

Reading comprehension using colored overlays essay sample



Introduction

Recently, educational strategies employed in the area of reading have evidenced increased interest in another technique used to help children having reading difficulties. Practically, the technique is to use color in order to create a more dynamic focus on the page when reading. According to Irlen (1991) the usage of colored chalk on a dark board made material presented not only more entertaining but also noticeable. Therefore, the idea of colored overlays, sheets of colored Mylar or acetate, applied to both children and adults having reading difficulties has almost impressive history of collaborative efforts made by teachers, researchers and clinicians.

The importance of reading as a fundamental skill for children is self-evident as it is introduced at the very onset of any formal education. Practically, any difficulties encountered on the early steps of the reading education usually result in general development and long-term complexities in adulthood. Orton (1937), a professor of psychiatry, studied children of normal or above normal intelligence who had been diagnosed as “word blind.” The children exhibited severe problems in memory for word pattern and letter orientation in their attempts to read or spell a word.

Orton termed this problem strephosymbolia, meaning “twisted symbols,” since he considered the term “word blindness” to be misleading when there was no evidence of loss of vision. Approximately one-fifth of all young adults and one-half of minority young adults read below the 8th grade level. This large number of poor readers indicates that fewer high school graduates are able to read adequately to succeed in college; yet, more young adults in the

U. S. are going to college than ever before. A college education is considered important to an improved lifestyle, but 25-50% of the students enrolling in college have reading skills that make a college degree difficult to achieve (Kirsch et al, 1993). Reading difficulty has been found to be a source of anxiety and frustration in four and five grade students, which have already developed strong coping mechanisms with their difficulties in reading. Importantly, at this point children exhibited poor performance not only in reading but also in all types of learning (Jeans et al, 1997).

Many researchers investigating the effect of colored overlays on reading have indicated a positive correlation between colored overlays and reading comprehension, fluency, and information retention in individuals with reading disabilities (Evans et al., 1994; Robinson, 1987). It is evident that providing adequate and suitable modifications, adaptations, and intervention techniques used in the program development for each reading student became a responsibility of the public school system. School districts across the country became interested in providing colored overlays as one form of intervention or modification in reading programs not only for dyslexic and reading disabled students, but for overall improvement of reading comprehension and retention of material by students.

Chapter 2

Literature Review

Visual/Perceptual Causes of Reading Disability

Inadequate visual perception is a proposed cause of reading difficulty. Visual perception difficulties deal not with how the eyes see, but with how the eyes perceive words on a printed page. Visual perception in reading refers to the ability to discern a given image on print and to assign meaning to it. Visual perception is comprised of visual discrimination, visual closure – recognizing complete figures from fragments, visual-spatial relationship – the ability to perceive objects in relationship to others in the visual field, and figure-ground discrimination – the ability to discern objects from irrelevant background stimulus (Miller, 1985). This syndrome is related to difficulties with light source, glare, luminance, wavelength and contrast.

Visual Perception. Color, and Reading

Breitmeyer and Breier (1994) studied the relationship of visual perception to reading dysfunction. Through their work and that of other researchers previously mentioned, a theory has developed that indicates that reading disability is related to visual pathways in the brain and the effect of light on the way in which print is processed by the brain. To review, this research indicated that humans use a high speed pathway when the eyes saccade, or move abruptly from one word grouping to another. This pathway is called the magnocellular pathway and is thought to be concerned with global recognition, perception of depth, motion, and brightness discrimination. The second, or parvocellular pathway, is thought to be slower and more involved with fine discrimination of print and recognition of detailed visual information. It responds best to high spatial frequency information and high amounts of pattern contrast.

Breitmeyer and Williams (1990) noted that light and glare seemed to cause slower reading rates in subjects and that a blue plastic transparency placed over reading material helped increase reading rates. A gray transparency helped reading disabled subjects but not good readers, while a red transparency made reading difficult for all subjects. Breitmeyer advanced the theory that placing a colored transparency on the page altered the wavelengths of light that reflected off the page and either increased or decreased the speed of the impulse along the magnocellular and parvocellular pathways.

Williams, LeCluyse, and Rock-Faucheux (1992) evaluated the reading performances of normal readers and readers with specifically reading-disabled (SRD) using colored overlays under varying reading conditions. The subjects were 70 children aged eight to 12 with normal intelligence and with no sensory deficits. Their reading comprehension was measured using a computer presentation of passages under three conditions: presentation of one word at a time, one line at a time with a window moving from left to right over the words, and reading passages a sentence at a time. The first condition provided limited input from the transient system, while the last passage required the greatest input from the transient channel. Results indicated that performance was not affected with the first two conditions but that subjects with SRD performed more poorly than did the normal readers when reading the passage a sentence at a time. Then colored transparencies were placed over the computer screen one at a time; first red, then white, then blue. This time the subjects with SRD improved when using the blue

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overlay when reading the passage a sentence at a time while the normal subjects' performances worsened. Red transparencies had a detrimental effect on both groups.

The researchers then used colored transparencies over text material with graded reading passages and got similar results. The SRD group improved significantly when using a blue or gray overlay while red overlays impaired performance. The normal subjects had significantly improved performance when using the blue overlay but poorer performance when using a red overlay. The authors surmised that their findings were consistent with those of other researchers reporting that short wavelength stimuli, such as blue overlays, increase the response and processing rate of the transient system. This helps subjects with SRD to read more easily.

LeCluyse (1993) conducted research to determine if colored overlays would improve the reading comprehension and rate of disabled readers. The subjects were 30 children, aged eight to 12 years, enrolled in a university-based summer reading clinic. All had normal or corrected to normal vision. None had diagnosed auditory, emotional, severe behavioral, or neurological disorders, and all had average or above average levels of intelligence. Each took the Nelson Reading Skills Test, and those scoring above grade level, at grade level, or less than 1.5 years below grade level were classified as normal readers. Subjects scoring 1.5 or more years below grade level were classified as disabled readers. Each subject read two sets of five one-page passages, each with a different overlay. Colors used were blue, gray, red, yellow, and clear. The passages were at a grade-equivalent appropriate for the reading level of each subject. Reading rate and comprehension scores

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were recorded for each passage, and the scores for each passage were added and averaged to attain a single score for each subject in rate and comprehension.

Results indicated that the groups did not differ in overall comprehension based on the color of overlay used, but the groups did differ in reading rate based on overlay color. Most subjects improved with the use of overlays, regardless of their reading levels, with blue producing the most overall improvement. While there was great variation with different colors, different subgroups showed improvement with every overlay condition, even clear. Disabled readers improved most with blue overlays, while normal readers did not improve with the use of any color and scored much lower with gray overlays. LeCluyse noted that the reading speed of disabled readers decreased when using a blue overlay and postulated that the slower reading speed might improve comprehension in the disabled readers, so the rates and comprehension scores were compared.

When compared to the clear overlay, both red and yellow overlays slowed the rate of normal readers, while the blue and gray overlays had no effect, and disabled readers read somewhat faster with blue and yellow overlays, much faster with gray overlays, and somewhat slower with red overlays. A comparison of rate and comprehension scores for each color revealed that, with a blue or a gray overlay, comprehension of disabled readers did not improve, but efficiency did. With a yellow overlay, disabled readers read faster but had poorer accuracy. Red overlays decreased reading efficiency in disabled readers. Normal readers were no more efficient with blue overlays,

but efficiency was decreased with use of red, gray, or yellow overlays because of slowed reading rate and no meaningful comprehension gains.

Evoked Potentials and Reading

Lehmkuhle, Garzia, Turner, Hash, and Baro (1993) measured evoked potentials in two groups of subjects eight to 11 years old, some normal readers and some with SRD. The SRD group was composed of eight subjects with reading levels one to two years below grade level, but their whole math and listening comprehension was at or above grade level. The control group had 13 age-matched normal readers. No subjects had a history of sensory or cognitive impairment, emotional disturbance, neurologic dysfunction, or attention-deficit disorder. All subjects were from upper lower to upper middle socioeconomic classes. None of the students were in remedial reading classes.

Evoked potentials are measured by attaching electrodes to the scalps of the subject and presenting a series of flashing designs composed of a target and background stimuli on a display monitor. The targets were gratings, or geometric designs, appearing as alternating vertical bars of light and dark with blurred edges. Both high- and low-spatial frequency targets were presented. The low-spatial-frequency targets had wide bars, while the high-spatial-frequency targets had narrow bars. Four combinations of background and target stimulus conditions were presented, ranging from steady background and a flashing target to a stimulus with both target and background flickering or flashing.

The subjects gazed at the targets and their EEG levels were measured. Each evoked potential was the average of 100 trials which lasted 503 milliseconds, with about one second elapsing between trials. Results were recorded on paper in wave-like marks, much like a heartbeat looks when recorded on paper. When a person focused on a target, the message was sent from the eyes to the brain, and an electric charge registered. The highest charge or voltage obtained for each subject was given a value of 1.0, and all other values for that subject under the other three combinations were scored in proportion to that value. Then the wave forms for normal and disabled readers were compared.

Results showed that the response time for SRD subjects is slower at low-spatial frequencies (which use the magnocellular pathway) but not at high spatial frequencies (which use the parvocellular pathway) when compared to normal readers. This indicated to the researchers that the magnocellular visual pathway is slower in SRD subjects even though they do not experience general slowing of the visual response (Lehmkuhle, Garzia, Turner, Hash, and Baro, 1993).

Jackson (1993) studied the effects of using three colored overlay treatments for 60 subjects, ranging in age from 8 to 18, divided into four different groups: 1) disabled in reading, spelling, and/or arithmetic; 2) disabled in reading and spelling; 3) disabled in arithmetic; and 4) attention deficit disorder (ADD) without learning disabilities. The subjects were from predominantly English speaking families, had no history of significant sensory impairments, no history of gross neurological disorder (e. g., epilepsy), no significant emotional disorders, and had a WISC-R score on <https://assignbuster.com/reading-comprehension-using-colored-overlays-essay-sample/>

either Verbal or Performance of 80 or above or the equivalent on another intelligence test. Subjects who were on medication for attention deficit disorder were asked to continue taking their medication during the study.

Jackson (1993) found that the four treatment groups were not significantly different in age or gender ($g > .05$), but they did differ significantly in overall intelligence ($p < .01$), with the ADD group scoring higher than the reading/spelling/arithmetic-disabled group and the arithmetic-disabled group but not higher than the reading/spelling-disabled group. The three learning disabled groups did not differ significantly in intelligence. Subjects in each of the groups were evaluated under three color conditions (blue, red, and clear transparency) on two measures of achievement. Three parallel forms were used. A student was shown a word with an overlay transparency covering it. With each word, the student's response and response time in seconds were recorded. The number of words read correctly and the total time taken to read the entire word list under each color condition were calculated. Then, to assess comprehension, short passages were presented with all the words seen simultaneously, allowing use of the transient system. Students began reading passages two years below their current grade placement and answered questions for each paragraph until their reading ceiling (answering three out of five questions incorrectly) was reached.

Then overlays were used on a parallel form of the test and the test was repeated. The results indicated that group performances in reading recognition were not significantly affected by colored transparencies, but reading comprehension was. The blue transparencies had a significant effect on reading comprehension rates for both the reading disabled and non-
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reading disabled groups, but the overlay seemed to slow reading rates.

Jackson warned that the findings of this study required careful interpretation for several reasons. Even though results indicated that the overlay effects were statistically significant, the magnitude of their effectiveness varied from individual to individual, with some subjects receiving minimal improvement and others receiving great improvement. Also, the small sample size limited conclusions about group findings. Jackson also noted that the reading instruments may have confounded the results because the passages became longer, more difficult, and had smaller print size and longer words as the grade level increased. This would cause the task to change somewhat, especially with subjects who made considerable improvement in reading performance. This could have slowed reading rate (Jackson, 1993).

The Eye and Reading

Studies of eye movement across the page of material have produced several theories in possible causes of reading and reading comprehension difficulties. Pavlidis (1981, 1985) compared eye movement of dyslexic, learning disabled, normal, and above average readers and concluded that erratic eye movements in the disabled reader were “ due to a brain malfunctions) yet to be determined” (Pavlidis, 1985: 48). He stated that when the causes of erratic eye movements can be determined, proper methods of treatment for certain dyslexics can be used. In a study to replicate Pavlidis in 1981 report, Stanley, Smith, and Howell (1983) concluded that “ the inefficiency of eye-movements during reading is related to the type of material being processed rather than to intrinsic oculomotor control defects” and are a “ result rather than a cause of their dyslexia”

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(Stanley, Smith, & Howell, 1983: 181). Rayner (1985) also stated that the comprehension level of the material being read was the major factor affecting eye movement.

Binocular vision control in disabled readers was found to be a contributing factor by Bedwell, Grant, and McKeown (1980). Stein and Fowler (1985) suggested that

the problems of ocular control could be corrected in one-sixth to one-third of dyslexic readers by occluding or covering the left eye/ using clear glasses with opaque tape on the left lens.

In a study of the use of foveal (central) vision and peripheral vision in the reading disabled/ Geiger and Lettvin (1987) had the subject use a piece of white paper with a window cut out approximately the size of eight or nine letters wide and slightly higher than the letter. This was an aid to assist the reader in controlling focus and encourage the use of central vision. An editorial by Shaywitz and Waxman (1987) criticized the design of the testing of subjects by Geiger and Lettvin. The subjects were presented stimuli in only one area; therefore/ they knew where to direct their focus. Shaywitz and Waxman added that later studies might provide more information on the theory of “ altered neural processing” (Shaywitz & Waxman, 1987, p. 1270).; Levinson (1989) found that disabled readers had compensated for their distortion problems by suppressing their peripheral vision to a type of tunnel vision in order to concentrate their fixation. When his subjects were forced to visualize a wider span, they lost their place or experienced a double vision.

Figure-ground perception was considered a related function, not a distinct function, in visual perceptual skills. Meares (1980) reported on the effects of some of the reading disabled students who were experiencing problems with figure-ground and brightness contrast of student books. She suggested that these factors contributed to a student's reading problems.

The Early Use of Color in Reading

One of the earliest methods of using color to help children learn to read was developed by Edith Norrie, herself a dyslexic. Norrie developed this method when she was in her twenties in order to teach herself. She later founded the Ordblind Institute in Copenhagen. The method involved instruction in synthetic phonic training with colored letters which helped the child to recall certain sounds. Bannatyne also developed a phonics system using color as did Gattegno and Hinman, who developed the "Words in Color" system. Letters are printed in different colors as are letters with similar vowel sounds (Benton and Pearl, 1979).

Strauss and Lehtinen (in Benton, 1979) also used different colors for each vowel and associated color with sounds. Benton reported no evidence which suggests that using color in this manner was effective with all children, and some researchers pointed to the substantial cost involved in multicolor printing, the difficulty with transition to black and white print, and the possibility that children would become more adept at word calling and not comprehend what they read (Benton and Pearl, 1979)

Studies Related to Scotopic Sensitivity/Irlen Syndrome and Reading

Irlen (1983) reported a reading disability that results from a perceptual dysfunction caused by excessive light or glare. In a study of 37 subjects, aged 18 to 50 years, who were unable to read effectively despite ophthalmic correction, no significant psychological or physiological problems, and adequate educational intervention, Irlen found that colored plastic sheets placed over print improved comprehension, concentration, and eye strain in 78% of the subjects (Irlen, 1983). While it was unclear why the colored plastic placed over print made reading easier, subjects reported greater ease in reading and less distortions, such as blurring, shaking, and movement, on the page. By experimentation, Irlen found a number of colors that benefitted different disabled readers and eventually developed colored plastic lenses. She termed the dysfunction Scotopic Sensitivity Syndrome, and the name was later changed to Scotopic Sensitivity/Irlen Syndrome, or SSIS.

Irlen developed a set of symptoms in a questionnaire format and a set of tasks which elicited the symptoms in subjects with SSIS. She termed this perceptual vision screening instrument the Irlen Differential Perceptual Scale (IDPS). The IDPS consists of questions in six categories: print resolution, depth perception, sustained focus, span of focus, peripheral vision, and strain and fatigue symptoms (Irlen, 1983).

The subjects in the original study were asked to wear tinted lenses for one month and then were interviewed to determine changes in level of reading, attention, concentration, penmanship, and eye-hand coordination. Subjects reported an increase in ability to read without eye strain and frustration, sustained focus, and improved visual resolution and elimination of

distortions. Reading rate and comprehension and number of regressions,
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blinking, and squinting decreased. However, no standardized measure of reading comprehension was used. Irlen was criticized by the vision specialists community because her results were reported before adequate studies had been done to determine the efficacy of the treatment, and Irlen had patented the method before releasing information about it.

Irlen's research pointed to a specific visual-perceptual dysfunction that causes dyslexia and other reading difficulties. SSIS is a visual-perceptual dysfunction and not a vision problem concerning refractive errors, muscle imbalance, vergence, or accommodative problems (Irlen, 1983). SSIS is a perceptual dysfunction that reportedly prevents an estimated 10-12% of people from reading proficiently. According to Irlen, people with SSIS may seem to be underachievers, hyperactive, slow readers, or to have an attention deficit disorder. They may be light sensitive, have problems with light or glare, contrast, or depth perception. They may complain of print that shakes, blurs, moves, doubles, or disappears. They may have trouble copying, suffer strain and fatigue from reading or working on computers, make careless errors in reading or math, get headaches or nausea when reading, or prefer to read in dim light.

This syndrome may be one layer of several learning difficulties, such as dyslexia or Attention Deficit Disorder. Although Irlen indicated at the time of the initial discovery that she did not understand the causes of the syndrome, she reasoned that the brain had difficulty effectively processing visual information from full spectral light, which caused perceptual problems with resolution, motion, color constancy, and depth perception (Irlen, 1991).

SSIS and Tests of Visual Perception

Evans (1948) described the levels of vision and explained the functions of the eyes in response to scotopic and photopic levels. In his treatise, the description of the eye's physical reactions to various light intensities, reception of color vision, and retinal decay are explained. Evans further described the difference between photopic and scotopic vision. Normal vision was referred to as photopic vision (i. e., the range at which colors are recognizable or there is a response to colored light). Scotopic vision is where " the maximum sensitivity of the eye falls at a shorter wavelength than at the level of normal vision" Evans/ 1948, p. 102).

In a published master's thesis by Miller (1985) the relationship of scotopic sensitivity to reading disability was investigated. Using the IDPS developed by Irlen (1983), Miller compared the amount of scotopic sensitivity in a group of high ability readers and a group of low ability readers. Scotopic sensitivity was found in both groups but to a higher degree and to be more severe in the low ability readers. A research question raised by Miller addressed the identification of scotopic sensitivity syndrome as possibly constituting a new development in the future research into the cause of reading disability.

Bald (1987) and Spencer (1987), writing in The London Times Educational Supplement, reviewed the Irlen method of using the colored lenses. The published anecdotal reports from reading disabled students and adults stated that positive effects were experienced after using the colored lenses or filters. Spencer reported the experience of a 13-year-old boy whose teachers reported that his reading and writing skills improved after he began

using purple lenses. Bald reviewed the experience of an 11-year-old boy who became nauseous from reading. After using blue lenses he experienced no headaches and began reading for pleasure. The boy's mother began to use blue lenses which reduced her problems with driving at night and stopped her migraine headaches.

Robinson and Miles (1987) used the colored overlays with forty volunteers who experienced different degrees of scotopic sensitivity syndrome. Four speeded tests were used which contained word matching, letter, number, and word identification tasks. Subjects were randomly assigned to color overlays of a maximizing color, random chosen, and no color. Improvement was significant only with the easier tasks of letter and number identification. They considered the difficulty of the tasks to be a contributing factor in the final results.

Stanley (1987) suggested that further research include the added dimension of a relationship between individual differences in color perception and reading (p. 8). In his work at the University of Melbourne he found that there were large individual differences with respect to response to color and questioned the necessity for the extensive range of color options for the overlays and lenses that Irlen advocated. Stanley recommended the use of colored overlays without the preliminary screening or testing for SSS. Stanley suggested that the use of overlays that were relatively inexpensive and “obtained at the stationery stores for a few dollars” were equally effective (Stanley, 1987: 9).

O'Connor and Sofo (1988) responded to the Stanley critique and cited research that had been done although the need for more rigorous research was confirmed. The possibility that the symptoms of SSS had resulted from central nervous system damage was addressed. Several symptoms of CNS had been eliminated in the subjects they observed after the use of tinted lenses when other intervention methods had failed.

In a critique of the Irlen filters, Wilshire and Taylor (1988) reviewed research which indicated that reading disabilities were caused by a failure to process linguistic material correctly rather than the failure of the visual perception abilities. They suggested that there should be more controlled studies using control, placebo, random assignment, blind assessment of reading abilities, and use of “a tint not thought to be beneficial” (p. 50). Listed were the possible psychological factors which might be involved in wearing colored glasses: (a) novelty value; (b) believing the treatment would be beneficial; (c) receiving a lot of attention; (d) one's hidden handicap can now be seen; (e) increased motivation from a new treatment that will help; and (f) the glamour of wearing dark glasses (p. 51). They stressed that the result of future research should show meaningful improvement in reading skills and the ability to generalize to other reading disabled children (Wilshire & Taylor, 1988).

Whiting (1988) reported his follow-up study of 343 clients who had worn colored lenses for twelve months. Survey forms were mailed to them, 166 were returned, with 155 completed. Clients had been asked to respond to a range of eleven problems or symptoms and indicate the amount or degree of improvement in each. Whiting used a three point scale: none (no help), <https://assignbuster.com/reading-comprehension-using-colored-overlays-essay-sample/>

some, and large (great). The highest/ or large, was assigned to those who indicated a large improvement in three or more areas of problems or symptoms. “ Some” was assigned to one or two areas improved or helped. If glasses were not worn or use discontinued, the survey was scored “ none.” Of the 155 completing surveys, 55% reported large or great help, 36% reported some help and 9% indicated lenses were of no help. Whiting suggested that the procedure of using the filters was worth further trials (Whiting, 1988).

MacLachlan, Yale, and Wilkins (1993) gave Irlen overlays to a group of 55 subjects who reported visual discomfort and a number of associated complaints, including migraine headaches. All subjects had received a recent optometric examination and wore corrective lenses if necessary. Subjects were asked to use the overlays for one month and to return, if desired, after that period to be fitted with precision tinted lenses. Forty subjects returned for precision-tinted lenses. These lenses were tinted by the patients themselves using an intuitive colorimeter, a machine designed to give subjects the opportunity to adjust the hue and saturation of light falling upon a page of random letters arranged to resemble text. All subjects were contacted between 10 and 26 months after being fitted with the tinted lenses. Eighty-two percent were still wearing the glasses and 44 subjects reported improvements in reading and reduction of headaches. Those patients who originally reported more reading problems expressed significantly more benefit ($p < .03$) from the lenses than those who reported few reading problems. Forty of the 45 subjects still wearing the lenses reported visual distortions of print as compared to five of the 10 no longer

wearing the lenses. Subjects also reported a reduction in the frequency of migraine headaches when wearing the lenses.

Donovan (1995) compared the effects of Irlen overlays on the word recognition accuracy, speed and comprehension of subjects diagnosed as reading disabled. Her subjects were 83 students (36 female, 47 male) in grades four through seven whose reading achievement and potential was 1.5 to 2.5 grade levels apart. Each subject tested positive for SSIS. All of the subjects' scores for word recognition accuracy, word recognition speed, and comprehension (in isolation and context) were measured under three conditions: with the use of an Irlen-prescribed overlay; with use of a spectral opposite-color overlay; and with no overlay used. Holding constant overall ability of the subject and test order, linear regression and analysis of variance were used to obtain the following results. Students' word accuracy in isolation and their comprehension were positively affected when using their Irlen overlays. For accuracy in isolation, the positive effects decreased for students who read at grade levels four and five, but increased slightly for students who read at grade level six. While a similar pattern occurred for comprehension, the strongest effects were observed for students reading at grade levels two through four, while students reading at fifth grade level and above were negatively affected by use of the Irlen overlay. Speed in isolation and context, as well as accuracy in context, were not improved by use of the Irlen overlays, especially with students who read at faster speeds. Donovan suggested that further research with a larger sample size needed to be done.

The major research and use of Irlen's method has been in Australia. Chan and Robinson (1989) conducted a test of gains in reading comprehension in <https://assignbuster.com/reading-comprehension-using-colored-overlays-essay-sample/>

80 students matched according to chronological age and reading age in a 2 x 4 test-retest design. Two groups of 40 normal readers were matched with two groups of 40 disabled readers, one with and one without colored lenses. Two instructional methods for locating an irrelevant passage within a reading example were used: (a) general instructions and marking with a highlighter and (b) specific instructions and marking with a highlighter. Students using the lenses performed better on this task than Chan and Robinson termed “comprehension monitoring” (p. 11). They stated that this was possibly due to the fact that the subjects were able to attend to the meaning of the passage rather than to the lower level tasks of identification of features such as letters and words. Therefore, students could use their cognitive strategies for better comprehension.

Chan and Robinson/ as a result of their study, suggested that disabled readers who exhibit scotopic sensitivity symptoms have unique difficulties and specific reading behaviors different from those disabled readers who do not show symptoms of scotopic sensitivity (Chan & Robinson, 1989). Irlen and Lass (1989) reviewed the research on the use of colored filters and overlays and gave further suggestions for techniques to be used in a school setting to assist students with SSS, Lighting for these students should be dimmer, in general/ by half. The glare present from white paper can be reduced by using a colored overlay filter. The student’s assignments can be written or typed on colored paper. To accommodate individual needs of the students, blue, green, beige, pink, yellow, and goldenrod colored paper should be available in a classroom. Tests can be xeroxed on colored paper. Bookstands can be used to change the angle of materials and visors used to

decrease glare. Modifications of the color of materials used on overhead projectors to reduce glare or contrast and colored chalk on chalkboards would be helpful; otherwise, the material can be copied by another student for the scotopic student to use. To reduce distortions, reading material should be placed in front of the student and not at an angle. To aid in math calculations and keep numbers in alignment, vertical lines can be drawn on the paper with a highlighter of the appropriate color.

Cheetham and Ovenden (1987) gave a detailed report of their application of the colored lenses with their optometric patients. They presented data on 225 client whom they had seen from 1930 to 1987 who had tinting of lenses. All but 2. 4% of the people with reading disability at time of diagnosis also experienced other types of visual difficulties, such as near or far sightedness, vertical phoria (one eye higher than the other), esophoria (eye turns inward), or exophoria (eye turns outward).

Hoyt (1990) reviewed the major articles and research reports on the use of Irlen lenses and overlays. He stressed the need for consistency in the research design, the involvement of multicenter experimentation, use of children with LD as subjects, control groups that are carefully constructed, regular optometric or opthamological examinations of subjects, use of the same groups of standardized tests, and studies covering a period of one year or longer. Hoyt also expressed the need to determine if there is such a syndrome as scotopic sensitivity, and, if so, establish a definition or description of the condition (Hoyt, 1990).

Worrall (1990) reviewed some of the more popular treatments currently being used in the field of learning disabilities and commented on quackery which operated under the guise of science. He stressed the need for objective evidence to support the use of any technique or therapy being used in the field of learning disabilities. Worrell developed a ranking scale worksheet for evaluating treatments which could be used when considering a new type of therapy or intervention. Major criticisms noted by Worrall of studies using colored filters or overlays with reading disabled students were the use of anecdotal reports to determine results, and the speed of reported “ success” (Worrall, 1990).

Summary

In the field of education and especially in the area of learning and reading disabilities, there have been numerous methodologies, theories, and approaches for the remediation or intervention for the disabled reader. Initial enthusiasm for an immediate cure has sometimes resulted in a proliferation of similar techniques, misinterpretation of the original intent of the developer, and misapplication of the technique or theory. Restraint and modification should be used in the consideration of the usefulness of the approach being considered. As the research in the functioning of the brain in the interpretation of visual stimuli, including the processes involved in reading printed or written materials, increases the presence of a condition as scotopic sensitivity syndrome may prove to be one of the problems of disabled readers. Until that time, educators may want to consider the recommendation of many researchers and use the colored overlays or filters

with students when this technique is shown to be a benefit in the classroom, not waiting until the syndrome has been defined.

References

Bald, J. (1987, September 18). Spectacular tints. *The Times (London) Educational Supplement*, 3716, 59.

Bedwell, C. H., Grant, R., & McKeown, J. R. (1980). Visual and ocular control anomalies in relation to reading difficulty. *British Journal of Educational Psychology*; 50, 61-70.

Breitmeyer, B. & Breier, J. I. (1994). Effects of background color on reaction time to stimuli varying in size and contrast: Inferences about human M channels. *Vision Research*. 34: 8. 1039-1045.

Breitmeyer, B. & Williams, M. (1990). Effect of isoluminant-background color on metacontrast and stroboscopic movement: Interactions between sustained (P) and transient (M) channels. *Vision Research*. 30. 1069-1075.

Benton, A. L. & Pearl, D. (1979). *Dyslexia: an appraisal of current knowledge*. Oxford University Press, New York.

Chan, L. K. S., & Robinson, G. L. W. (1989). Effects of comprehension monitoring instruction for reading disabled students with and without tinted glasses. *The Australasian Journal of Special Education*, JJ5(1), 4-15.

Cheetham, J. S., & Ovenden, J. A. (1987). Tinted lens: Hoax or help?

Australian Journal of Remedial Education, 10: 10-11.

Evans, B. J. W., Cook, A., Richards, I. L., & Drasdo, N. (1994). Effect of pattern glare and colored overlays on a simulated-reading task in dyslexics and normal readers. *Optometry and Vision Science: Official Publication of the American Academy of*

Optometry, 71, 619.

Hoyt, C S., III. (1990). Irlen lenses and reading disabilities. *Journal of Learning Disabilities*, 11(10), 624-626.

Irlen, H. (1983). *Irlen Differential Perceptual Schedule (IDPS)*. Long Beach, CA: Perceptual Development Corporation.

Irlen, H. (1991). *Reading by the colors: Overcoming dyslexia and other reading*

disabilities through the Irlen method. New York: Avery Publishing Group.

Irlen, H., & Lass, M. J. (1989). Improving reading problems due to symptoms of scotopic sensitivity syndrome using Irlen lenses and overlays. *Education*, 109(4), 413-417.

Jackson, I. I. (1993). *Interventions for visual perceptual deficits in reading disabled children* (Doctoral dissertation, University of Houston, 1993).

Dissertation Abstracts International, 54, 4437

Jeanes, R., Busby, A., Martin, J., Lewis, E., Stevenson, N., et al. (1997).

Prolonged use of colored overlays for classroom reading. *British Journal of Psychology*, 88, 531-

549

LeCluyse, K. B. (1993). *The efficacy of colored overlay intervention with reading disability, attention disorder, and visual discomfort* (Doctoral dissertation, University of New Orleans, 1993). Dissertation Abstracts International, 54, 3874.

Lehmkuhle, S., Garzia, R., Turner, B. S., Hash, T., & Baro, J. A. (1993). A defective visual pathway in children with reading disability. *The New England Journal of Medicine*. 328: 14. 989-996.

Geiger, G., & Lettvin, J. Y. (1987). Peripheral vision in persons with dyslexia. *The New England Journal of Medicine*, 316(20), 1238-1243.

Levinson, H. N. (1989). Abnormal optokinetic and perceptual span parameters in cerebellar- vestibular dysfunction and learning disabilities or dyslexia. *Perceptual and Motor Skills*, 68, 35-54.

MacLachlan, A., Yale, S. & Wilkins, A. J. (1993). Open trials of precision ophthalmic tinting: 1-year follow-up of 55 patients. *Ophthalmic and Physiological Optics*, 13, 175-178

Meares, O. (1980). Figure/ground, brightness contrast, and reading disabilities. *Visible Language*, 14(1), 13-19.

Miller, L. S. (1985). *Scotopic sensitivity and reading disabilities* (Master thesis, University of California, Long Beach, 1985). Master's Abstracts, 24(2), 94B.

Orton, S. T. (1937). Reading, writing, and speech problems in children. *A presentation of certain types of disorders in the development of the language faculty*. New York: W. W. Norton.

O'Connor, P. D. , & Sofo, F. (1988). Dyslexia and tinted lenses. A response to Gordon Stanley . *Australian Journal of Remedial Education* , 2: 10-12.

Robinson, G. L. , & Miles, J. (1987). The use of coloured overlays to improve visual processing. A preliminary survey. *The Exceptional Child* , 34(1), 65-70.

Pavlidis, G. T. (1981). Do eye movements hold the key to dyslexia? *Neuropsychologia* , 19, 57-64.

Shaywitz, B. A., & Waxman, S. G. (1987). Dyslexia. *The New England Journal of Medicine* , 316(20), 1268.

Spencer, D. (1987, May 8). What the professor found at the end of the rainbow. *The Times (London) Educational Supplement* , 3697, 9.

Stanley, G. (1987). Coloured filters and dyslexia. *Australian Journal of Remedial Education* , 19(3), 8-9.

Stanley G., Smith, G. A., & Howell, E. A. (1983). Eye movement and sequential tracking in dyslexic and control children. *British Journal of Psychology* , 74, 181-187.

Stein, J., & Fowler, S. (1985). Effect of monocular occlusion of visuomotor perception and reading in dyslexic children. *The Lancet* , 8446(2), 69-73.

Wilshire, C. R. , & Taylor, J. S. (1988). Commentary: Tinted glasses and dyslexia. *Journal of Research in Reading* , 11(1), 50-52.

Whiting, P. (1988). Improvements in reading and other skills using Irlen colored lenses. *Australian Journal of Remedial Education* , 20(1), 13-15.

Williams, M. C, LeCluyse, K., & Rock-Faucheux, A. (1992). Effective interventions for reading disability. *Journal of the American Optometric Association* . 63, 411-417.

Worrall, R. S. (1990). Detecting health fraud in the field of learning disabilities. *Journal of Learning Disabilities* , 23(4), 207-212.