, to go some way toward providing a basis for the future development of a three dimensional kinetic test, and to undertake some investigation of the effect of these additional variables, a simple task was constructed utilising a moving display of solid stimuli.

15.4. Subject Characteristics.

Two groups of partially sighted subjects were utilised for the purpose of determining the validity of the tests as predictors of employment outcome. One group consisted of individuals who had been successful in employment, the other group consisted of individuals who had been unsuccessful in employment. A small group of normally sighted observers was also utilised for the purpose of providing an estimate of a normal standard against which the responses of partially sighted observers could be compared.

The normally sighted subjects were drawn from staff and students of the Department of Ophthalmic Optics in the University of Aston. The age range was between 18 and 28 years. All normally sighted subjects had a corrected visual acuity of 6/6 or better, and had no ophthalmic abnormality as determined by a full ophthalmic clinical examination. It was the intention to carry out an extensive determination of the normal response only if investigation of the responses of partially sighted subjects indicated that standardisation was appropriate. The five normally sighted subjects used were considered suitable for the purpose for which they were intended.

The partially sighted subjects were drawn from among those who had responded to the questionnaire on employment.

The validity of the two tests as predictors of employment outcome could therefore be investigated as all subjects had been classified on the basis of their employment history as either successful or unsuccessful in employment. From the 95 respondents, 56 subjects were contacted and their co-operation in the investigation requested. As the homes of all the respondents were widely distributed throughout England and Scotland three cities, Birmingham, London and Edinburgh were chosen as the best centres at which the investigation could be based. The 56 subjects contacted were chosen on the basis of their living within reasonable travelling distance of one of the centres.

Of the 13 subjects contacted in the Birmingham area, 6 agreed to take part in the investigation. Of the 11 subjects in the Edinburgh area 5 agreed to take part, and of the 32 subjects in the Greater London area, 12 subjects agreed to take part. From the total of 23 subjects who were prepared to take part in the experimental investigation, 16 subjects attended for examination. Three subjects in Scotland were unable to attend due to adverse weather and impossible travelling conditions, 2 subjects in Birmingham and 2 in London could not attend at the dates originally agreed and no alternative dates could be arranged.

Of the 16 subjects who took part in the investigation of the measures of visual ability, 8 were successful in employment, and 8 were unsuccessful. The ratio of successful to unsuccessful individuals, observed in the total sample of 95 school leavers and young adults was 2.3:1 and, in the group of 56 individuals from which the 16 subjects were drawn was 1.8:1. It was felt that the larger proportion of unsuccessful individuals obtained in the sample of 16 subjects arose as a result of a greater proportion of unsuccessful individuals than successful individuals having been unemployed at the time of the investigation and therefore more able and probably more willing to attend for examination. Four individuals, 50% of the unsuccessful group, were unemployed at the time of the investigation and all the successful individuals were in full time employment.

The average age of the partially sighted subjects was 20.2 years, with a standard deviation of 2.7 years, and the male/female ratio was 2.7:1. The average age of the entire sample of 95 leavers was 20.9 years and the male/female ratio was 1.9:1. The sixteen subjects were therefore considered as reasonably representative of the total population of partially sighted school leavers and young adults, but with a greater proportion of males represented. (Table 15.1).

	Sex	Age	Visual Acuity	Visual Field	Ophthalmic Condition	Employment Classification
1	F	19	6/24	Restricted	Cataract	S
2	F	19	6/72	R	Retrolental Fibroplasia	U
3	M	17	6/18	R	Congenital Nystagmus	U
4	F	19	6/36	Good	Dislocated lens	U
5	M	19	6/18	G	Cataract	S
6	F	22	6/48	R	Optic Atrophy	S
7	M	19	6/48	G	Congenital Nystagmus	U
8	M	18	6/24	G	Albinism	S
9	M	23	6/18	G	Albinism Nystagmus	S
10	M	24	6/36	R	Cone Blindness	U
11	M	18	6/24	G	Albinism	S
12	M	19	6/72	G	Cataract, Corneal Opacity and Nystagmus	U
13	F	20	2/60	R	Optic Atrophy	U
14	M	27	6/72	R	Cataract	U
15	M	17	6/24	G	Albinism, Nystagmus	S
16	F	23	6/12	G	Congenital Nystagmus	S

Table 15.1. Ophthalmic Condition, Visual Acuity, Visual Field, Age, Sex and Employment Classification of Partially Sighted Subjects.

Visual Acuity	Fine 1968	Sample Group
Hand Movements - 2/60	5.0	6.25
3/60 - 6/60	37.2	31.25
6/36 - 6/24	34.8	37.5
6/18 or better	21.5	25.0
Unknown	1.5	------
	100.0	100.0

Table 15.2 Distribution of Visual Acuity in Sample Group. (Percentage).

Table 15.2 gives the distribution of visual acuity levels in the group of 16 subjects, compared to that found by Fine (1968) for the total population of partially sighted school children. The proportions are not dissimilar within the major classifications. It was considered, therefore, that no bias in visual acuity was present in the subject group, and that with respect to visual acuity the group was reasonably representative of the total partially sighted population.

Table 15.3 gives the incidence of Ophthalmic Conditions present in the total population of partially sighted school children, and the incidence of Ophthalmic Conditions found in the sample group.

Ophthalmic Condition	Sample (%)	Fine 1968(%)
Cataract and lens displacement	31.25	27.1
Opti c Atrophy	12.5	12.0
Albinism, Nystagmus	18.75	11.2
Retrolental Fibroplasia	6.25	6.0
Diseases of Retina and Choroid	6.25	8.7
Others (including Myopia)	----	35.0
	100.0	100.0

Table 15.3. Incidence of Ophthalmic Condition in Sample Group and Total Population. (Percentage).

The conditions most commonly found in the total population were all represented within the sample group in approximately similar proportions, but with the exception of Myopia, which was not represented at all, and Albinism, in which more than twice the expected number was present in the sample group.

Comparison of characteristics within the two groups of partially sighted subjects showed that with respect to sex, the proportions of males and females were exactly similar. Unsuccessful subjects were on average slightly older than successful subjects; the average age in each group was 20.5 years and 19.8 years respectively. Analysis using the Mann Whitney 'U' Test showed that the age difference between the two groups was not significant ($U = 26.5$, $0.32 > p > 0.29$). Using the Fisher Exact Probability Test, analysis showed that with respect to the visual field, there was no significant difference between the two groups (p 0.05). It was found, however, using the Mann Whitney 'U' Test, that unsuccessful subjects had significantly poorer visual acuity than successful subjects. ($U = 8.5$, $0.007 > p > 0.005$).

Intelligence quotients were available for only 5 unsuccessful and 2 successful subjects, but schools had been requested to provide an assessment of ability on the scale 'Above Average', 'Average' and 'Below Average'. For the 16 subjects, 5 were assessed as 'Above Average', 6 as 'Average' and 5 as 'Below Average'. This distribution is somewhat different to that found by Fine (1968), where Intelligence Quotients indicated that in the school population 11% were 'Gifted' (115+), 67% were 'Average'

(85 - 114) and 22% were 'Dull' (50 - 84). The difference between the two distributions may possibly be accounted for in part by the teachers' approach to assessment: it may be the case that where individuals are near the upper or lower extreme of 'Average', teachers may be more inclined to rate them as 'Above Average' or 'Below Average'. It would still seem, however, that the subject group had a slightly greater number of both'above'and'below'average individuals than might have been expected. Analysis showed that 'ability' as assessed by teachers was significantly associated with employment outcome. Of the 5 individuals assessed as 'Above Average', all were successful and of the 5 individuals assessed as 'Below Average', 4 were unsuccessful (Fisher Exact Probability $p \leq 0.025$). Within the group assessed as 'Average', however, only 2 were successful and 4 were unsuccessful. It would seem then, that at least for those individuals considered by their teachers as 'Above Average' or 'Below Average', that assessment might be as good an indication of employment outcome as any other.

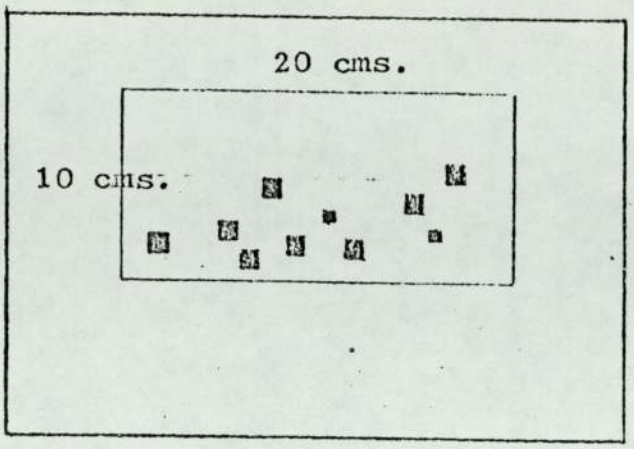
In strict terms, the numbers of subjects in the two sample groups were less than satisfactory. Extension of the investigation to include more subjects was, however,

virtually impossible due to the limitations in time and man-power available, and the lengthy and difficult procedures required to arrange suitable places, dates and times for subject examination. It was considered that the number of subjects would have to suffice unless analysis of the results obtained from the tests proved to be completely inconclusive.

15.5. Apparatus and Procedures, Three Dimensional Kinetic Task.

Performance in the Three Dimensional Kinetic task was measured in terms of the number of observations required for the correct determination of the total number of target stimuli set within a complex display of non target stimuli. Two static and two kinetic presentations were utilised. For static presentation, subjects viewed each display for 1 second in the one instance, and for 2 seconds in the other. For the two kinetic presentations, the display passed in front of the subject at 40 cms per second and at 20 cms per second. During kinetic presentation the displays were in view for slightly more than one second in the first instance, and slightly more than two seconds in the second instance. As presentation and occlusion of displays was operated manually during the static test, viewing times were approximately equivalent in each instance to the viewing times during kinetic presentation.

Stimuli were constructed as black cubes mounted on a white background. The white background was a continuous belt of polyvinylchloride attached to two toothed conveyor belts held under tension by two internal axles contained within a rigid metal frame. Movement of the entire display was brought about by



Subject View

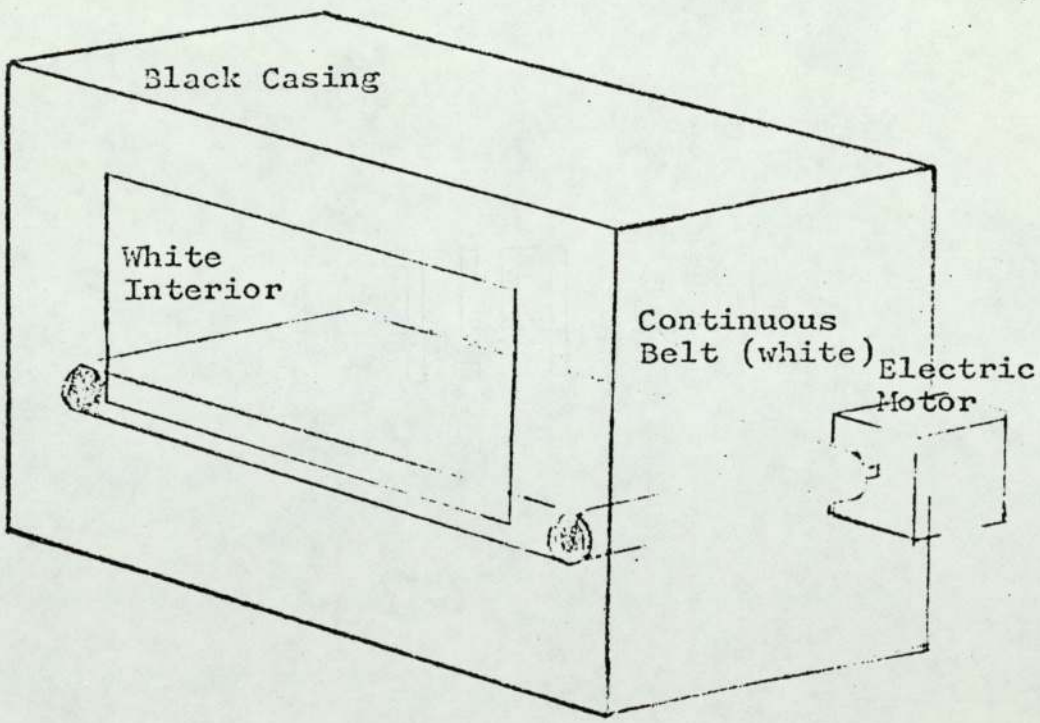


Figure 15.3. Apparatus for Kinetic, Three Dimensional Test.

driving one axle with a variable speed electric motor. The continuous belt and targets were contained within a black outer casing and viewed through an aperture 20 cms long by 10 cms high. (Figs. 15.3).

Target stimuli were 5 mm cubes and non target stimuli were 10 mm cubes. The maximum number of stimuli within any one display was varied between 10 and 15 stimuli. Larger numbers of stimuli, equivalent to the number used in the static two dimensional tests, could not be incorporated due to limitations in the size and bulk of the apparatus. A display area large enough to accomodate 50 solid stimuli was not feasible in an apparatus which needed to be portable for use in field investigations.

Each display could contain a maximum of 15 stimuli. To provide a variety of different display configurations the number of target stimuli was varied between zero and 5. Subjects were required to report the number of smaller stimuli contained in the display. Subjects viewed the display from whatever distance at which they felt that they were able to distinguish between the large non target stimuli and the small test target stimuli. The majority of partially sighted subjects viewed displays from within 35 cms. The number of presentations required for correct identification of the number of test stimuli was recorded for 5 different

display configurations, in each of the 4 modes of presentation. The average number of presentations required for correct identification was taken as the score of performance.

15.6. Results of the Kinetic, Three Dimensional Task.

Using the Mann Whitney 'U' Test, analysis of the average number of presentations required for correct identification of target stimuli showed no significant difference between successful and unsuccessful subjects for either static or kinetic displays. (Table 15.4).

Successful Subjects

	Static 1 Sec.	Kinetic 40cm/sec.	Static 2 Sec.	Kinetic 20cm/sec.
1	2.4	4.0	2.6	3.0
5	3.6	8.8	2.0	5.6
6	1.8	5.4	1.4	2.0
9	2.4	7.6	1.2	7.0
11	1.8	5.0	2.2	3.6
16	2.0	6.4	1.2	3.8

Unsuccessful Subjects

	Static 1 Sec.	Kinetic 40cm/sec.	Static 2 Sec.	Kinetic 20 cm/sec.
2	3.0	8.6	1.8	2.4
4	2.6	11.4	2.0	8.0
7	2.0	6.8	1.4	4.6
10	2.8	6.0	1.6	5.4
12	2.2	7.6	2.2	3.8
13	2.2	7.0	2.8	4.8

(Average Number of Observations for correct identification of target stimuli).

Table 15.4 continued.....

Hypotheses.

That successful subjects require less observations than unsuccessful subjects.....

1	Static 1 Sec. Display,	'U'=10.5	0.15>p>0.12	Not Sig.
2	Kinetic 40cm/sec.Display,	'U'=9.5	0.1 > p>0.09	"
3	Static 2 Sec. Display,	'U'=13.5	0.29>p>0.24	"
4	Kinetic 20cm/sec. Display	'U'=13.5	0.29>p>0.24	"

Table 15.4. Results for Kinetic 3 dimensional Test. Successful and Unsuccesfful Partially Sighted Subjects.

It was found however, that on average, unsuccessful subjects tended to require slightly more observations than did successful individuals. (Table 15.5).

	Static 1 Sec.	Kinetic 40cm/sec.	Static 2 Sec.	Kinetic 20cm/sec.
Successful Subjects	2.33	6.2	1.76	4.16
Unsuccessful Subjects	2.47	7.9	1.96	4.83

Table 15.5. Average number of observations for correct identification. Static & Kinetic presentation. Successful & Unsuccessful Subjects.

Analysis of the number of observations required for kinetic displays compared to the number required for static displays of the same period, showed that in all cases a kinetic display required more observations. Successful subjects, on average, required 3.8 more observations for the kinetic display moving at 40cm/secs than the number required for the equivalent static display of 1 second, and required 2.7 more observations for the kinetic, 20cm/sec. display than the number required for the equivalent 2 second static display. Unsuccessful subjects required 5.4 more observations in the first instance, and 2.8 more observations in the second instance. Analysis using the Mann Whitney 'U' Test showed that in both instances there was no significant difference between successful and unsuccessful subjects in the increase in observations required for a kinetic display. (K40-S1, U=16, $p = 0.35$; K20-S2, U=15, $p = 0.294$).

The results therefore show that observation of a moving display is more difficult than observation of an equivalent static display. It would appear, however, that for the ranges utilised the procedure does not differentiate between successful and unsuccessful partially sighted subjects. Although the difference between the two groups was not significant the average

for each indicates that unsuccessful subjects, on the whole, had greater difficulty than successful subjects. The results suggest that in subsequent development of a test of visual ability, movement of stimuli would be a useful addition to displays more complex than those utilised in the described test, and might provide a more comprehensive and critical assessment of visual ability than that derived from static tests.

15.7. Apparatus and Procedures, Tests 'A' and 'B'.

The apparatus used to present displays and record search times was that which was used in the initial pilot investigation of the test. (Chapter 13.3).

For partially sighted subjects, displays were projected from a distance of three metres, and subjects viewed the display from the distance at which they could correctly determine, in four out of five trials, a target stimulus containing a vernier break of 1mm. If more than one error was recorded the subject was positioned closer to the display. Partially sighted subjects normally viewed the display from a distance of 3 metres or less. Once the subject was positioned the test series was run using stimuli in which the vernier break was 2mm. thus ensuring that the stimulus characteristics were well above the threshold of resolution of each partially sighted observer. For normally sighted observers the displays were projected and viewed from a distance of 6 metres. The resolution required to determine the vernier break in stimuli was therefore equivalent to a visual acuity of 6/12 and was thus well above the normal average threshold.

Test 'A', in which non target stimuli contained a vernier

break, was carried out first. A display containing 25 stimuli, of which 5 were target and 20 were non target stimuli, was demonstrated. Target stimuli were pointed out and the subjects instructed that they were to count the total number of target stimuli which appeared in each display. Subjects were further instructed that some displays contained no target stimuli and that the maximum number in any display was five. To ensure that the characteristics of target stimuli were fully understood, and to familiarise subjects with the recording procedures, 5 displays were presented as a practice run and any errors were pointed out to the subject.

After it had been ascertained that the subjects were accurately positioned and fully familiar with the procedures, the full test series was carried out. Subjects recorded the time taken to search each display by pressing the hand held recording button simultaneously with giving their count of the number of target stimuli within the display. Errors were recorded by the investigator, using a guide list, and a continuous record of both speed and accuracy was obtained via the Facit printer linked to the digital time clock. As in the initial test, initiation of each display was controlled by the investigator and was actuated automatically when subject accuracy for the preceding

display was recorded.

Test 'B', in which target stimuli contained a vernier break and in which non-target stimuli contained no vernier break, was carried out after test 'A' and with the same procedure.

15.8. Results of Tests 'A' and 'B'.

From the visual search times recorded for each normally sighted subject, the average and maximum limits of the gradients of the regression equation, which describes the relationship between search time and display complexity, were obtained. The regression equation for each subject was determined by the Method of Least Squares, and the maximum limits of the gradient expected in the normal population were determined by applying Tchebycheffs Inequality to the average and standard deviation of the gradient obtained. The maximum number of errors expected for the majority (93%) of the normally sighted population was similarly calculated by applying Tchebycheffs Inequality to the average and standard deviation of the number of errors made by normally sighted subjects.

The results of Test 'A' for normally sighted observers are given in Figure 15.4 and in Table 15.6.

	Average	Standard Deviation	Maximum Limit for 93% of Normal Observers.
Gradient	0.15	± 0.04	0.25
Errors	1.6	± 0.96	4.08
Average Total Search Time = 284.22 secs.			

Table 15.6. Results for Normally Sighted Observers Test 'A'.

TEST 'A' NORMALS

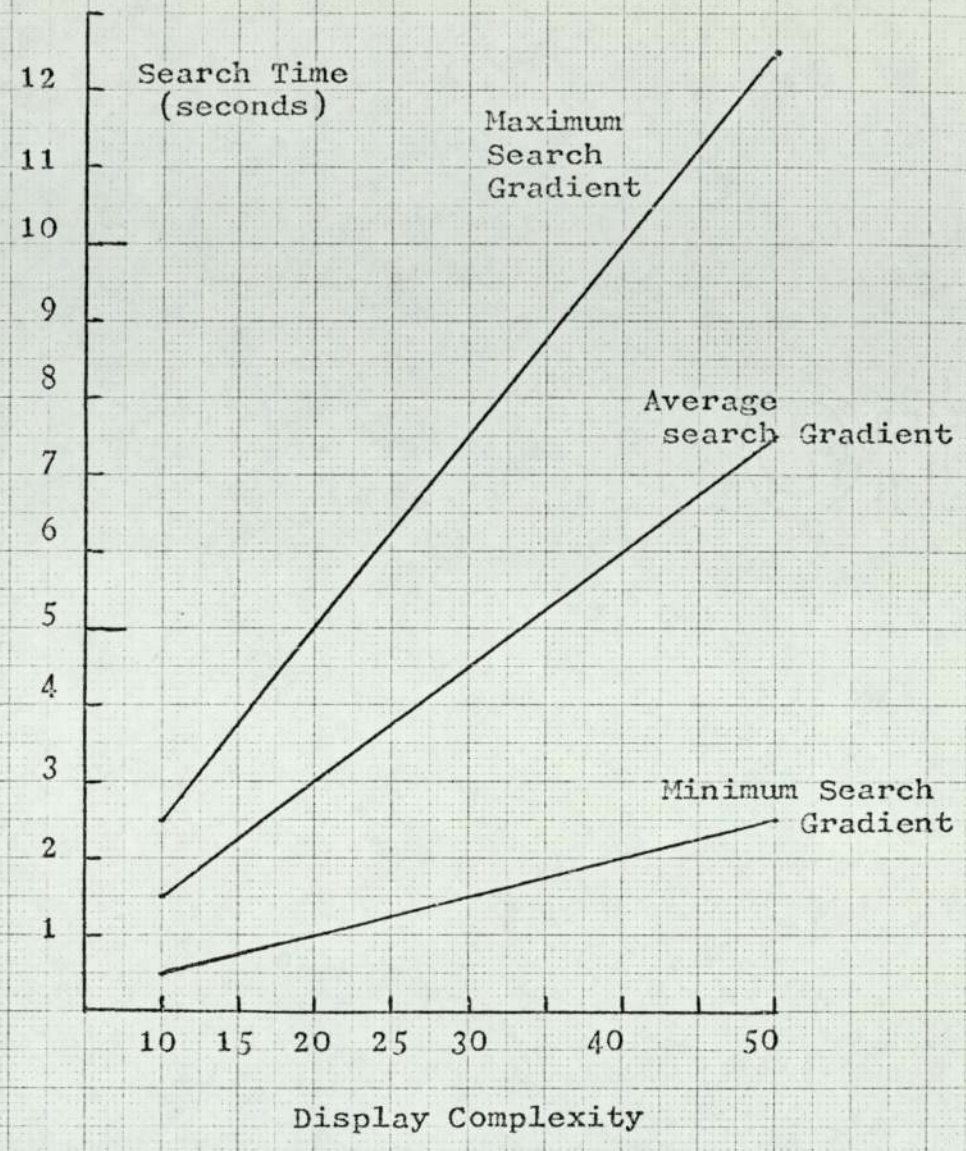


Figure 15.4. Average, Maximum and Minimum Search Gradients. Normally Sighted Observers, Modified Test.

The results for partially sighted subjects showed that all subjects, with the exception of one individual (Subject 16), had gradients that were outwith the maximum limits expected for normally sighted observers. (Table 15.7, Figures 15.5 and 15.6). The results also showed that as display complexity increased, partially sighted subjects had far greater difficulty than normally sighted subjects, in counting the number of target stimuli present in the display. With repect to the total number of errors made, all except two subjects, numbers 14 and 15, were outwith the maximum number of errors expected in the normally sighted population.

Analysis of differences in the results between successful and unsuccessful partially sighted subjects, using the Mann Whitney 'U' Test (S. Siegel 1956) showed that with respect to the gradients obtained, there was no significant difference between the two groups ($p = 0.48$), but that with respect to the number of errors made, successful partially sighted subjects made significantly fewer errors than unsuccessful partially sighted subjects. ($p = 0.04$).

Further analysis, using the Student 't' test (S. Siegel 1956), of the total time required by partially sighted subjects to search every display, showed that partially sighted subjects successful in employment were significantly faster than partially sighted subjects who were unsuccessful in employment. ($0.05 > p > 0.025$).

S	Visual Acuity	Gradient	Errors	Total Time (secs)
		Successful Subjects		
1	6/24	0.61	13	680.00
5	6/18	0.37	7	509.45
6	6/48	0.46	10	618.10
8	6/24	0.67	5	960.55
9	6/18	0.47	10	496.95
11	6/24	0.45	20	698.60
15	6/24	0.73	3	919.50
16	6/12	0.21	8	282.45
		M=9.5 ± 4.9		M=645.77 ± 209.38
		Unsuccessful Subjects		
2	6/72	0.55	30	1009.80
3	6/18	0.64	34	1208.45
4	6/36	1.10	20	1995.90
7	6/48	0.33	23	580.65
10	6/36	0.36	7	563.90
12	6/72	0.51	16	909.80
13	6/180	0.51	20	1138.90
14	6/72	0.39	3	650.60
		M= 19.12 ± 9.8		M=1007.2 ± 440.25

Table 15.7. Results, Test 'A' Partially Sighted Subjects.

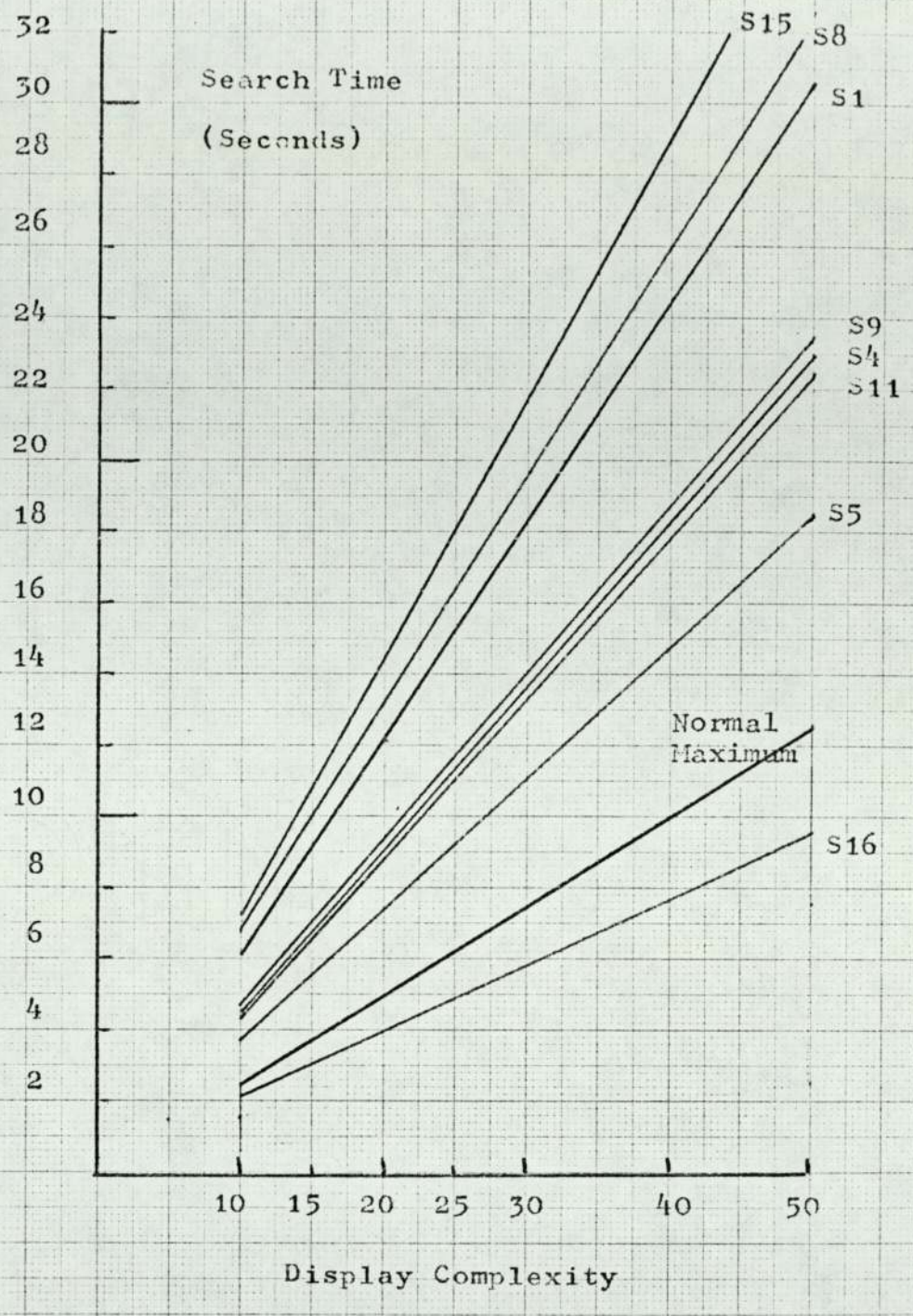


Figure 15.5. Gradient of Succesful Partially Sighted Observers. Test 'A'

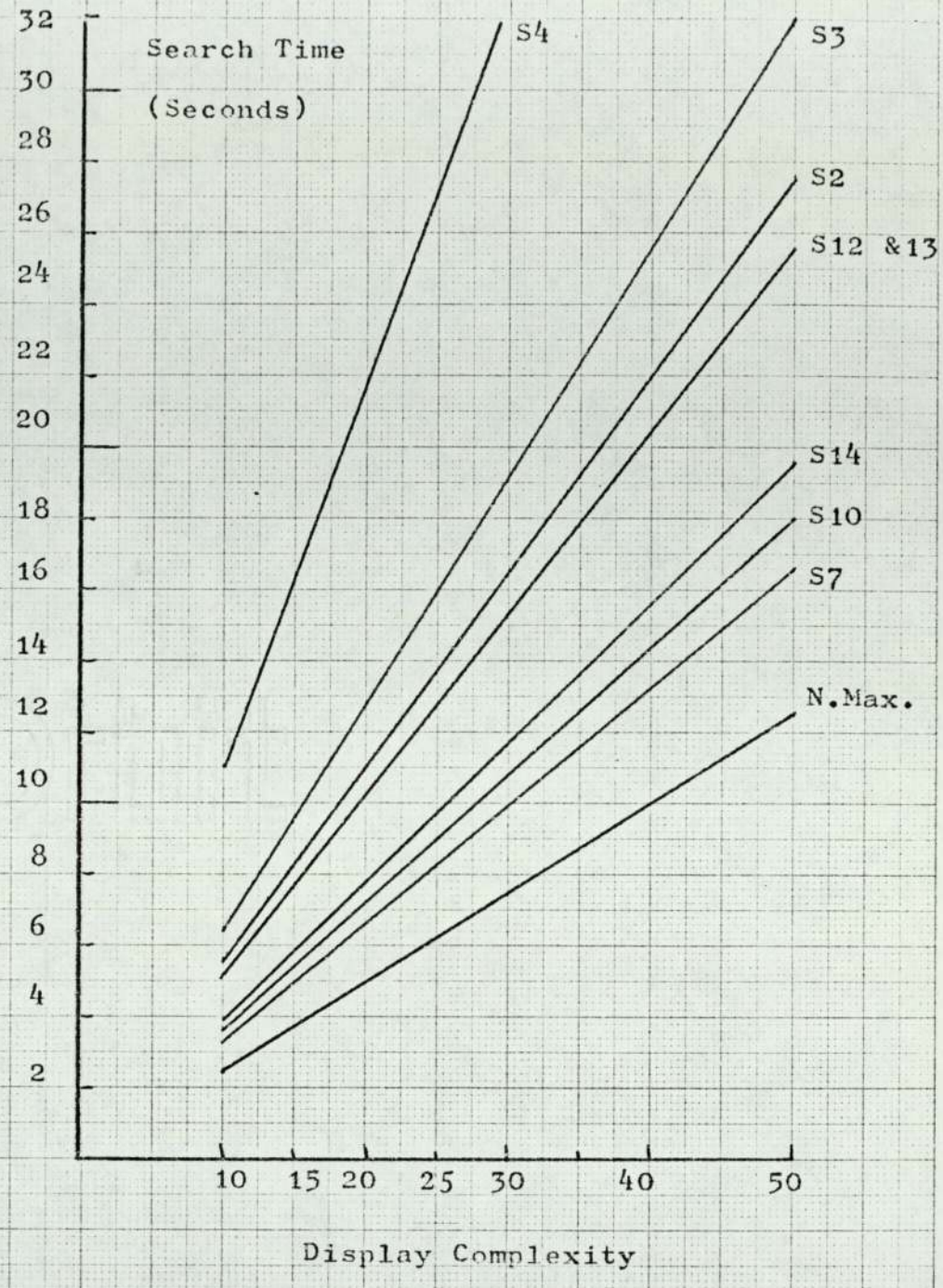


Figure 15.6. Gradients of Unsuccesful Partially Sighted Observers. Test 'A'.

Using the Spearman Rank Correlation Coefficient (S. Siegel 1956), investigation of the association between the measures obtained and the visual acuity of partially sighted subjects showed that neither gradient nor errors were related to visual acuity but that the total time taken, the speed with which the test was carried out, was directly related to the visual acuity of the subject. (Table 15.8).

Visual Acuity and Gradient	rs = 0.06, t = 0.224, df = 14 p > 0.20 Not Significant
Visual Acuity and Total Time	rs = 0.57, t = 2.59, df = 14 0.057 > p > 0.02 Significant
Visual Acuity and Errors	rs = 0.20, t = 0.75, df = 14 p > 0.20 Not Significant

Table 15.8. Test 'A', Spearmann Rank Correlation Coefficient, Visual Acuity and Gradient, Time, Errors of Partially Sighted Subjects.

Further analysis using the Mann Whitney 'U' Test showed that there was no significant difference between subjects with a 'Good' visual field and subjects with a 'Restricted' visual field in gradient, errors or total time taken. (Table 15.9).

Hypotheses.

That there is a significant difference between subjects with a 'Good' visual field and subjects with a 'Restricted' visual field in:-

1.	Gradient	: U= 30.5,	$p > 0.1$	Not Significant
2.	Errors	: U= 27.5,	$p > 0.1$	" "
3.	Total Time	: U= 28.0,	$p > 0.1$	" "

Table 15.9. Results of Analysis of Visual Field and Gradient, Errors and Times Test 'A'. Partially Sighted Subjects.

Using the same techniques as for test 'A' the average and maximum limits for gradient and errors in Test 'B' were calculated for normally sighted observers (Table 15.10).

	Average	Standard Deviation	Maximum limit expected for 93% of normal observers.
Gradient	0.07	$\pm$ 0.01	0.1
Errors	1.4	$\pm$ 0.57	2.87

Table 15.10. Results for Normally Sighted Observers Test 'B'.

Only 12 of the 16 partially sighted subjects completed Test 'B'. Subjects 2,8 and 13 were unable to do so because of fatigue, and subject 16 was required to leave before the examination could be completed. With respect to the gradients obtained and errors made by partially sighted subjects, all subjects were outwith the maximum limits expected for normally sighted observers. This result was due mainly to the fact that the test was extremely easy for normally sighted observers as only a small number of target stimuli required resolution for identification.

Analysis of results on test 'B', using the Mann Whitney 'U' Test showed that neither the gradients, errors nor total time were significantly different between successful and unsuccessful subjects. (Table 15.11). None of the measures obtained were significantly associated with the visual acuity or visual field of the subjects (Table 15.11).

	Gradient	Errors	Total Time
	Successful Subjects		
1	0.45	15	689.20
5	0.30	5	475.25
6	0.37	13	541.95
9	0.39	10	575.75
11	0.19	20	580.20
15	0.44	11	688.65
	Unsuccessful Subjects		
3	0.39	25	728.85
4	0.77	12	1152.35
7	0.24	19	501.00
10	0.29	7	486.65
12	0.27	13	618.00
14	0.22	4	532.85

Table 15.11. Test 'B' Results of Partially Sighted Subjects.

Continued over.....

Difference between Successful and Unsuccessful Subjects

Mann Whitney 'U' Test:-

Gradient	$0.294 > p > 0.242$	Not Significant
Errors	$p > 0.531$	Not Significant

Student 't' Test:

Total Time $t=0.72$ $df=10, p>0.2$ Not Significant

Relationship between measures and Visual Acuity.

Spearman Rank Correlation Coefficient:-

Visual Acuity and Gradient

$rs=0.43, t=1, df=10, p > 0.2$ Not Significant

Visual Acuity and Errors

$rs=0.04, t=0.12, df=10, p > 0.2$ Not Significant

Visual Acuity & Total Time

$rs=0.10, t=0.33, df=10, p > 0.2$ Not Significant

Table 15.11. Test 'B' Results of Partially Sighted Subjects.

Continued over.....

Relationship between measures and Visual Field.

Mann Whitney 'U' Test:-

Visual Field and Gradient	U=16.5	0.5>p>0.4 Not Significant
Visual Field and Errors	U=17.5	0.56>p>0.5 Not Significant
Visual Field and Total Time	U=17.0	p = 0.5 Not Significant

Table 15.11. Test 'B' Results of Partially Sighted Subjects.

15.9. Implications of the Results of Tests 'A' & 'B'

In test 'A', in which subjects were required to count the number of target stimuli which required no resolution, set within numerous non target stimuli each of which did require resolution, and in test 'B' in which the characteristics of targets and non targets were reversed, all the partially sighted subjects, with the exception of subject 16 in test 'A', demonstrated an increase in search time for an increase in display complexity, that was greater than the maximum increase expected for the majority of normally sighted observers.

It had been hoped that the gradient of the function relating search time and display complexity, which defines the increase in search time independent of the actual time taken and provides a numerical assessment of the ability of the individual to process increasingly complex visual information, might prove to be a measure suitable for use as a predictor of the employment success of partially sighted individuals. The measures obtained in each of the two tests did not, however, differentiate significantly between partially sighted individuals successful in employment and those unsuccessful. Test 'B' indicated a greater difference between normally sighted subjects and partially sighted subjects than was the case in test 'A', mainly because additional non target stimuli which did

not require resolution brought about little increase in overall search time for the normally sighted subjects. Test 'A' indicated a wider variance amongst partially sighted individuals, than was the case in test 'B', because additional non target stimuli, which did require resolution, produced a far greater increase in overall search time than did non target stimuli which did not require resolution.

As no significant difference between successful and unsuccessful partially sighted subjects was obtained, the results indicated that the gradient of the function relating search time with display complexity, determined using either of the two tests, was unsatisfactory for use as a predictor of employment outcome.

In test 'A', however, both the total time taken and the number of errors made were found to be significantly different between successful and unsuccessful partially sighted subjects. Successful subjects made fewer errors and were much faster than unsuccessful subjects.

The results therefore indicate that a test of visual ability which could be used as a predictor of employment outcome, and which also gave a numerical assessment of that ability in terms of a normal standard,

might be based on the function of the relationship between accuracy and display complexity. This relationship could not be derived from the display series utilised in determination of search time gradients as the procedure incorporated only 5 observations at each level of complexity. It should, however, be possible to retain approximately the same number of displays as that used in tests A and B and obtain a measure of this relationship. Three levels of complexity requiring some 10 or 15 observations within each level would probably be adequate. Further investigation will be required to determine the validity of such a test.

The results obtained for test 'A' did, however, provide data from which it was possible to determine the association between the test scores of partially sighted observers and their employment outcome.

The results showed that successful subjects took on average, 654.77 secs. to complete the test, with a standard deviation of 209.38 secs., and made, on average, 9.5 errors with a standard deviation of 4.9 errors. Unsuccessful subjects had an average total time of 1007.2 secs., with a standard deviation of 440.25 secs., and made, on average, 19.1 errors with a standard deviation of 9.8 errors.

Utilising the means and standard deviations of the two overlapping distributions for successful and unsuccessful subjects, the probability density of each was calculated (Moroney 1968) and the exact probability of success, or failure, for any given error score or total time was determined. (Table 15.12 and 15.13).

Number of Errors	Probability of Success	Number of Errors	Probability of Success	Probability of Failure
1	0.69	13	0.65	
2	0.75	14	0.60	
3	0.76	15	0.54	
4	0.77	16		0.53
5	0.78	17		0.60
6	0.79	18		0.70
7	0.80	19		0.78
8	0.78	20		0.83
9	0.77	21		0.88
10	0.75	22		0.92
11	0.73	23		0.95
12	0.70	24+		0.97

Table 15.12. Error Score and Probability of Success or Failure in Employment.

Time	P.Success	P.Failure	Time	P.Success	P.Failure
100		0.66	800	0.64	
200	0.54		900	0.51	
300	0.67		1000		0.66
400	0.70		1100		0.83
500	0.76		1200		0.43
600	0.76		1300		0.97
700	0.73		1400		0.97

Table 15.13. Time Taken and Probability of Success or Failure in Employment.

Tables 15.12 and 15.13 therefore provide a means by which the employment outcome of a partially sighted person can be determined, utilising either error scores or the total time required to complete Test A. The two components of the test can be used either independently or in combination dependent on the requirements of a particular employment area under consideration.

Although the display series utilised in Test 'A' may be used in its present form as a method of assessing the likely employment outcome of a partially sighted person, the prediction can be considered only as an approximate estimate. The number of subjects utilised

in the determination of the relationship between employment outcome and test scores was less than the number which would be required to obtain a reasonable estimate of the true association in the total population of partially sighted individuals. The results must therefore be viewed only as the best indications which could be obtained from the available data.

Chapter 16.

Discussion and Conclusions.

In the experience of individuals responsible for the occupational guidance and placement of partially sighted school leavers and young adults, there exists no adequate means by which to assess vocational aptitude. Furthermore, visual acuity, the most readily understood clinical measure and seemingly the most suitable for assessment and comparison of individuals, has proved to be an inaccurate and often wholly misleading indicator of ability. As a consequence, many school leavers and young adults have been placed in unsuitable occupations or, worse still, have been excluded from occupations of which they are quite capable.

The experience of the individuals who requested this investigation had indicated, however, that vocational aptitude might well be dependent on the ability of the partially sighted individual to make effective use of his residual vision. They suggested that if this ability could be measured and be shown to be associated with vocational aptitude, such a measure would provide a valuable tool and a much needed foundation upon which to

base assessment of vocational potential. This study therefore set out to investigate the visual ability of partially sighted school leavers and young adults, with the aims of developing a simple means by which to measure visual ability and of determining the validity of those measures as predictors of vocational aptitude.

The investigator felt that the influence of visual ability on the subsequent employment of partially sighted school leavers could not reasonably be examined without taking into consideration the social and psychological factors which arise during the transition from school to work. The results of studies of normally sighted school leavers have shown that such factors have a significant influence on the employment of young people. In addition to the investigation of visual ability, the study therefore set out to examine the factors which affect the first employment obtained after leaving school and subsequent employment success.

The preliminary investigation was undertaken in order to obtain a basis upon which a test of visual ability could be developed, and also to identify those factors which arise when partially sighted school leavers and young adults seek to choose, obtain and undertake employment.

The results of the preliminary investigation tended to corroborate the view that vocational aptitude is unrelated to visual acuity. Although the sample was very small and was for the purpose of providing direction in which a major study should proceed, analysis indicated that there was little association between visual acuity and employment success. Investigation of the validity of measures of visual efficiency indicated that these measures also are of no real value as a means of assessing the vocational aptitude of partially sighted individuals. These measures of efficiency are invalid mainly because they are based solely on measures of visual acuity and are merely a different form of expression of visual acuity. They are in the main designed to provide a guide to the potential of the normally sighted individual who has suffered a visual loss.

The results of investigation into performance in a reading task, and particularly in a dynamic sorting task provided the basis for the design of a test of visual ability. The results indicated that the vocational aptitude of partially sighted individuals may well be associated with their ability to carry out complex visual tasks. In the reading task, although

there was no significant difference between individuals who were considered successful in employment and those who were considered unsuccessful, the results indicated that on the whole successful individuals were less affected by fatigue. In the dynamic sorting task, however, successful individuals were significantly faster and more accurate than unsuccessful individuals in observation and identification of target stimuli contained in a display of numerous non target confusion stimuli. Development of tests of visual ability therefore proceeded on the basis of investigation of the response of partially sighted persons to target stimuli set within complex visual displays.

During the preliminary investigation extensive discussions were held with all the partially sighted school leavers and young adults in the sample group, and several young persons who were approaching the end of their final year in school. Discussions were also held with their teachers, careers officers, employers and in some cases, their families. The comments made by these individuals clearly indicated several major problems which affect employment choice, placement and execution.

An important aspect is that not only are careers officers and employers unable to assess the aptitude of school leavers, but partially sighted individuals themselves have great difficulty in assessing their own ability or suitability for particular employment. Many school leavers, probably as a consequence of immaturity, are also quite unable to appreciate the advice or guidance given prior to their leaving school. As a result, when they come to leave school, the majority of individuals have not been able to formulate any ideas as to the type of work which they might like to enter, or which they feel capable of successfully undertaking.

Specific problems which arise when leavers seek to obtain employment were identified. In particular, employers do not know what to expect of partially sighted individuals. They are uncertain of how individuals might perform, are concerned if any special training or facilities might be required and feel that what little information they can obtain from school leavers, or with which they are supplied by the careers services, is of little value in either allaying their fears or providing them with concrete facts upon which to judge the suitability and potential of a partially sighted applicant. They are also concerned that there is no organisation to which they can turn for information and advice. As a result, employers are wary

of partially sighted individuals, and many are unwilling to employ them other than on an initial basis of a probationary period. In the main, employers desire some form of proof or assurance that an individual is capable of successfully carrying out the work for which he has applied. They feel that only with such assurance or proof would it be possible for them to judge the suitability of a partially sighted applicant in comparison to a normally sighted applicant.

Further difficulties were identified which arise for both the employer and the young partially sighted school leaver when new employment is first entered. The majority of leavers, it would appear, are unable to become proficient in unfamiliar employment as quickly as can normally sighted new employees. Partially sighted workers have often to devise new means by which to carry out the work, in order to achieve a quality and quantity of output equal to that of their normally sighted workmates. In the group studied, many were unable to achieve this without extensive experience and practice, and some were unable to do so at all. Where employers had been unable or unwilling to accept an extended period of low efficiency or where efficiency had not reached an acceptable standard by the

end of the probationary period, individuals had lost their employment. An additional factor which affects employment is the ability of school leavers to adjust to the real world of employment and the success with which they can make that adjustment. In half the preliminary sample group there was strong evidence of maladjustment. Some individuals had been unable to come to terms with the limitations that their visual handicap placed upon them. Several had been over eager to prove their equality with normally sighted workers, which led to costly errors when mistakes were inevitably made. The remainder had 'given up' in the face of mounting difficulties and had resigned themselves to a life of unemployment. The comments made by the young adults indicated that because of immaturity and inexperience many had great difficulty in their relationships with their workmates and employers, and that these difficulties could adversely affect not only the first employment obtained after leaving school but also subsequent employment entered in the years following.

It seemed clear from the types of problems identified in the preliminary investigation that partially sighted school leavers might benefit enormously from undertaking prior to leaving school, some form of work experience programme. The investigator felt that many of the problems and difficulties encountered during the

transition from school to work might be resolved by the experience which the young persons could gain from spending periods of time in different forms of employment, and during which time they had support and guidance from their teachers, careers officers and other experienced individuals.

In undertaking such a programme potential school leavers could have the opportunity to test themselves in 'real' situations, assess their ability, form ideas about different types of employment and where problems arose could receive immediate help and advice from experienced individuals. More employers might also be willing to take on partially sighted workers on a part-time basis, in the knowledge that they had no commitment to continue to employ the individual, and having gained experience and understanding of the partially sighted worker may be more prepared to provide full time employment to such school leavers. With individuals undertaking a wide range of different forms of employment, careers officers could also gain a greater understanding of the capability of individuals and be far better able to advise them and guide them to suitable full time employment.

Following the preliminary investigation, it was proposed to institute a work experience programme and

follow up the subsequent progress of a small group of school leavers. Unfortunately, it was not possible to do so, principally because of the legal barriers which control the employment of school children. It was suggested also that educational aspects might make such a programme inadvisable for young persons during their final year of school. During that period partially sighted children are in an accelerated phase of learning and are catching up with their normally sighted peers. As a consequence, time spent out of school could interfere during this critical period and result in young persons being educationally ill-prepared when they subsequently come to leave school. It is possible, however, that the stimulus gained from the experiences undergone during a work experience programme might lead to an added interest and advances so that there is no educational loss.

It is to be hoped that some form of work experience programme can be introduced in the future, and its value investigated. If it is not possible to provide this during the final year of school, then at the very least, facilities could be made available for school leavers to attend a centre immediately after leaving school and prior to taking up full time employment. The indications given from the information obtained during the preliminary investigation would seem to suggest that many of the problems which affect the'

employment of partially sighted school leavers could be alleviated, if some not totally resolved, by this very simple expedient.

The preliminary investigation was designed, however, only for the purpose of obtaining a general overall view for use in determining the direction in which a major study might proceed. The results had indicated the basis on which a test of visual ability might be developed, and whilst development of tests could initially be undertaken utilising normally sighted and partially sighted subjects, determination of the validity of tests as predictors of vocational aptitude could not be carried out without first of all defining vocational success. Criteria of the vocational success of partially sighted school leavers and young adults, and sample groups of successful and unsuccessful individuals for use in examination of the validity of tests were therefore required. The major study was undertaken in order to obtain this information. The study set out to investigate the employment history of a representative sample of partially sighted school leavers and young adults and to examine the ophthalmic, social and psychological aspects which affected the first employment obtained after leaving school and subsequent employment success.

The questionnaire survey technique utilised was considered the most appropriate method of obtaining information on employment history, experiences, attitudes and expectations. Information on ophthalmic factors was obtained from records maintained by schools, careers and hospital services. As great difficulty and delay was experienced in obtaining a sample, the total number of individuals finally achieved (95) was insufficient for sophisticated analysis. Factors had to be treated as though they were all totally independent of one another. The results, therefore, provide only the best indications which could be obtained from the available data.

In order to examine the consequences and extent of influence of factors affecting the first employment, the sample was split into two groups: those who had remained in their first employment and those who had left their first employment. The two groups represented respectively 45.3% and 54.7% of all individuals who had obtained employment after leaving school.

In comparison to the first employment of normally sighted school leavers it was found that a far greater proportion of male partially sighted leavers had been placed in the 'lighter' occupations such as shop work,

or general clerical work, and a smaller proportion in the 'heavy' occupations such as construction trades or engineering. There was little difference in the occupations entered by the normally sighted and partially sighted females, other than that a greater proportion of the partially sighted girls had taken up paramedical work. These results suggest that in terms of placement there may be a tendency to undervalue the ability of partially sighted school leavers and place them in the apparently less demanding occupations. Paradoxically, clerical occupations and shop work may be equally as demanding in visual terms as apprenticeship in the various different trades. The bias toward placement of males in clerical occupations may, however, reflect the fact that whilst there is no provision to assist partially sighted individuals overcome or deal with the visual problems which must inevitably arise in undertaking special courses or training for employment, employers will be unwilling to accept them, and careers officers will be unwilling to expose them to potential if not certain frustration and disappointment. Without such provisions for assistance, partially sighted school leavers and young adults will, however, have to continue to face the real frustration of having no opportunity to test for themselves their own capability.

Analysis showed that of those individuals who had remained in their first employment a far greater

proportion than those who had left had gained some previous part time experience of the work before entering full time employment. Where individuals had had no previous part time experience but had undertaken a special training course run by their new employer, a far greater proportion of such individuals had remained in that employment than was the case for individuals who had to learn how to carry out the work 'on the job'. These results suggest that where leavers do have the opportunity to gain experience they are far better able to choose a suitable employment, and when given the opportunity to train for an occupation are in a few cases found wanting. The results showed that whilst 57% of the sample had encountered difficulties in their first employment as a direct result of their partial sight, in only 10% of all cases were the difficulties such that they had led to young workers having to give up their employment.

Further factors which affect the first employment are the speed at which young school leavers are required to work, the effort required to attain that speed and also the effort required to maintain a quality and quantity of output equal to that of normally sighted workers. These aspects were all found to be significant factors in relation to continuation in the first

employment. Of those who left their first employment, a significant proportion had done so because the demands made upon them to work as fast as required, and to maintain the required work rate and quality, were too great. These are all factors which could readily be assessed prior to individuals entering full time employment. Given the facility to undertake such assessment, individuals unsuited to occupations demanding high work rates could be guided to more suitable employment. Undoubtedly many individuals could gain proficiency equal to that of normally sighted workers, and with little extra effort, were facilities available for them to obtain help in learning how to make effective use of their residual vision. It would be of great benefit if it was possible to provide an opportunity for individuals to determine for themselves the limitations imposed by their visual handicap, in a situation where they could receive expert advice and guidance on means by which limitations might be overcome.

The relationships which young workers achieved with their employer and their colleagues were found to be of great significance in their first employment. Of individuals who left their first employment a significantly greater proportion than those who remained had been unable to 'get on' with their employer and colleagues, or found them unhelpful. Analysis indicated that the relationship with the employer was more

important than the relationship with workmates. This result undoubtedly reflects the difficulties faced by partially sighted school leavers in adjusting to and coping with the 'real' world of work. The preliminary investigation also suggested that extremes of maladjustment are not uncommon. The results obtained from the major study indicate that difficulties in relationships occur for a significant number of school leavers (19% of the sample) and almost invariably lead to individuals leaving their first employment.

The transition from school to work is known to be a focal point in adolescence during which time there can occur for young school leavers many problems in social and emotional adjustment. (Veness 1962, Maizells 1970, Carter 1969, Willmott 1966). The partially sighted school leaver has undoubtedly more problems with which to cope, greater uncertainties, and greater challenges to face than the normally sighted individual. Studies in America (Mehr 1972) have shown that partially sighted school leavers derive great benefit and achieve a far more adequate adjustment as a result of taking part in small group therapy sessions. The sessions provide an opportunity for discussion of problems and provide young leavers with mutual support and the opportunity to derive solutions to their own problems

with the guidance of other experienced partially sighted workers and the advice of individuals expert in their particular problems. In view of the proportion of individuals who manifestly fail to achieve successful adjustment, notwithstanding the proportion who although retaining employment do so with difficulty, it would be of value if provision for such expert advice and guidance was made avilable in this country.

The results also showed, not surprisingly, that a significant proportion of school leavers left their first employment because they were dissatisfied with their income. It did not appear that consideration of future financial prospects was of any great importance, but the results do suggest that where future pay seems to the young worker not to be as satisfactory as might be hoped, this does play some part in their decision to leave. With respect to the responsibility which young workers felt they held in their first employment, the results were very similar to those obtained with respect to income. Of young workers who felt they had no responsibility a significantly greater proportion than those who felt they had responsibility had left their first employment. The results indicate that where workers feel that there might be no opportunity for achieving responsibility, this also plays a part in their decision to leave. As might be expected, it was also found that more individuals who enjoyed their work than those who did not enjoy it

remained in their first employment. Quite apart from personal satisfaction, however, the contribution which young workers feel that they can make is of equal importance. The results showed that individuals who felt that their work was of little value to either their firm or to others outside their firm, left that work.

It would appear, then, that although partially sighted school leavers face many difficulties and problems in attempting to obtain and hold down their first employment they are prepared to leave an unsatisfactory occupation in pursuit of employment commensurate with their expectations and hopes.

In order to examine the factors which affect employment success, the sample was split into two groups of successful and unsuccessful individuals. The criterion of employment success was derived from the employment history of individuals. Within the sample, the distributions of time spent without employment showed that of those individuals who had been available for full time employment for a period of less than 3 years since leaving school, approximately 50% had spent more than half their available time without employment. Of individuals who had been available for full time employment for a period of between 3 and 5 years since leaving school, 33% had spent more than 40% of their time without employment, and of individuals who had been

available for employment for 5 years or more, 18% had spent more than 30% of their time without employment. The level of 50% or more of available time spent without employment could have been utilised as the criterion of failure. The distributions within the three groups showed, however, fairly distinct divisions with peaks at each extreme end and as a result failure was interpreted according to these divisions. Within the entire sample 69% were considered successful, as they had spent the major proportion of their time in full time employment or further education, and the remaining 31% were considered unsuccessful.

Analysis of the differences between successful and unsuccessful individuals showed that no one source of information or advice on employment, nor method of obtaining employment was more effective than any other in leading to individuals undertaking work in which they were subsequently successful. It was found, however, that of those individuals who had been unable to obtain any form of employment within three months of leaving school, a significantly greater proportion than those who had been able to obtain employment during that period, was subsequently unsuccessful. It could not be determined whether or not individuals who could not obtain employment within three months of leaving school were particularly difficult to place for some specific reason. The result would, however, seem to

indicate that the first three months after school is a critical period of time in which the experiences undergone can have a significant effect on subsequent employment success. Regardless of the mechanism by which these individuals fail in employment, this information serves as a useful indication: anyone unplaced after three months will require extra special attention and help.

The results also show that academic qualifications are greatly relevant to employment success. Analysis showed that a far greater proportion of individuals who had not achieved any qualifications than those who had gained some form of qualification while in school, was subsequently unsuccessful in employment. The analysis also indicated that a greater, but not significant proportion of individuals who had undertaken further education courses was subsequently successful in employment.

An unexpected result was that employment success did not appear to be associated with vocational training. There was no difference in employment outcome between individuals who had undergone special vocational training and those who had not done so. The comments of the young workers interviewed in the preliminary investigation indicate, however, that individuals faced with long periods of unemployment will undertake any available vocational training course, even when the courses are not

within an employment area which they wish to enter. This may in part explain the lack of association between vocational training and employment success, as individuals who have attended training courses purely to fill time may not subsequently enter the employment for which they have been trained, or may leave such work when a desired different employment becomes available. Their comments also indicate, however, an additional aspect may be that training courses designed for normally sighted, blind, or otherwise handicapped individuals may not be appropriate to the partially sighted person who functions in some circumstances as sighted, in other circumstances as blind and may or may not have an additional handicap. The importance of having proof of ability and of having qualifications for employment is emphasised by the comments of the employers, who indicated that when faced with the choice between an unqualified partially sighted applicant and an unqualified normally sighted applicant they would have to accept the normally sighted person on the basis of there being less risk that they might prove unsuitable. When faced with the choice between a qualified partially sighted applicant and a qualified normally sighted applicant, however, the balance might be, if anything, in favour of the partially sighted individual. Employers indicated that they believed

that suitable partially sighted workers were less likely to leave their employment, and tended to be more conscientious than young normally sighted workers. This latter suggestion was not examined in this study, but is worthy of further investigation. Regardless of the relative advantages or disadvantages the qualified partially sighted individual may have in comparison to the qualified normally sighted individual, there is clearly a need for further education courses and vocational training and rehabilitation courses designed specifically to meet the special needs of the partially sighted individual. The very fact that it is considered necessary to provide primary and secondary education in special schools utilising special methods adapted to their needs must surely emphasise the fact that further education, vocational training and vocational rehabilitation cannot be adequately provided in anything other than centres designed to deal with their special problems.

In contrast to the results observed in relation to the first employment, it was found that there was no difference between successful and unsuccessful individuals in the difficulty or ease with which they could maintain a quality and quantity of output equal to that of normally sighted employees. Nor was there any difference between successful and unsuccessful

individuals in their ability to maintain good relations with their workmates and employer. Although the exact number of individuals who had difficulty in learning unfamiliar employment could not be determined as the respondents were not specifically asked about such problems, the comments made by many individuals indicated that for a large proportion the difficulties which they faced in learning new employment, and the fact that they often took much longer to become proficient than did normally sighted workers, could cast doubts as to their capabilities. In some instances individuals were asked to leave before they had the opportunity to gain proficiency and demonstrate their real capability. In other cases these doubts and learning problems gave rise to difficulties in their relationships with workmates and employers. The results suggest, however, that these problems are of less importance in subsequent employment than in the first employment obtained after leaving school. The results would seem also to indicate that for the majority at least, these types of problems are eventually resolved through experience. The information obtained during the preliminary investigation showed, however, that the length of time required for individuals to gain experience sufficient to resolve these problems for themselves could extend to as long as 6 or 7 years after first entering employment.

Clearly, it is not valid to argue that provision for helping solve these problems need not be introduced simply because they appear to be eventually resolved with the passage of time and accumulation of experience. If anything, the results emphasise the fact that their solution prior to individuals undertaking full time employment might well result in long term gains. Individuals could then enter at a much earlier stage occupations of which it is known they are capable and pursue careers in which they might achieve real advancement and a high level of success.

The investigation of the attitudes and expectations of successful and unsuccessful individuals showed that a greater proportion of unsuccessful individuals had what could only be considered as negative attitudes and unrealistic expectations. Whilst 50% of the entire sample stated that there was a particular occupation which they wanted to obtain, a significantly greater proportion of unsuccessful individuals stated that there was no reason which might prevent them from obtaining that employment. A significantly greater proportion of unsuccessful individuals than successful individuals also stated that they had never experienced any kind of difficulty as a result of their partial sight. Whether these attitudes and expectations contributed to their

employment failure or were some form of reaction against the difficulties which they faced could not be determined from the data collected. It would, however, be of value to investigate the source and consequences of such attitudes. It is distinctly possible that many of these individuals might be greatly helped by taking part in small group therapy sessions, the introduction of which has already been indicated.

In the investigation of the ophthalmic factors and their influence on employment outcome, it was not possible to examine if any relationship might exist between employment success and ophthalmic condition. The sample was too small and the number of conditions too large. There was little to be gained from examining pathologic type, however, as the extent, location and type of defect resulting from the ophthalmic condition are the important aspects in relation to employment. The major ophthalmic factors found to be related to employment outcome, are the course of the ophthalmic condition and the visual field. Analysis showed that a significantly greater proportion of unsuccessful individuals than successful individuals suffered from visual defects which were unstable. It would seem to be the case that where changes in vision

occur such that they introduce additional difficulty to the execution of employment, there is little recourse for such individuals but to leave their employment, solely because there is no means by which they can obtain assistance to adjust to their new visual circumstances, or help in dealing with new problems. The results also showed that a significantly greater proportion of individuals whose visual field was less than 'good', was subsequently unsuccessful in employment. Consultants had been asked to provide precise details of the extent, location and type of field loss, as well as to indicate their overall assessment of the functional field by classifying it as 'Good', 'Restricted' or 'Poor'. Unfortunately, insufficient details on visual fields were provided and it was not possible to quantify the amount or type of field loss which was associated with employment failure. Further investigation of the relationships between employment outcome and the extent, location and type of field loss is urgently required in view of the significant association found between employment failure and visual field defects.

The findings of the investigation into ophthalmic factors show that employment success is only associated with the very acute levels of distance visual acuity.

A significantly greater proportion of successful than unsuccessful individuals had an acuity of $\frac{6}{24}$ or better, but no difference in employment outcome was evident between individuals with $\frac{6}{36}$ or better and individuals with $\frac{6}{60}$ or worse; those with $\frac{6}{24}$ or better constituted 48% of the group, whilst those with $\frac{6}{36}$ or better constituted 65% of the group. The results also showed that approximately 80% of the sample had a near visual acuity of N8 or better, and analysis indicated that the level of near visual acuity bore no relation to employment outcome. In view of the high proportion of individuals with such good near acuity it must be assumed that these measures of near acuity refer to the best near acuity attainable at the most appropriate working distance. In view of the fact that in most occupational situations the worker cannot always observe every operation or significant aspect at the best working distance, and in view of the fact that most operations are likely to be carried out at various distances under 1 metre, it would be of value to undertake further investigation in order to determine if any relationship exists between employment outcome and visual acuity at specific near and intermediate distances. Whilst visual acuity measures obtained from charts presented at 6 metres define the threshold of resolution of an individual, and in the emmetropic eye

corrected for the appropriate distance should define the threshold of resolution at every distance under 6 metres, in the partially sighted individual it is not uncommonly found in clinical prescribing that the threshold of resolution can vary markedly at near and intermediate distances. It may well be the case that in a wide range of occupations there is a critical distance range within which the majority of visual demands arise, and for which distance the resolution attainable by the partially sighted individual may be associated with his vocational aptitude.

Overall the results support the observation made by teachers and careers officers that for the majority of partially sighted individuals employment success is not wholly dependent on distance visual acuity. The results indicate, however, that the majority of partially sighted individuals with a visual acuity of $\frac{6}{24}$ or better are unlikely to fail to achieve adequate employment.

Investigation of the use of low vision aids showed that only 8.5% of the total sample had been prescribed a low vision aid specifically for use in their work. A further 3% had themselves obtained hand magnifiers for use as aids in their work. The small proportion of individuals who used visual aids was surprising in view

of the benefits which can be obtained from their use. A great many more school leavers and young adults could benefit from the provision of an appropriate visual aid. With the provision of facilities and services whereby individuals could obtain advice on work procedures and visual aids to assist them in specific aspects of an occupation, many individuals could probably enter and successfully undertake occupations which, at present, they are unable even to consider, let alone carry out.

The results also show that the presence of a handicap additional to the ophthalmic defect is of great relevance to employment outcome. A significantly greater proportion of unsuccessful individuals than successful individuals suffered from some form of additional handicap. This result clearly indicates the need for particularly special attention to be paid to individuals suffering from an additional handicap.

The investigation into the visual ability of partially sighted young persons was undertaken in order to develop a simple test which would measure their ability to make effective use of their residual vision. The major aim was that the measure of visual ability obtained from the test should provide an assessment of vocational

aptitude. The design and development of the test had one main constraint, in that the final design and procedures needed to be relatively simple. The test had to be applicable to young partially sighted school children, and operation and interpretation of results had to be such that they could be carried out by relatively unskilled individuals. It was hoped, however, that a test could be constructed which was a reasonable simulation of the visual demands likely to be met in a wide range of occupations.

Towards this end, the dynamic sorting task examined during the preliminary investigation was designed with a view to providing just such a simulation. The results obtained for the dynamic sorting task indicated that vocational aptitude might be dependent on the ability of the individual to identify target stimuli set within complex visual displays. As a consequence of these results, a pilot investigation was undertaken in order to examine in partially sighted individuals the factors which might affect their accuracy and speed of visual response. The task designed required location and identification of a target stimulus contained in a complex display of numerous non target stimuli. The stimuli utilised were designed such that when viewed as a slightly

blurred image they were easily confused, and constructed such that the characteristic differentiating between target and non target could be varied in intensity, in terms which could be related to resolution. The display series was designed to allow investigation of relationships between accuracy and display complexity, response time and display complexity, and search time and display complexity. The series also allowed investigation of relationships between accuracy, response time, search time and the extent of differentiation between target and non target characteristics. The effect of orientation and position of stimuli could also be investigated. An excessive number of observations was, however, required for accurate investigation of all these aspects. In order to reduce the investigation to manageable proportions the number of observations was reduced for the secondary aspects of target and non target differentiation, orientation and position. The display series was therefore modified to 64 observations and utilised 4 levels of complexity containing 3, 7, 11 and 15 stimuli. Subjects were required to determine whether or not a target stimulus was present in each display, and their speed of response, search times and accuracy were recorded. The initial test was constructed in this manner in the hope that it might be possible to develop

the display series such that the increase in difficulty brought about by the increase in complexity would provide a measure of visual ability which was associated with vocational aptitude. As response might be dependent on several other factors, the initial test design retained a small number of observations which allowed relatively crude investigation of the effects of orientation and position of stimuli, and the extent of differentiation between target and non target stimuli. The variables of movement and solidity of stimuli were not incorporated in the initial test design as their contribution could not be determined without further increasing an already overly complex experimental procedure.

The results of the initial pilot investigation showed that partially sighted individuals differed markedly amongst themselves in their ability to identify correctly a target stimulus set in a display of numerous non target stimuli; and that response was independent of visual acuity. It was found that orientation and position of stimuli had no significant effect on response. As other investigations had, however, shown that small effects do arise as a result of these factors it was felt that they should continue to be controlled in subsequent test designs. The results also showed that for increasing levels of display complexity, the increase in response

time for the majority of partially sighted subjects was outwith the maximum limits which would be expected for the normally sighted population. For displays which contained only non target stimuli similar results were obtained for search times. The procedure utilised in the pilot investigation was, however, too lengthy and required sophisticated timing and recording equipment. In order that a less complicated procedure could be employed and timing and recording could be undertaken without such equipment, the test was redesigned on the same principle but utilising even more complex displays to give longer search times. The test of visual ability was redesigned as a visual search task requiring 42 observations and utilising between 0 and 5 target stimuli set within 7 levels of display complexity containing 10, 15, 20, 25, 30, 40 and 50 stimuli. As subjects were required to identify the number of target stimuli in displays, the procedure incorporated a relatively sophisticated score of accuracy. Two tests were constructed in which target and non target stimulus characteristics were reversed. In test 'A' subjects were required to identify a target stimulus which contained an unbroken diameter set within a complex display of numerous non target stimuli in which the two halves of the diameter were separated laterally to give a vernier break. In test 'A', the more numerous non target stimuli therefore required

resolution for identification. In test 'B', only target stimuli required resolution for identification. It was considered that test 'A' might present a more difficult and critical task than test 'B'. At this stage in the investigation it was clear that due to limitations in time and the availability of appropriate successful and unsuccessful partially sighted subjects, it would not be possible to examine the effects of the contribution of movement and solidity of stimuli in test procedures constructed on the same principle as tests 'A' and 'B'. It was felt that construction of tests on these same principles and utilising solid moving stimuli was unwarranted before determination of the validity of the principle had been undertaken. It was hoped, however, that direction could be obtained for the future development of a task which was a close simulation of the visual demands of the employment environment. A relatively simple three dimensional kinetic task was therefore constructed in order to examine the effect of movement of stimuli.

The results obtained for the three dimensional kinetic task showed that although the test procedure failed to differentiate between successful and unsuccessful individuals, accuracy in observation of moving displays was less than that for static displays. This result

indicates that the incorporation of movement of displays or stimuli would add to the difficulty of the test and might provide a more critical assessment. Further investigation will have to be undertaken in order to examine the effects of various speeds, types and ranges of movement and their relation to visual ability.

The results of investigation into the two static tests 'A' and 'B' showed that in both tests the gradient of the function relating search time to display complexity failed to differentiate between partially sighted individuals who were successful in employment and those who were unsuccessful. It was therefore not possible to derive, as had originally been hoped, a measure of visual ability in terms of a scale of visual response to increasing display complexity. It was found, however, that for test 'A' the number of errors made by successful individuals was significantly less than the number made by unsuccessful individuals, and that visual acuity was not associated with the error scores. Furthermore, search times of successful individuals were significantly faster than those of unsuccessful individuals. The measures of speed and accuracy obtained from test 'A' thus differentiated between successful and unsuccessful individuals.

The results for Test 'A' were obtained from a small sample and for this reason the real accuracy of scores, and indeed the validity of the test, must remain in question until further work has been undertaken to examine specificity and reliability using an adequate sample. It does seem, however, that the test does provide a means of assessing the visual ability of partially sighted individuals, the scores of which are significantly related to employment outcome. Although the technique is slightly more complex than was desired, it broadly satisfies the original requirements. It is simple to understand and operate, requiring little sophisticated equipment other than a projector, stop watch and display series, and the results are easy to obtain and interpret. It could therefore be used in its present form as a means of assessing vocational potential. To this end the probability of success or failure in employment for specific error and time scores have been calculated and are given in Tables 15.12 and 15.13 respectively. It must be emphasised that, considering the small sample used in the investigation, if the test is used in its present form the results must be considered at best only as identification of individuals 'at risk' in the employment sphere, rather than as indicative of the degree of risk.

Further investigation is indicated in several areas. If, using a more adequate size of sample, the technique is shown to be specific and reliable, it would be desirable to develop a near presentation display series. Furthermore, extensive investigation of a large number of employed individuals will be required to determine if scores of speed and accuracy could be used to match individuals to a particular occupation or area of employment. Further investigation of the association between vocational aptitude and the function relating errors with display complexity is also indicated, as the results suggested that a useful scale of visual response might be derived.

This investigation achieved less than had originally been hoped as the total sample obtained was not large enough to examine with real precision the consequence of partial sight on employment. Although the results must be considered only as the best indications which could be obtained from the available data, they do confirm that partial sight gives rise to many different problems which directly affect the employment and prospects of the individual. Problems of assessment of ability, social and emotional adjustment, development of attitudes, self assessment, learning ability, attitudes of employers,

lack of informed guidance and appropriate facilities for vocational training or assistance and the general availability of employment, or otherwise, all contribute to partially sighted individuals failing to achieve full employment. It is clear from the results obtained that not all partially sighted school leavers and young adults can be expected to compete in the employment market on an equal footing with their normally sighted peers. Although the test of visual ability provides a preliminary means of assessing vocational potential, and even if it can be sufficiently developed to match individuals to employment, it will still provide nothing for those individuals who are identified as 'likely to be unsuccessful in employment'. For these people in particular, and for all partially sighted persons, there is clearly a real need for the establishment of special provisions designed to deal with all problems associated with and accruing from partial sight. Centres for vocational guidance, rehabilitation and training, able to provide expert advice and assistance to both employers and partially sighted workers and able also to provide visual aid programmes and psychological support and assistance to individuals and their families, are vitally necessary.

The author hopes that the test of visual ability and the information on the factors affecting employment can be of real assistance to those concerned with the vocational assessment and placement of the partially sighted. It is hoped that as a result, school leavers and young adults will be able to obtain and be successful in employment commensurate with their abilities. It is clear, however, that unless some special provision is made, designed specifically to help all partially sighted individuals, at least 30% of all school leavers and young adults will fail to achieve anything approaching adequate employment, and the remainder will have to continue to cope as well as they can, by themselves.

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with much love and thanks