DIAGNOSIS AND REMEDIATION OF VISUAL PERCEPTUAL PROBLEMS BY THE USE OF COLORED TRANSPARENCIES - *A NEW APPROACH*

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In the Pomona Unified School District, 700 students currently use colored transparencies for reading and other print-based activities. Assessment for Scotopic Sensitivity Syndrome is used in the pre-referral Student Study Team process and training is offered district-wide in a new authentic, student work-based assessment named See it Right!® which grew out of a 7-classroom study initiated and administered by the author. The use of colored transparencies is a technique developed by Helen Irlen of Long Beach, California. She is credited with developing the most well-known procedure for testing and treating individuals with this type of perceptually-based reading problem. *As school psychologists, the use of this technique can allow us to both diagnose and effectively recommend remediation techniques for visual-perceptual difficulties and some visual processing disorders.* Some students identified as having visual perceptual and/or visual processing disorders may instead have a sensitivity to light that responds to the use of color. This author has used color with both informal and standardized testing instruments.

The following definition is from the Irlen Institute: "Scotopic Sensitivity/Irlen Syndrome (SSS) is a perceptual dysfunction associated with the brain's ability to accurately process visual information. Looking through color may correct this difficulty by altering the timing by which the visual information is received and processed. Individuals with this dysfunction report problems of print and/or background distortions, especially when reading black print on white paper and under bright lighting or under fluorescent lighting. Such difficulties are reported despite visual examinations and correction and affect principally reading and writing-based activities. Individuals with SSS may read slowly, or inefficiently, or have poor comprehension, eye strain, or fatigue." Historically, this set of behavioral symptoms has been described by several authors in the literature about reading difficulties.

FIELD STUDY/RESEARCH

Purpose - The purpose of this study was simple. I wanted to use color with children in our district so that their visual perception, and thus their ability to profit from reading instruction, could be improved. The administration was concerned about possible liability. The study was undertaken to convince the administration of the efficacy of using this intervention. This study was not undertaken as a doctoral study or funded by a grant. With the exception of a little money from each school administrator for the supplies needed and for substitutes for the teachers on the days testing was done, there was no funding and no time allotted. The work was done before school and after school, nights and weekends, as is typical in schools. No time was provided to this school psychologist, until the next year, when, as results were reviewed, the significance of our effort was realized. As to liability, we made sure that all who were involved knew that we do not provide glasses in the school setting. For glasses, parents need to consult with vision professionals. We had students screened by the school nurse and appropriate referrals were made as indicated.

Brief Overview - A 2-page proposal for this field study was submitted to our district office and approved. Seven teachers at two different Pomona schools volunteered to undertake this project. Thus, the project was begun with a total of 7 classes of students grades 1 through 3. Students were tested and then retested after 2 months, after 1 year, and after 2 years. Each class was tested by the original classroom teacher each year.

Out of 7 classes, 179 students were tested in April, 1989. At the end of the study, we had complete records on only 85 students. Fifty-three percent of our students moved. (For the purposes of this study, complete records are those for students who were still at the schools and present for the assessments.) As you can see, our transiency rate is very high in Pomona. Students who moved were followed up if still in our district, but not retested after the move.

NOTE: This study was not intended to be a scientific research study. It was a field study to find out what could be done with limited time and very limited resources. Controlling for variables is difficult in the school setting. However, any recognized variables were addressed as much as possible (ie. Students were encouraged to use their colors consistently, colors were replaced as needed, etc.) No other special projects or interventions were being conducted with these classrooms for the duration of our project.

Subsequently, this battery was further developed as the See it Right!® screening instrument, a work-based assessment, using the student's own books and writings as well as copying samples from the student to show how color changes what he sees. *Students are still being*

followed after more than 7 years, but no more standardized testing has been done because of financial constraints.

Original testing - April, 1989. 179 students, grades 1 through 3, were assessed. An observation form was completed by the child's teacher, a questionnaire was completed and each child was assessed to see if color was beneficial. All except 13 of the 179 students selected a color and reported that the color helped in some way. (This in itself was a source of questions by all of us and will be addressed later.) The Word Recognition Subtest of the Brigance Diagnostic Inventory of Basic Skills was used as the measure of reading achievement and administered to each student.

Those who were determined to benefit from color were tested twice: first without color and then using color over the word lists. Using color, 43% of those students scored the same, 4% scored lower and 54% scored higher, some significantly.

NOTE: In future studies a comprehension measure and one which yields standard scores will be used because of the criticism of grade scores. Also some of the students did so well that by the end of the first full year of the study, they hit the ceiling (which is 6.2) of this test. Because of this, we also used the Brigance Inventory next level up to try to get a measure of the child's improvement. With some students, we used the Wide Range Achievement Test - Revised (when the Brigance next level did not have a high enough ceiling). *Because we could not use the same measure with some of these students, the results are considered in a range only.*

After 2 months - June, 1989. (Note: Students were tested with color if they were originally given color and without if they had no color. Also, support for the project was continued for the next school year because of the very positive results seen after this short period of time. No money was given, however, this psychologist was given some scheduled time to follow up with the project.) One of the classes (Sullivan) was separated from the others because all the students were at a Readiness level and the increases were generally within the Readiness category.

After 1 year - April, 1990. All but 4 students continued using color. Several students had moved. The statistical summary presented below shows the shift in achievement from below grade level to either on or above grade level.

After 2 years - April, 1991. Of the 85 students left in the project after 2 years, 30 students who started below grade level *and used color*, 15 caught up and some scored above grade level. This is in contrast to the 8 students who also began below grade level but *did not use color.* Only 2 of these students caught up to grade level in the 2 year study.

Parent surveys - Surveys were sent to all the parents of children who had been given plastic transparencies. Surveys were sent first in June, 1989, (68.5% returned) and then in June, 1990. (54% returned.)

The comments made were favorable in almost every case. The following are representative comments: "He said it's very helpful and he doesn't skip lines anymore." "It seems that it is easier with the plastic"
". . .Please keep helping him. Thank you."

In summary, the parents were overwhelmingly in support of the program. Parents were asked to encourage use at home and keep in communication with the school as a continued partnership with us. Many of the parents also used color, either the home copies of their child's color or one that they obtained from the school.

Statistical Summary of Results - Six classes (grades 1 to 3)

		GRADE LEVEL		
	date	below	on	above
Original testing	4/89	48%	21%	31%
After 2 months	6/89	37%	18%	45%
After 1 year	4/90	32%	21%	47%
after 2 years	4/91	26%	26%	48%

*Criteria for on grade level was a score of .2 +/- grade placement. For example, on grade level for 1.7 grade placement (April of the school year) would be in the 1.5 to 1.9 range for the purposed of this study.

General summary:

Number of children who tested below grade level:
Reduced by about 22 per cent.

Number of children who tested on grade level:
Increased by about 5 per cent.

Number of children who tested above grade level:
Increased by about 17 per cent.

CONCLUSIONS:

Based on the reports of students, parents and teachers, as well as test results and rate of progress before and after, the intervention of color was much more effective than I had any idea it would be. We know that all children do not benefit from the use of color.However, it is surprising to me how many children *did* progress with the use of color. Many caught up to grade level and some even surpassed grade level after starting below grade level. *Overall, this intervention appears to be an effective technique.*

The project showed that a significant number of students can benefit from the use of color. Original determinations about the benefits were validated over time. Results also demonstrated what can be done in a regular school setting. The project also shows that a difference can be made with little money, and without a specific grant or other funding. You only need commitment from teachers and administrators.

I know of more than a few children who would probably have been referred for special education if they had not had this intervention. I was sure of this when they showed me what they were seeing. By intervening early, the child could get accurate and consistent input. *I had no idea that someone could see what they reported and read at all.*

Children are making adjustments and coping better than we think they can. When color is an effective intervention, the child no longer has to spend so much time and effort trying to "translate" what they see into something they can read. They begin to get accurate visual input. I now know this can have a significant effect on achievement.

QUESTIONS ARISING FROM THE PROJECT:

I. *What is happening that so many children appear to be seeing visual distortions on the page?* Has this been the case all along and gone undiagnosed? Can so many children be reporting these falsely? If these numbers are validated by different researchers, we will know more about what is happening.

2. W*ith very limited resources, how can we do more controlled studies into the use of color and its effects?* I am currently communicating with an optometrist from the Southern California School of Optometry in Fullerton, California, to participate in his study. Please contact me with ideas.

3. *Do we need more interventions available in the school by medical vision professionals?* Now only Far Point acuity screening (Snellen) is mandated by the State of California. We need at least Near Point screening as part of our regular school screening. More mandated services would be even more helpful, such as a complete visual exam. Some used color first and then were prescribed glasses. Some used both, however. Why? I don't know. There are so many unanswered questions that medical and educational researchers will have to answer. Some of these answers are known by vision professionals already, however, those of us in the schools working with children do not know these answers. We need regular access to vision professionals to get these answers.

4. *Why have a few of the younger children who were given color at the first or second grade level reported that the distortions have disappeared after 1-2 years of consistent use?* We have some theories and plan to ask more questions of these students. The reason for these findings needs o be researched.

See it Right!® - AN ASSESSMENT DEVELOPED FROM THE POMONA STUDY

See it Right!® is a complete system for assessing light sensitivity problems. The procedures and techniques were developed over a period of 5+ years to relate directly to the student's work and performance. This authentic assessment uses the student's own reader and written work in the diagnostic process. The process allows the student to use his familiarity with the materials to aid him in helping you identify and resolve the problem.

These techniques were originally developed for use with elementary-age children from grades 1 to 6. Many of these students are unaware that what they see is not normal. Hence, techniques were developed to help the evaluator discover what the child is seeing. Early intervention is very important. The goal is to have this technique available to little ones who have difficulty telling us what they see, but nonetheless may have these visual-perceptual problems that are interfering with their acquisition of reading skills.

There is much speculation about what happens to cause the distortions or just why the colored filters often ameliorate the problem. However, in general, research has shown the positive effects of using colored transparencies. However, more research is needed. In the meantime, we can use this technology in our schools to help our students acquire reading skills. *Dr. Robert Sylwester of the University of Oregon* calls this "the 75 cent fix" because it is quite inexpensive and effective.

We know that visual discrimination is central to reading acquisition along with oral language development. Finding out what a child sees when looking at letters and/or numbers is very important when a child is having difficulty.

The techniques are described in detail and are meant to help identify, as specifically as possible, what the child is seeing as he reads and to provide accurate visual input. Validation of your work is provided through specific techniques to help you find out if the student still sees reversed letters, poor spacing and/or other distortions.

A FOUR STEP PROCESS

The steps in the assessment process are:

STEP I - REVIEW WORK
STEP 2 - INTERVIEW THE CHILD
STEP 3 - COLOR TESTING
STEP 4 - FOLLOW-UP

In **STEP I**, you **REVIEW THE WORK** of the student (the first step in any assessment process.) The diagnostician gives the observation form to the child's teacher to complete and requests student work samples. One new technique involves analyzing student handwriting to figure out what the younger child may be seeing. This is also the best time to have the school nurse check the child's vision.

In **STEP 2**, you will **INTERVIEW THE CHILD** to verify the teachers observations and learn new information.

In **STEP 3**, you will do the **COLOR TESTING** in an attempt to get rid of any distortions the child may be seeing. The child will look through various colors of plastic transparencies as you and the child assess the usefulness of each in eliminating the child's problems.

In **STEP 4**, **FOLLOW-UP**, you communicate your results and provide for the success of your intervention. Forms are provided to help you to perform assessment and follow-up activities with a minimum of effort. Parent letters are provided in both English and Spanish. The assessment can be done in parts of all in one sitting.

Accurate visual input is essential to allow the child to learn to read and/or read more efficiently. The teacher needs to know what is happening on the page for the student, in terms of visual perception, in order to teach that student to read. With this assessment process, you can tell the teacher and other evaluation team members just what the child is seeing and relate this to a visual processing problem, if this is the area of disability.

Results of this intervention - When visual distortions are eliminated, the child can benefit from instruction and begin to progress at a rate more consistent with his measured potential. Hundreds of students have told us that one or more of the following happens when the right color is placed over the page: letters become clearer, movement ceases or lessens, letters become correctly oriented, spacing becomes regular, headaches cease and eyes no longer hurt.

Communication of results - Letters are provided to communicate with parents and teachers which are easy to complete and convey the information needed.

Visual acuity versus visual perception - Many of the symptoms of visual acuity problems and visual perceptual difficulties are either very similar or the same. Thus, a referral for an assessment by an optometrist or an educational psychologist can both be appropriate. Those of us who work with children need to be sure, and not assume that students are receiving accurate visual input. For this reason, it is very important that the student be screened for visual acuity problems as early as possible and whenever symptoms of possible visual problems are present. The student sometimes has both light sensitivity and other visual problems.

DEVELOPMENT OF A GROUP ASSESSMENT

This particular type of visual-perceptual problem appears to be a widespread problem. There's a broad continuum of symptoms, from glare on the page to upside down and backwards letters, that we are seeing across the range of students from those in special education to those identified for gifted programs. Because of what I've found, I've been working for the last 4+ years on group screening procedures to make identification easier. *So far, approximately 35 classes have been screened and results are fairly consistent with the original project in numbers of students who benefit in some way from the use of color.*

Since the comments of children are sometimes considered suspect by professionals, I have been surveying the adults who have attended my inservice training presentations in school districts and at conferences. Out of these groups over the past 2 years, I have gotten the following results: (documented by written surveys.) The number of adults in any one group, who reported benefits from using color, ranged from a minimum of 50% to a maximum of 95%. Benefits reported ranged from increased comfort to letters that don't move on the page.

INTEGRATION OF COLOR ASSESSMENT INTO YOUR REGULAR BATTERY

Insure validity of results - A sensitivity to light can effect the results of various visual-perceptual, visual-motor and other performance-based measures. We want our test results to be the most valid possible and not be influenced by correctable conditions. If the student does not see the material clearly, he will have difficulty completing the tasks. If, however, the student is able to see clearly, and still cannot accurately complete the task, our result is more reliable. This is the reason we do not test students without their glasses. *We don't want to incorrectly identify students as having learning disabilities.*

Visual acuity versus cognitive errors - For the past 5 years, I have been researching the effects of the use of color over the visual stimulus material on various performance, visual-motor and visual-perceptual assessments. I have found that my performance-based cognitive measures seem to more accurately reflect the perceived potential and are more consistent with teacher reports if I use color in an assessment of a child who has been identified as needing color. Also, I have noted, as you probably already know, that cognitive errors are quite different than those caused by poor visual acuity. Some good examples are seen in some of the Picture Completion items on the WISC-R. For example, when looking at the picture of the boy who is missing his watchband, a cognitive error would be if the student says the boy needs another pocket. If, on the other hand, the student indicated he can't see anything missing, this may be an acuity error, especially if this is the first error made.

Typical profiles - Wechsler profiles typically seen with these students show, in general, lower levels on the Performance subtests of Picture completion, Coding and Mazes. Sometimes you will also see design reversals and/or inversions on Block Design. With Picture Arrangement, there may be some difficulty seeing the details such as the difference between the bedroom and office window detail, etc. The integration of color over these test materials will frequently produce a reaction from the student, indicating the pictures are clearer or more easily visible. School Psychologist Jami Lawson, also from PUSD, notes how now you can get a more accurate discrepancy if the verbal cognitive measure is depressed and is truly an area of disability but the Performance Scale score is affected by a sensitivity to light.

Color can be used over the Bender cards and over the stimulus material used to measure visual perception, such as the Jordan Left-Right Reversal Test, the Motor-Free Visual Perception Test, TVPS, et al. You may be surprised to find the differences you will see in performance when administering the tests first without and then with the addition of color. Much more research needs to be done in this area to validate the effects. Whenever I use color in this way, I report it in detail and document the students comments and reactions.

Accuracy of the psychological diagnosis is extremely important in that the remediation must logically follow a valid diagnosis. Accurate matching of the remediation to the problem results in a successful intervention. Valid recommendations to the teacher and/or other specialists who will do the remediation are essential. **Please consider the use of color as part of your assessment process.**