

IRLEN LENSES: AN APPRAISAL

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ABSTRACT

An experiment was conducted to identify and analyse any positive effects of Irlen lenses upon visual perceptual performance of children previously diagnosed as Scotopic Sensitive. Pupils performed a letter identification visual search task under Irlen lens, Untinted lens, Plain Grey lens and No lens conditions. No condition was associated with superior performance on the task. Nevertheless, several children reported that untinted or plain grey lenses helped them perform the task. The study provides no evidence to suggest that Irlen lenses improve visual performance.

INTRODUCTION

Publicity and attendant controversy have surrounded the recent discovery of a hitherto unknown retinal dysfunction believed to be responsible for a number of difficulties associated with dyslexia. Based upon her experience at the Adult Learning Disability Programme at California State University at Long Beach, Mrs. Helen Irlen has suggested that certain colour frequencies can often disrupt an individual's perception of print upon a page and lead to unacceptable reading speed, error rates, tiredness and other 'symptoms'. She uses the term 'Scotopic Sensitivity' to describe the condition she has identified and argues that dramatic improvements are to be found when a scotopically sensitive client is asked to read through carefully chosen coloured tints, often incorporated into specially constructed spectacles, designed to filter out the offending frequency for that individual.

Press and television have given substantial coverage to the Syndrome and its attractively simple treatment. Scotopic sensitivity and Irlen lenses have been the subject of newspaper articles in places as far apart as the U.K. (Sunday Times 22/12/85, Times Educational Supplement 18/9/87), Hong Kong (Hong Kong Standard 18/2/85, South China Morning Post 18/6/85) and Australia (Australian Women's Weekly June 1985, The Australian, 6/6/85). The internationally syndicated television programme 'Sixty Minutes Plus' has devoted two reports to the topic.

Irlen has travelled within America, Australia, Britain and Hong Kong to talk to professionals and others about her work. Strong claims have been made in regard to her lenses, sometimes by her associates. One wrote, in a letter to a Hong Kong newspaper in December 1984, that the 'courageous and brilliant efforts of Mrs. Irlen' had led to a 'breakthrough in remedying dyslexia' that resulted in 70-80% of dyslexics being "cured"

By summer 1986 there were apparently at least 17 licensees qualified to diagnose scotopic sensitivity and prescribe the Irlen lenses. Teachers, doctors, psychologists and optometrists in Australia, New Zealand, Britain, Hong Kong and the Netherlands were amongst those prescribing the treatment. One suspects that the number is now much higher. A large number of adults and children in the world are now wearing the lenses. In Hong Kong, where the subject has at various times filled the news, correspondence and editorial pages of local papers and formed the basis of a locally

produced documentary TV programme, there is perhaps a greater percentage of the population wearing these lenses than anywhere else in the world. In summer 1986 there were 22 children wearing them in one primary school alone.

The activity and interest evident from the above was not until recently reflected in professional and academic journals. By mid 1986 there were apparently no successfully published research reports that would expose Scotopic Sensitivity and Irlen lenses to independent scrutiny from professional colleagues. It is in this context that the research described in this paper was conducted. Both the research and the report owe a great deal to discussions I have had with Mrs. Irlen herself and to unpublished, sometimes undated and untitled reports and essays which she and her co workers have been kind enough to send me.

Irlen suggests that symptoms of scotopic sensitivity fall into four categories:

1. VISUAL RESOLUTION PROBLEMS such as word or letter distortions, blurs, halos and shadows, letter vibration and light pulsation, all of which prevent the person from clearly perceiving the visual symbols on the page before him/her:
2. LIMITED SPAN OF FOCUS preventing the person from reading words or phrases at a glance:
3. PHOTOPHOBIA, comprising a susceptibility to glare, perceived flicker, apparently insufficient contrast between letters and background, and a tendency to focus on the background rather than the visual symbol itself. These symptoms appear to be exacerbated by fluorescent lighting and page gloss:
4. PROBLEMS IN SUSTAINING FOCUS over a period of time engaged in reading, resulting in increased blurring, eye strain and other difficulties.

In addition Whiting (1985) writes of the tendency Scotopically Sensitive persons have to skip or repeat lines or words when reading.

Irlen has developed a structured questionnaire, the Irlen Differential Perception Schedule (IDPS), by which it is argued those children and adults suffering from scotopic sensitivity may be identified. The schedule covers six broad areas; visual resolution, depth perception, sustained focus, span of focus, peripheral vision and eye strain.

Irlen reports that those identified as scotopically sensitive individuals can read better if given carefully selected coloured lenses which adjust the spectral qualities of light reaching the eyes and remove the symptoms of scotopic sensitivity. Although she recommends other remediation measures for such persons (for example avoiding fluorescent lighting and glossy paper) it is the Irlen lens treatment which has attracted most professional and media attention.

In a report of a California study conducted with over 100 learning disabled adults Irlen (1983) mentions that over 70% of her clients exhibited a visual dysfunction of the sort identified by the IDPS. Irlen lenses were provided, incorporating refractive corrections where necessary. Irlen reports that subsequent evaluation by way of the IDPS and interviews revealed that many clients were able to read better. Clients reported, amongst other improvements, that they could read faster and for longer periods without eye strain or a need to rest or squint, without distortions of print or a need to re-read material several times. No figures are included by which one might judge the frequency or degree of improvements obtained in this sample.

Murphy, working until recently at Hong Kong University, has attempted to refine the diagnostic procedures employed with this population using, amongst other devices, computer driven colour monitors. He has continued to focus treatment around the use of coloured Irlen lenses. In an as yet unpublished paper (1985) he reports the results obtained for twenty children aged six to nine years who had been diagnosed as scotopically sensitive and had been prescribed Irlen lenses. Murphy reports that the performance of these children on a thirty second random 'Primary One' word list improved dramatically as a consequence of these lenses. The mean rate of reading rose 24%, whilst the accuracy rate rose from 85% to 95%.

Murphy argues that individuals suffering from scotopic sensitivity encounter problems when reading because specific colour frequencies disrupt the perception of letter forms, perhaps by a process involving reciprocal inhibition at the level of the retina. The coloured lenses filter out the disrupting frequencies and restore normality to the page as perceived by the individual concerned.

He suggests that approximately 10% of the general population suffers from dyslexia and that the bulk of these are displaying symptoms of scotopic sensitivity. The implication is that a substantial proportion of those reporting some sort of difficulty in reading may be helped by Irlen lenses (or coloured plastic overlays: an apparently cheaper substitute).

Stanley and Howell (1987) reviewed a number of Australian studies in this area. The authors noted a high coincidence between the presence of Scotopic Sensitivity symptoms and optometrically assessed defects involving convergence and accommodation. They therefore expressed doubts that the syndrome exists as a phenomenon 'distinct from accommodation and convergence insufficiencies, long studied and corrected by more orthodox optometric procedures' (p5). In addition, after studying the effectiveness data for Irlen lenses and overlays, they questioned a) whether these devices had any enduring positive effects upon reading and academic performance and b) whether the effects

that are sometimes reported might be due to mood or placebo effects?

THIS STUDY

The present study represents an attempt to examine objectively the claims being made for Irlen lenses. More specifically, the study had the following two goals;

1. to determine whether pupils diagnosed as scotopically sensitive were in fact able to perform better at a reading-related task as a result of the Irlen lenses that they wore, and
2. if Irlen lenses yielded superior performance levels, to determine the reasons underlying the effect.

A number of mechanisms, other than the one claimed by the Irlen group, might underline any effects which Irlen lenses might have upon reading performance.

It is possible that the lenses could influence performance through a novelty effect; children might read more proficiently when wearing the lenses simply because they knew they were the subject of a new, unusual and, in many cases, expensive treatment, and were therefore prepared to attend and persevere at the task rather more than would otherwise be the case. Such a novelty effect may correspond to the mood effect mentioned by Stanley and Howell (1987).

At a more subtle level, it is feasible that any effect of the lenses upon reading is attributional in nature. A child who has experienced months or years of difficulty on reading tasks might learn to attribute his problems to a physical defect rather than a mental one. The new attribution carries less stigma than the first. The pupil might therefore adopt a new and more positive attitude towards reading than was possible before.

A third possibility is that high parent and teacher expectations, perhaps generated (and certainly supported) by media coverage, are communicated to and act upon the pupil, generating a change in attitude towards and performance in reading. Such high expectations have been reported in very clear terms by Ament, Carriera and Salmond (undated paper) in their study of Irlen lenses in the Northern Territory. One might speculate as to the extent to which the sometimes considerable effort and expense that the parents have undergone may add to the force those expectations acquire.

A rather simpler explanation may be possible for any Irlen lens effects that may occur. Recent research by Riding and Pugh (1986) has indicated that some children (those with a long Dark Interval Threshold) perform better on a reading task when placed in low-illumination conditions. The implication is that Irlen lenses may help certain pupils merely by reducing illumination levels.

This study represented an attempt to investigate all these issues. It arose out of discussions with the Principal of an English Medium Primary School in Hong Kong which was known to have on roll a number of pupils who had been assessed for and routinely wore Irlen lenses but who had apparently not been subsequently reviewed in school for purposes of treatment evaluation.

The study took place in June 1986.

RESEARCH DESIGN

Subjects participating in the study were asked to perform

a timed letter identification task four times, each time under a different condition; 1) wearing their own Irlen lenses, with or without refractive corrections, 2) wearing plain lenses with neither refractive or spectral corrections, 3) wearing grey tinted lenses without refractive corrections, and 4) wearing no lenses at all. Students were told that plain and/or grey lenses might improve their reading performance. Pupils were divided into four groups, each of which underwent the experimental conditions in a different sequence in order to control for any practice effects on the experimental task.

Measures were taken of the number of true positives, false positives, false negatives and of the number of letters not covered by pupils in the time available.

Were Irlen lenses effects to be linked, as claimed, to the correction of a defect called Scotopic Sensitivity then only those lenses would be expected to facilitate performance on this task.

Should Irlen lenses have an effect because they reduce apparent illumination of the page then one might expect both Irlen and plain grey lenses to have a beneficial effect upon task performance in this experiment.

Were novelty, attributional or expectational effects to underpin their effect then one might expect all three lens conditions to have a somewhat positive effect (Irlen lenses assuming superiority in direct relation to the importance of media generated expectations which the other lenses had not shared).

Subjects

There were 22 pupils in the school who wore Irlen lenses. Parents of all the pupils were contacted regarding the study and gave permission for their child to take part. Five children forgot to bring their Irlen lenses to school, one was absent and one refused to participate on the day of the study. Fifteen pupils therefore took part in the study.

Of the twenty scotopically sensitive pupils in the school for whom optometric records were available it was found that nineteen had refractive corrections incorporated into their Irlen lenses. Sixteen of these had never worn refractive corrections prior to being diagnosed as scotopically sensitive. Of the fourteen pupils included in the study for whom optometric data were available the corresponding figures were thirteen and eleven respectively. The above figures are important. They indicate a possible confounding variable. Quite clearly, superior performance displayed when wearing Irlen lenses may be the result of refractive rather than spectral corrections.

Pupils taking part in the study were aged seven to eleven years.

Materials

The Letter Identification Task:

Materials consisted of three pages upon each of which were printed 600 random letters in 20 lines of 30 letters. Lines were grouped into four 'paragraphs' each of five lines. Pages were stapled together in a different order for each of the four trials. In each case the child was to locate as many examples of the letter 'b' in four minutes. There were 68 examples of the letter. The task was designed to maximise any difficulties of visual resolution,

sustained focus and photophobia that these children might experience.

It was felt that a timed visual search task such as the one chosen would be sensitive to difficulties of visual resolution reported by Irlen (1983) as well as to those of line and word skipping and repetition reported in detail by Whiting (1985). The random order of letters (entirely devoid of context) and small typeface constituted conditions designed to maximise visual resolution problems itemised earlier in this paper. The white paper and fluorescent lighting were designed to maximise photophobic symptoms.

Finally, the temporal nature of the task (four separate four minute tasks following directly upon a ten minute reading period) was likely to exacerbate any problems of sustained focus. Most of the symptom clusters characteristic of scotopic sensitivity were therefore being elicited by this letter identification task.

The Plain and Grey Lenses: Child sized glasses were purchased at a price of HK\$18 (approximately US\$2.20) from a Kowloon street market. Each could be adjusted for maximum comfort by the wearer.

Procedure

Pupils taking part in the study were asked to come to a room within their school which had been prepared for the study. They were asked to bring their Irlen lenses, a pencil and their class reading book. Within the room tables and chairs had been arranged at intervals of approximately three feet in columns and rows. Once in the room children were randomly assigned to four groups, membership of which was displayed on a blackboard. The room was illuminated by a combination of natural and fluorescent lighting.

Children received the following preliminary instructions designed to induce expectations that the plain and grey lenses could improve reading performance.

"My name is Mr. Winter. I am an educational psychologist and nowadays I work at Hong Kong University training teachers to teach. I am very interested in how children learn to read. I am a colleague of Dr. --- whom you all met before you got your special glasses.

I myself have today brought along some special glasses. They may help you to read. Here are some grey lenses (a sample displayed) and here are some plain lenses (displayed). They are all made for children and I obtained them especially for you.

Later on each of you will have a chance to wear these glasses whilst doing a reading task for me. I will be interested in finding out how many of you can read better when wearing them. Some of you may read faster and more accurately. Some of you may find that you get less tired and that the page looks more pleasant.

At a later date I will let you know whether these glasses have helped you. You may today form an opinion about how they help. If so please keep your opinions to yourself for now. I will give you an opportunity to share your opinions later on today.

Now, before any of you try on the special glasses, I would like you all to open your reading books and read for ten minutes."

Subjects then read for 10 minutes without their Irlen spectacles. The purpose of a period of silent reading was

to ensure that pupils were reaching a stage of exhaustion by the time the experiment proper began. Murphy (personal communication) has argued that it is under such conditions that Irlen lenses produce superior performance levels.

At the end of 10 minutes subjects put on the appropriate pair of glasses for the first trial. One group wore plain, one group wore grey, one group retained their Irlen glasses and the last group refrained from wearing any at all. All subjects then received the following instructions:

“Now close your reading books,,,,. I am about to hand out a special reading task. It is four pages long. Each page contains lines of letters printed in a very mixed up order. When I tell you to begin you must start at the top of page one and look along each line trying to find examples of the letter ‘b’ (letter displayed and left on blackboard). Each time you find a letter ‘b’ I want you to put a ring around it with your pencil. When you reach the bottom of one page then turn over and start the next. I will allow you 4 minutes. If you make a mistake then cross the mistake out. If you need a new pencil then raise your hand. I will tell you when it is time to stop. Are there any questions,,,,?”

There were no additional instructions for subsequent trials. However before each one all subjects were allowed time to remove or change their glasses, as appropriate for the group to which they belonged.

Table 1 shows a clear practice effect operating through trials one to four. Subjects tended to cover a greater proportion of the task, identify more letters correctly and omit fewer letters in later trials. False Positives do not show the same trends for the simple reason that very few subjects under any conditions ever identified letters

wrongly as examples of ‘b’. The figures in Table 1 retrospectively justify the use of a Latin square research design.

Table 2 shows the effects of the four experimental conditions upon the four performance variables. It is immediately obvious that children performed equally well at this task no matter whether they were wearing Irlen lenses, plain lenses, grey lenses or, indeed, no lenses at all. Analyses of Variance (Repeated measures, Latin Square design) reveal no significant main effects at even the 0.05% level. Neither speed nor accuracy appeared in any way to have been influenced by the experimental conditions.

It is perhaps interesting to note that eight children accepted an invitation at the end of the experiment to stay behind and share their reactions to the plain and grey lenses. Of these, four reported that they were able to read better with the plain glasses than with no glasses at all, and one reported the same reaction to the grey lenses.

CONCLUSION

The data obtained in this study reveal uniform performance levels across all conditions. There appears to be no relationship between, on one hand, subjective reports of improved reading performance using Irlen lenses and, on the other hand, objective data. The same appears to be the case for plain and grey lenses used in this study. In a study of this sort it seems that none of the possible components involved in Irlen lens treatment, intended (spectral shift) or unintended (novelty or expectation elements, attributional shift, or illumination reduction) produce any effect whatsoever.

RESULTS

Table 1

Performance data from the letter identification task: Practice effects; mean data for all 15 subjects.

	TRIALS			
	ONE	TWO	THREE	FOUR
TRUE POSITIVES	36.8	34.2	47.0	45.4
FALSE POSITIVES	0.0	0.1	0.3	0.4
FALSE NEGATIVES	6.1	6.4	7.3	8.3
NOT ATTEMPTED	25.1	27.5	13.7	14.8

Table 2

Performance data from the letter identification task: Effects of different experimental conditions; mean data for all 15 subjects.

	EXPERIMENTAL CONDITIONS			
	IRLEN LENSES	NO LENSES	PLAIN LENSES	GREY LENSES
TRUE POSITIVES	41.7	42.5	39.5	39.8
FALSE POSITIVES	0.2	0.0	0.2	0.1
FALSE NEGATIVES	7.1	6.2	9.0	5.7
NOT ATTEMPTED	19.2	19.3	20.1	22.6

It may be argued that the study was ill-suited to the experimental questions being addressed.

For example, it is conceivable that Irlen lenses which are worn for a lengthy period of time actually in some way 'cure' the retinal dysfunction supposedly found in this population. If this were the case then their beneficial effects would maintain over all the conditions of the study described and the consequence would be uniform performance levels throughout all experimental conditions precisely what was found in this study. A rather similar uniformity would occur if Irlen lenses influenced expectations, attributions, or self-esteem to produce improvements in reading that persisted for all the children in this study, even when the glasses were not being worn.

However, there has been no suggestion, either in the limited literature or in personal communications with those involved in the field, that the lenses produce 'a cure' of this sort. Instead proponents of the approach argue that Irlen lenses improve perception as long, and only as long as they are worn. The short term experimental study described in this paper therefore appears appropriate.

A rather different objection that might be raised is that the task employed did not correspond closely to that of reading in 'the real world' and that the benefits of Irlen lenses would consequently not show up. The response to such criticism is that the most direct way of testing visual perceptual performance supposedly being disrupted at the level of the retina is to devise a visual perceptual task which focuses upon those difficulties. The precise reasons underlying the choice of these particular experimental conditions were outlined earlier in this paper. The author would find it difficult to develop a simpler and purer test of the Irlen lens treatment.

In this regard, I should also add that inspection of reading and English standardised test scores kept over time by the school fail to indicate any beneficial effect of Irlen lenses upon academic performance of those identified as Scotopic Sensitive; a finding that is of course open to many interpretations.

In summary, the present writer argues that the experiment described in this paper, one believed to be appropriate for the study of Irlen lens effects, offers no evidence whatsoever to support the contention that the lenses are effective in improving visual perceptual performance in reading tasks. It may be that in the absence of published research to indicate a positive effect upon reading performance the claims that have been made for the treatment should be viewed with great caution.

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