VISUAL FIELDS

  Duncan, Okla.

By
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With the Technical Assistance of T. A. Brombach, OPT. **D.**

August -1942 Vol. 2 No. 11

Upon the introduction of this work in visual field analysis we had given to us an entirely new meaning in perimetry in addition to that which had existed before. We found that field analysis had much more significance than merely that of detecting actual pathology of the eye, tract and brain. Now that we have learned how to find toxic interferences as well, let us not find ourselves assuming we now have two phases of visual field analysis only. Through the research we have had presented it has been shown that the interpretative value of a set of fields is unlimited; that peripheral portions of the visual area may be affected in all types of visual problems fully as much as may central vision. Our problem is learning to interpret the meaning of the changes that take place.

One thing that has been covered quite thoroughly is that of finding toxic poisoning that interferes with efficient visual skills, and how to dispose of them. Another is interpretation of field changes that occur independent of toxemia in the previous sense, but which are a result of a visual interference per se. The difference is this: in one case the toxin may upset visual efficiency and upset fields, the latter giving us our clue in finding the source. In this case the toxins may also reduce the fields to a point of preventing the best efficiency in seeing. In the second instance the visual skills themselves are upset by a fatigue and as a direct result the useful area of the field is reduced. In the former case we must lend our efforts to eliminating the toxic source to permit efficient vision. In the second we must restore visual efficiency so the fields will improve and record the change.

In addition to the possibility of having dual toxic agents affecting vision we may also have the combination of toxin and fatigue. Usually, however, a disturbance can be traced to a single source as it's cause.

The diagnostic evidence of the presence of toxins is in color field changes. In the advanced stage of focal infection it also involves form field collapse but usually toxemia simply produces inter lacing of the color outlines. When we have a reduction in the size of the form field so it is smaller than blue, but with no involvement of one color with another, cause is usually a visual fatigue. If it is present morning and evening correction of the visual imbalance will produce an increased form field area. If it is present in the evening only then some factor during the day has induced the state of exhaustion. If so the contributing factor must be eliminated. Common among such causes is improper lighting, small and indistinct print or other working material, visual fatigue from special vocational working environments, remaining at one task for long periods without change of the visual task or relaxation, or a simple visual interference that becomes intensified during the working day. In past papers cases and circumstances have been shown covering some of these phases. (For improper lighting, physical exhaustion from playing football, vocational visual fatigue and from long hours of work see Volume 1 Number 8)

We have another problem causing reduced form fields without color deviations from characteristic perception and that is from the common ailment we miscall “eyestrain.” An interference in the normal process of performing visual skills very often produces this reduced form area, and usually one eye is more advanced than the other, When the source of interference is removed there will be an enlargement of the form field and a change from interlacment with color outlines. Such a return to normal is dramatic and ample proof of the value of the work performed in behalf of the patient. These cases are common, and even amount to a considerable percentage of ones entire practice. Visual fields themselves don't contribute much to the diagnosis of such a problem but rather after confirmation and rule out other possibilities.

As an illustrative case let's look at the following problem: A young housewife, 23 years of age, complained of almost daily headaches in and around her eyes and frontal head regions. Print would blur after short periods of reading. Her one hobby, fancy needlework, had become such a task that she had discontinued it. Any kind of visual concentration was upsetting and left her with a headache. Evenings were worse than mornings. Motion pictures with double features were too long and tiring, but a short movie usually left her feeling better than when she entered.

Twice within the past seven months she had been given glasses which gave her no comfort for reading or fancy sewing. Her presence in an Optometrist's office was evidence of her extreme discomfort because she had developed a pronounced dislike for glasses. This was supposed to be from the non-satisfaction from her two pairs previously. Another patient had urged her to come almost against her own desires.

A visual analysis was carefully made. It disclosed a “B-1” type problem with defense complications. As she continued to force near point visual concentration despite the “IB" type interference she made new mental associations in controlling and maintaining clear and single vision. It was necessary to make new associations if she maintained seeing. These changes were manifested by lowering hyperopia at near and the blur-out balances tending away from plus acceptance. Hyperopia at far was 1.25 diopters greater than at near, and blur-outs rejected 1.50 diopters of the +2.25 that was measured in the subjective at far. It is obvious that no more than +.75 was accepted in the equilibrium findings to be tolerated as a near lens prescription. The other two pairs of lenses were +2.00 and +1.50 respectively.

Color fields showed no deviation from normal except that they were smaller than might appear mare desirable. The form field was in the medium classification but inside blue in several meridians. These were taken at 4:35 P.M. and are recorded in Figure 1.

Fields taken the next morning at 10:15 showed slight increases in size but form was still smaller than blue in same meridians. No color interlacings were shown. (Figure 2). The formula is as follows (M-l) (F-27) (R-27) (C-l6).

The analytical chart given in Volume II number 9 classifies the above formula as normal. It is normal so far as color fields is concerned and so gives no evidence of toxemia, yet it is not as desirable as might be. A lens prescription of +.75 was given far constant wear with instructions to return in twenty-one days for a progress report.

The progress report showed a lowering of the far subjective by .25 diopter, and an increase of the near subjective by 1.00 diopter, making them exactly equal. The blur points new accepted +1.75 of the subjective. Herewith are comparative figures.

First Examination

No.7 +2.25 -.50 x 180
14b +2.00 -.50x 180
15b 12 exophoria
19 3.50
20 -3.75
21 - .75

Progress Report

No. 7 +2.00 -.50 x 180
14b +2.75 -_50 x 180
15b 8 exophoria
19 4.75
20 -3.50
21 +3.00

The visual fields taken at 2:30 P.M. showed an increase in all fields, and white, on form, is new outside blue. (Figure 3).

The fact that the lady was visually comfortable pleased her and she wanted to let “well enough" alone. However, through the use of the picture presented in visual fields she was convinced that a definite improvement had been made, and was impressed that comfort alone was not enough; that findings must approach normal before we could be assured of any lasting success.

It was pointed out that ductions were still low and that a lens change was now to further relieve **the interference. When the interference was relieved the ductions would return toward normal.**

A new lens prescription of +1.75 -.50 x 180 was given for another twenty-one days when a progress report was made. This did show a stabilization of findings with increased duction reserves. Visual fields, being normal at the first progress report, were not taken again. Complete near-point comfort was reported. Advice was given to continue wearing the lenses for all near - point work and that they need not be worn at all times if undesirable.

Herewith we have observed the value of visual field work even though there were no toxic involvement. It presented to the patient a picture of improvement from the use of lenses, and it helped restore faith in Optometric procedure where doubt had entered in from previous inadequate services.

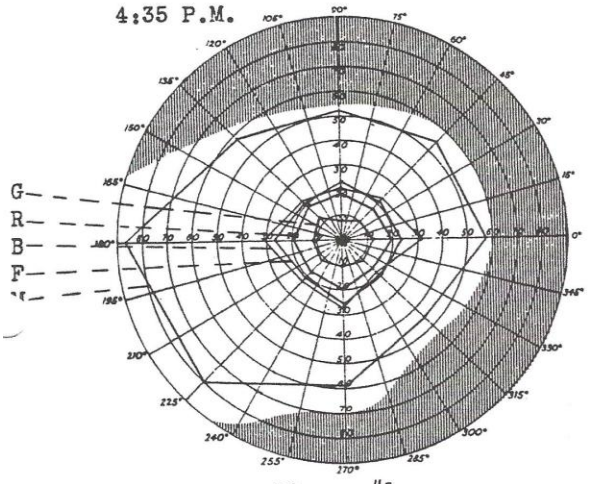


Figure #1.

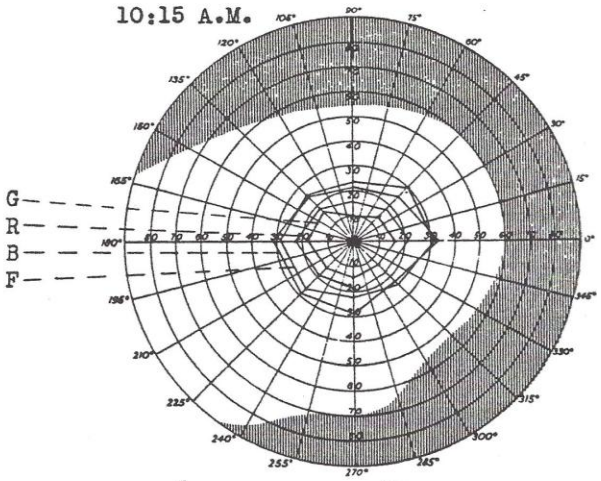
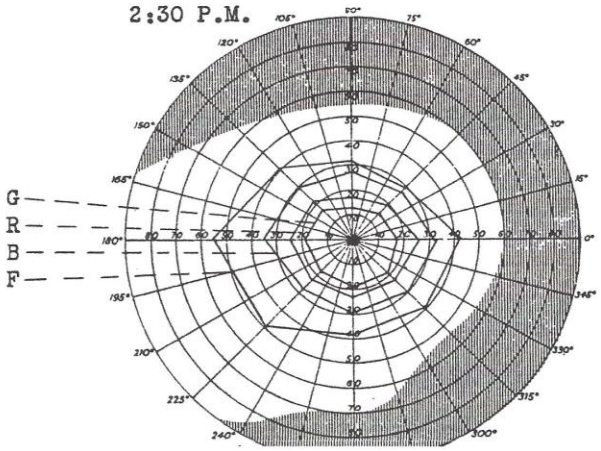


Figure #2.



VISUAL FIELDS  Duncan, Okla.

By
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September 1942 Vol.2 No. 12

Emphasis has been made in recent papers on the 1nterpretation of the outlines of color perception, When this is done the deviations from characteristic color perception indicate to us a toxic problem. In fact we have learned that any over lapping or interlacing of the color out-lines is indicative of toxemia.

Several examples of actual intoxication have been demonstrated. It must be remembered that all toxic problems affecting visual fields will not be so clear cut and precise as these. The border-line and in between cases must be left to the judgment of the practitioner after he has acquired a working knowledge of the various distinct types of visual field indications. It is the borderline cases, those outside the typical ones, that we wish to discuss at the moment.

Since visual field analysis has become better known there has been a tendency for many more practitioners to use it, at least use part of it. Along with this has come a certain amount of slip-shod methods which cannot be depended upon for accurate interpretation. In addition, improper techniques of obtaining field measurements have accounted for errors.

Perhaps the most common oversight among all of us is to look for gross field defects only, or for complete color inversions, rather than paying attention to minor overlappings and interlacings. A minor color field interlacing can be the result of an equally as dangerous toxemia as a more startling complete color inversion, Let us take heed, however, to remember that errors in recording, or in patient response, can account for an apparent overlapping of one or two meridians only, where none really exists. It is a wise practice to “re take” all meridians showing minor overlappings, remembering that true, fully saturated colors are required while the target is in a stationary position. Remember too, that overlapping colors at the time of one examination only, whether taken early in the day or late, do not give a sound basis for a "toxic" diagnosis. It is impossible to claim a diagnosis of foci of infection from but one set of field charts. Comparative examination must be made, one early in the day of the patient, and one later, representing a time when fatigue may be built up and drugs or stimulants may have been consumed.

It is these careless attempts at visual field diagnosis that has opened the paths of some criticism, and worse still, discouraged some practitioners from using visual fields in routine Optometric practice. When used according to the method that is laid before us visual fields gives valuable information concerning our patients that can be obtained in no other way. This information is, of course, that which has a direct bearing on Optometric practice, To determine which cases will not respond to visual training, and to determine when a toxic source must be eliminated before lenses, training, or other of our methods will be of value cannot be over estimated. This is sound reasoning from every angle of practice.

Foremost in the heart of a professional man is his work. His work cannot be satisfactory to himself if he knows he is neglecting some phase of service to his patients. The sheer joy of practicing Optometry is knowing we have filled a requirement in the life of each patient. To see that each one receives the best and complete care in our hands is our unselfish goal.

From another standpoint we wish to personally gain all we possibly can from our practice. This must be done by gaining as much as we can from each patient, and also from increasing the number of patients we serve. Certainly neither of these can be accomplished without satisfactory service for each individual patient. It is human nature to be willing to pay a greater fee for a greater service. It is also human nature to refer our friends to the place where we received that satisfying service. Visual fields can be utilized then for both patient service and practice building.

For routine optometric practice visual field diagnosis is not intended to be a diagnostic method of determining kinds, or methods of treating pathology. There is room for some specialists in visual field analysis, i.e., for the purpose of assisting other practitioners, just as there is room for specialists who do only X ray work, etc. It is not intended that all optometrists should become visual field specialists to this extent or for this purpose, but field studies should be part of the routine optometric examination for the primary purpose of ruling out possibilities of outside interference, both those under our control and those outside our control, just as we use the ophthalmoscope routinely even though positive findings are usually beyond our practice limitations.

Remember that the study of visual fields is the study of the projected field. When we view a field chart it is as though we were the patient looking at a reduced chart of our own field of vision. The upper meridian of the chart represents the superior field of the patients view. The left side represents the patients own left side view. In the left eye this would be the temporal meridian and in the right eye the nasal meridian, but in both, together or independently, it still remains the left side. In recording fields simply say to yourself
"I am bringing the target from the patient's upper outside meridian, therefore on the chart this recording goes in the upper outside meridian, etc."

Different instruments require slightly different techniques Get the instrument best suited to your needs and use it. There are very few gadgets that make one *i*nstrument better than another. Most modern equipment is good, and has the essential physical requirements (See Vol. I No.3).

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Among the more important phases of field analysis is the learning to separate those cases with field problems who should have the care of another practitioner, from these whom you can best control yourself, Do not hesitate to refer pathology, active or impending, to the proper place. This is far the patient's own best good, and your protection.

Generally speaking the normal person should have a red field beyond that of the area for green, and blue should extend beyond red perception. The form field, obtained with a white target in the same fashion as in obtaining color outlines, should be larger than, all colors, Motion perception should extend practically to 90 degrees, or so far as the anatomical portions of the face do not intercept light.

Internal toxins (endogenous) are all depressive in nature except where certain stimulative effects are produced from glandular dysfunction. External sources of toxemia (exogenous) may be stimulating or depressing in nature, frequently depending upon the intensity and duration of administration of the agent. Stimulating imbalances produce visual color fields larger than average and depressive types produce reduced visual areas,

Regardless of internal or external sources the overlapping of green over red, or the interlacing of the two color outlines is indicative of the primary stage of the intoxicant, and usually carries with it the symptoms of increased irritability, nervousness and lack of ability to concentrate and maintain attention at one thing for any length of time. Red overlapping or interlacing with the blue outline is indicative of the secondary stage. Other symptoms frequently accompanying this stage are general depression, headaches at the base and top of head, lack of enthusiasm, sluggishness, sleepiness and arising tired even after sleep.

Reduced form fields to the small stage inside 15 degrees both in the morning and the evening, with small and interlacing color outlines is a positive indication of a foci of infection. Any abnormality at anytime indicates something out of order and fields should be investigated at another hour of day.

Comparative tests are essential for complete interpretive value. A normal field taken in the morning only is not sufficient to pass over as being free from toxin because it may be completely overlooking an exogenous source of toxemia that would be manifested only later in the day, and such an exogenous source may be responsible for the visual problem on hand. A field normal in the afternoon is not sufficient to discharge a case as one without toxic complications because the effects of some stimulate during the day may be counter-acting the depressive effects of an endogenous toxemia. A morning field examination would disclose such a fact.

Reduced form fields without any color abnormality may indicate an interference in the visual processes, probably a fatigue. Usually these would be more prevalent in the afternoon hours but it may be such in the morning as well, same as other visual fatigues may give rise to symptoms in the early hours of the morning eliminating the source of interference will cause the fields to return to normal in this instance Just as if it were a toxic source and were eliminated. It is readily observed that a normal visual field taken at a date after the source of interference, toxic or fatigue, has been removed is strong evidence to the patient of the value of your work for him. It offers a picture rather than an involved explanation.

It is earnestly and strongly recommended that all cases of visual field disorder be typed, or classified. This is an accepted and standard procedure in any diagnosis where different types are recognized. The formulas of motion (M), form {F), relative size (R**),** color (C) and scotomas (S) is concise and descriptive, and such a syndrome is as easily read as the syndromes of findings in focus, phorias, ductions and blur points, etc.

Visual field findings constitute an independent biological test that offers no contention or dispute with other findings or tests. They supplement rather than contradict other findings. The diligence with which we persue visual field studies will determine the measure of results we obtain, just as the greater knowledge we gain and use in all our work will determine our position in optometry among the recognized arts.

VISUAL FIELDS

 

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October 1942 Vol. 3, No. 1

In accordance with good semantics definitions of our various types of blind spots were given from a functional viewpoint in Volume 1 Number 4. These were definitions of the adjectives commonly used to describe blind spots, and as will be recalled all of these are used to differentiate blind areas regardless of the cause of the scotoma. Details of causes and results surrounding physiologic non-seeing; areas will be found in Volume 1, Numbers 4, 5 and 6: and Volume 2, Number 2.

Another type of blind area becomes vastly important to us and exceeding1y interesting. These are blind spots found in perfectly healthy eyes, tracts and brains, and are due to non-interpretation in mind as a result of an inhibition of a sensory impulse. The name applied to this situation is TRANISITORY VISUAL APHASIA.

When we speak of seeing we usually refer to interpretation of sensory impulses coming from the macular portion of the retina. Some of our knowledge gained through seeing, including memory and recall began as an afferent impulse from the macula. We will make no attempt to state any percentages but some of it began there. Another part began as an afferent impulse from peripheral retinal portions. Though the ma1cular area is slightly different anatomically than peripheral portions, as are the pathways from it to the brain, no proof has ever been offered to our knowledge that psycho-physiological processes that gain vision are any different from varying retinal areas. Then we can safely assume that authoritative statements regarding vision and visual processes pertain just as much to peripheral as macular seeing.

Skeffington says that "seeing is interpretation of radiation through the brain of the impulses from retina integrated with all previous experience, and the perceptual sum being infinitely greater than all its components." The first clause in that sentence is the important one to us in this study: ie, "seeing is interpretation of radiation through the brain ***** from retina," which implies that impulses might be transferred from retina to the brain but with no interpretation.

Our understanding of the philosophy of the technique developed for clinical use in refraction by Skeffington and his associate is, briefly, that seeing is interpretation of the external environment, and that control of the structure (eyeballs and muscles to permit clear and single vision is a matter of learned mental response, that clear focus and single impressions are maintained and regained through conditioned patterns of neurological organization. When a fatigue exists, or is created, in either reflex (focus or triangulation) an interference is brought about between the conditioned patterns of the two. Then the person (organism) does one of these things to compensate for the interference taking place.

1. Retreats from tasks requiring visual concentration, (reading, etc),

2. Makes a concession in the pattern of neurological organization resulting in a postural change, such as a myopia.

3. Maintains an inhibition of motor impulse in one of the patterns which is initiated from an increased stimulation in the other, and as a rest may experience a perceptual discomfort as a projection.

4. Maintains an inhibition of a sensory impulse from retina, such as an amblyopia.

This fourth step is a phase of visual re-adaptation a young person frequently attempts upon the manifestation of a visual interference.

A statement made in Volume 1 Number 10 is worth repeating here. "It must be obvious to every student of physiology that activities of cells of a living organism do not ordinarily change from normal function to an almost lethal stage without certain preceding indications." It was originally made with reference to impending pathology, but applies equally as well to this fourth item of organismic adaptation. The advanced conditions of amblyopia do not come on suddenly without giving some preceding indications. Among those that precede the four mentioned concessions are non-receptive retinal areas in pre-adolescent children after maintained and sustained visual concentration. (reading)

The purpose of the organism in creating this non-receptive area is to avoid the problem of interference between the two neurological patterns of focus and triangulation by elimination of the need of binocular co-ordination. A monocular act of seeing, though conceivably less efficient, never-the-less is better to that individual with binocular troubles. We can never justifiably say that any learned reflex is a wrong reflex. It was learned to satisfy a demand of the organism and therefore is a right reflex. If we can eliminate the causative factor perhaps another right reflex can be learned that will permit the performance of greater visual skills. .

Though the organism may have very good reasons for creating non-receptive retinal areas, and the learned reflexes are right under the circumstances, never-the-less large non-receptive areas are not a boon to quick and accurate fixations on a printe3d line of words.

Reading is a complex activity. Off-hand we sometimes have assumed that only the fovea centralis of the macula is utilized in interpreting printed words. Much evidence disputes this. Recent research has shown that the span of recognition has almost no correlation with the size of the macular area of compact cones. The span of recognition (the distance, or number of letters interpreted with each fixation) varies tremendously, and can be enlarged by training. It is obvious that visual training cannot produce an anatomical change in the size of the macula. Therefore the span of recognition is, or can be, much larger than the macula itself. If there is a non-receptive area close around the macula obviously there will be a restriction on the span of recognition and consequently a reduced reading speed, etc.

In addition to limitations on the span of recognition itself another important factor comes to light. In the process of reading there are many neurological, psychological and muscular acts functioning at the same time. While impulses from the area involved in the span of recognition are being transmitted to and through the brain, impulses are also being transmitted from peripheral retina to and through the brain in preparation for the next muscular activity of change of fixation. Indeed, the peripheral is fully as active as the center of fixation in reading. Ware this not so the eyes would wander hopelessly between every act of change of fixation. There would

be no mental-muscular preparation for the length of the fixation jump, and exploratory movements would be necessary before the next span could be successfully encountered. Return sweeps to begin a new 1ine would he exceedingly difficult. It might be easier to find the first fixation on a line than a point in the middle if the visual limitation were strictly to the span or recognition.

It is obvious, then, that the blind spots that come on while reading, which we call transitory visual aphasia, will be a definite handicap in reading performance.

VISUAL FIELDS  Duncan, Okla.

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November – 1942 Vol.3 No.2

Transitory visual aphasia, the condition of temporary enlargement of the normal blind spot, or the creation of a temporary new blind retinal area from binocular dysfunction, have proved to be far more common than ordinarily suspected.

It takes but a moment's recollection for a practitioner of experience to recount many conditions representing a concession in the visual act among his patients. These will be remembered as monocular amblyopia, squint, functional myopia, alternating right and left eye vision, and many others. Each of these conditions represents the results of an advanced stage of an interference in the co-operation of the two eyes, known as binocular vision. These advanced stages of concession have occurred only after early attempts have been made to avoid trouble.

If these concessions are results of interference in the binocular act of seeing, then we may suspect that the first, or early, signs of the interference would be manifest when other visual skills begin to become impaired. Also we would suspect them to become more pronounced when the reading* load increases.

We have learned that the visual problems we encounter day by day have been brought on because the patient has been using his eyes in visual concentration in restricted areas and for limited types of use. His visual environment has been an utterly artificial one, one for which nature has made no, (or at least inadequate) provision. It is the using of eyes under these conditions that creates visual problems. In contrast, the person who performs no job requiring visual concentration has no visual trouble.

The child in school is in an environment artificial to his natural visual abilities. If he learns the visual skills involved to permit nearpoint concentration he has no troubles with vision or comprehension. If he fails to accomplish this, visual symptoms will appear. These are the first, of course, the symptoms we find during our analysis procedure, and don't at this early stage create discomfort, strabismus, or blurred vision, or any other symptoms obvious to the patient himself.

It has been found that frequently young patients of the preadolescent stage make a very dramatic concession in an attempt to eliminate the disharmony created in forcing the binocular function. It is ignoring energy transference from areas of the retina, a blocking of sensory impulses. This usually occurs around the blind spot but may spread to include the entire retina, though it rarely includes the macula. The skill of reading obviously will be impaired while one or both eyes have enlarged blind areas, and especially if only a small area at the macula remains receptive.

In as much as the creation of enlarged blind spots is the direct result of disharmony in the binocular function while doing maintained visual work, they are created only after a period of

reading*. Usually a twenty minute period of concentrated visual maintenance will bring on the enlargements if the person is subject to them. Also they will disappear when reading* is discontinued for a while, or if reading is pursued while one eye is occluded.

In the case of persistent blind areas it is difficult to differentiate transitory visual aphasia from pathological scotomas. If the blind area remains after the young patient has been outdoors playing it may be suspected as arising from pathology. Control tests later, after occlusion of one eye, will tell. If it is transitory, then solving the visual problem will prevent recurrences.

Young Jimmy W., a student in the third grade had been doing poorly in his reading progress. Both teachers and parents were aware of the situation and had been together with a remedial reading teacher to discuss his problems. It was brought out that he was superior to his classmates in some subjects. These were problems on nature and memory. In addition he excelled in games during recess periods.

He could read very well for awhile, but after a very short try at it he would rebel and refuse to read. For this reason it had long been suspected that his problem was one of behavior and not reading disability. Now he was in the third grade and reading assignments were becoming more difficult, even his apparent ability for short periods was being questioned. A visual analysis was advised.

He passed the Betts' "Ready-to-Read" test except he first stated the “fusion at near” card had four balls, then later said it changed to three balls.

Visual skills were all sub-par, but none were radically deficient. Amplitude of focus and amplitude of triangulation were high, as expected in a young person. Recoveries on ductions at near, both base-in and base-out were 9 prism diopters, too low to be passed by as negative. Both breaking points were adequate.

No visual fields were taken but blind spot measurements were slightly larger than desirable, being from three to five degrees larger in all meridians than average, and with no peculiar shapes.

While talking with his mother after the analysis Jimmy was given a book of illustrated Mother Goose rhymes and a picture book of various breeds of dogs. He soon became tired of them and so was given a pencil and paper and the office shears, and instructed to draw one of the animals in the book and then cut it out. This absorbed his attention for about fifteen minutes.

After reading* this way for a total of about twenty minutes blind spots were again taken and showed decisive enlargements. (figure 1).

A program of training in the visual skills was outlined most of which was done at home. It included following monocularly a red ribbon tied to the rear wheel of his brother's bicycle. The bicycle was turned upside down to stand on the seat and handlebars, and the brother turned the pedals. This soon proved monotonous to the brother and so the bicycle was turned upright and blocked there with the rear wheel off the floor so the operator could pedal the machine in a normal fashion.

Fixation skills were improved through playing the game of "jacks" where a ball is bounced while

picking up the "jacks." Also he was given a paddle with a small ball attached by means of a rubber cord and instructed to hit the ball with the paddle and follow its movement. These were also done monocularly. He was also to watch monocularly from the sidelines two other persons playing table tennis, to develop a good pursuit ability from side to side. This was done at only one time for about ten minutes.

After sixteen days of training a progress report showed improved skills and increased duction reserves. Blind spot measurements were not taken. A reading prescription of convex lens power was given him. Two weeks later blind spot measurements proved to be normal after eighteen minutes of reading* in the office before the test was made. (figure 2). .

Follow-up on this case has not been as complete as desirable, but an improvement in reading, and attitude, were reported by his teacher. Jimmy himself was proud of his glasses and said, "Now I can read better than anybody too." (in addition to better ball playing).

Obviously reading skill is much more possible now that visual perception is not limited to very small areas around the macula.

*Reading here refers to "maintained and sustained visual concentration within restricted areas."

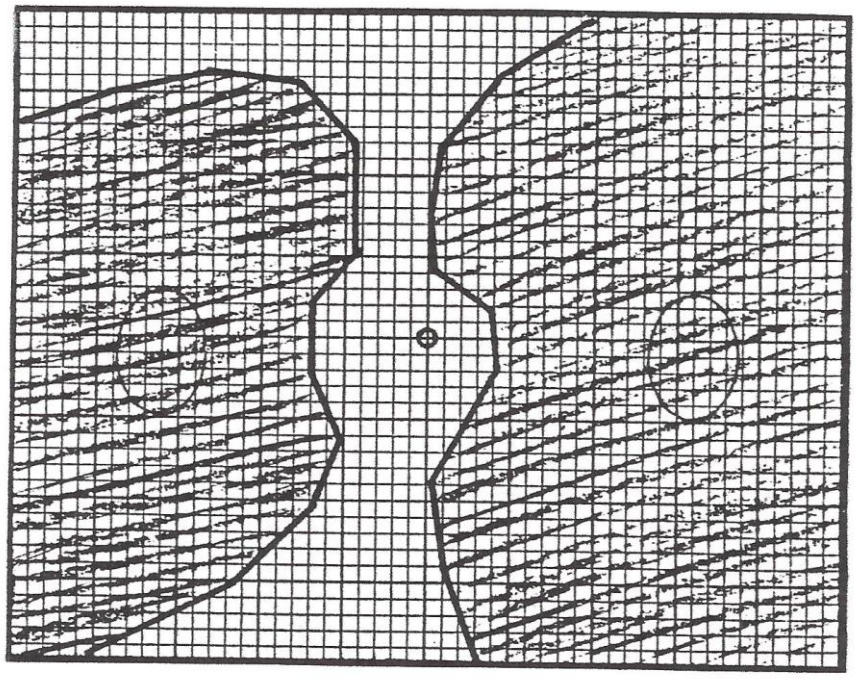

Figure #1. 1 MM Target

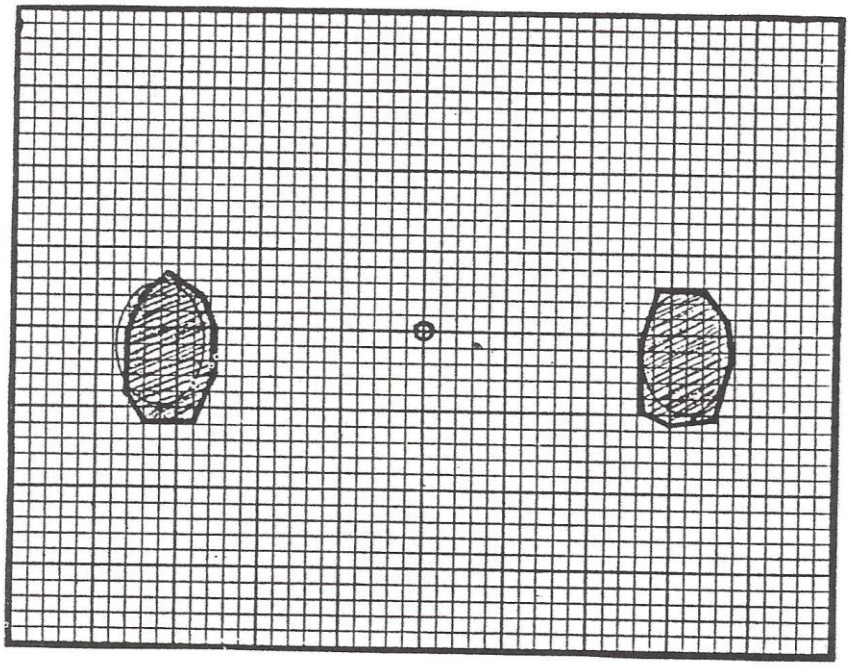

Figure #2. 1 MM Target