VISUAL FIELDS FOR DIAGNOSIS AND CONTROL OF TREATMENT

by Cecil W. Henry, O.D., F.C.S.O. 1964

The subject of visual fields is so vast that an attempt to present anything more than an introduction to the subject in an article would be futile, so at this time we will have a general discussion of the importance of taking field studies.

Definition: a field study is a subjective examination of the sensory pathways.

Definition #2: a visual field is an island of vision surrounded by a sea of blindness. Field charting should not be regarded as conveying a mathematically accurate and precise expression of the state of the peripheral vision, but should be interpreted liberally.

Various errors are involved in this type of examination, but if the same methods, under as near the same conditions are applied in each case, the errors will be remaining flexible. In making field studies, you are given an additional tool to work with, thereby making available to you more information so that you may do a better job of correcting your patient's difficulties. It is not an answer to every question or condition any more than a subjective is to a complete visual analysis. It will help to verify your other findings or bring to light a condition the other findings had not made apparent. Many conditions which manifest themselves as primarily visual errors have as their background pathological conditions. The field study may help to pinpoint the existing pathological or systemic disturbance.

Visual field studies are most important in functional (non-pathologic) disorders of the visual system, not only for diagnostic value, but also as a guide in determining the type of therapy to use and the effectiveness of the therapy.

Many patients with anomalies such as amblyopia ex anopsia, poor reading, under achievement, abnormal phorias and tropias have been found to have abnormal or constricted peripheral fields.

Let us at this time discuss some of the conditions where field studies should be made:

1. If ocular pathology is suspected, always check the color field, for often the fundus appears negative, but the color field will give an indication of bodily, systemic or ocular pathology.
2. If the patient is still complaining of discomfort when the refractive and muscular status does not warrant it, check the color fields. Some systemic toxemia is usually present.
3. Reversion of fusion – if the break and recovery findings are abnormal with the recovery quite low, chart a field, because some type of systemic condition is most likely causing it.
4. When heterophorias are constantly varying showing an increase one time and a decrease the next, this is indicative of some toxemia.
5. If the refractive condition and muscular deficiencies have been taken care of and your patient suddenly develops discomfort, you had better chart fields. In short, chart color fields in all cases which do not respond adequately to ordinary means. (These are usually called your grief cases)
6. Chart fields on all of your training cases. From my experience, the possibility of obtaining the results you are striving for is greatly reduced or impossible if the peripheral area is not within the normal range. I feel strongly that both the central and peripheral vision should be as close to normal as possible before starting visual training.

7. Chart fields on all of your cases where light therapy is used. It is one of the most dramatic means of following the progress which your therapy is accomplishing as you watch the field of vision increase in size towards normal and in proper color sequence. It will also allow you to make any changes in your frequencies so as to accomplish the desired results. As you know, these findings are principally for your information and benefit, but it is also a very dramatic way to gain and hold the interest of the patient and act as an incentive for him to follow through with the program you have set up to try and correct his visual problem.

There are several methods for charting the visual form and color fields:

1. Tangent screen.
2. Perimeter.
3. Perimeter with ultra-violet (black light).
4. Stereo-campimeter.
5. Several companies have come out with modifications and different types; therefore we will not discuss the merits of various instruments.

I. The interpretation and results of field studies is dependent on many factors:
   A. Rapport between the patient and examiner.
      1. Personality of examiner
         a) No two patients can be handled in the same manner.
         b) In short, the man behind the instrument is more important than the equipment he uses.
         c) No two visual field examinations are exactly alike.
         d) Do not have a too rigid routine of examination – be flexible.
         e) There must be rapport between patient and examiner. The patient must understand what is expected of him in the examination.
         f) You can't possibly expect the same kind of responses from a senile old man as from an alert, intelligent young person. Assure the patient of his ability to do the test. Give him confidence.

II. First check the patient for their ability to distinguish colors.
   A. Always accept patients' color interpretations. Example: if blue is purple, accept purple as blue.
   B. Refractive errors should be checked for opacities for these may produce puzzling and abnormal field defects.

III. Instruct the patient to concentrate on the cross and never look at the test object.
   A. While he is concentrating on the cross or fixation point, he is to inform you the moment he is able to distinguish the color of the test objet. Explain to him that he will be able to observe the moving object before he can determine its color, but only at the point of color identification is he to signify recognition of the test object.
      1. If the patient reports that the object is gray, agree with him and keep moving toward the cross (fixation point) and tell him to inform you when the gray changes color and what color it changes to. This keeps the patient from being curious and having a tendency to look at the test object.
   B. The usual procedure is to start from the periphery in towards the fixation point (cross). The patient has less tendency to look at the test object. But if I feel that he patient is observing the test object (unintentionally), I check this by starting at the center and moving out toward the

periphery. Instructing him to tell me when the color of the test object disappears or changes to gray.

C. I test in the following order: white, blue, red, green.

D. When the white is charted, chart the blind spot if the expanse reaches that far, starting in the center and working out until the test object appears.

E. Areas of the field which you may wish to check more critically will depend on the general appearance of the field, patient's history and other findings which may cause you to be suspicious of some particular condition. I feel that a thorough case history is very important in giving you a lead as to what to pay particular attention to.

F. The size of the test object used is usually determined by the visual condition of the patient. I use a 1.5 mm test object in most cases. If I am trying to define a particular area more critically, I use the smallest test object I can use .5 mm. For example, if you are trying to plot scotomas etc. a 1.5 mm test object is the smallest I would use in the color. The movement of the test object should be at moderate speed, not jerky, but continuous.

WHAT DO YOUR FIELDS SHOW?

I. Low fusional reserves

A. lateral depressions especially in the nasal field (for red and blue only) are found in low fusional reserves. The horizontal meridians are much smaller than the average normal limits. The rest of the meridians are practically normal.

II. Green field

A. Constriction of the entire field.

1. This is traceable in most cases to so-called focal infections (point infection where pus is exuding and toxins are being absorbed into the general system).
2. Some authorities say that the constriction of the green field is an indication of choroidal or retinal disease. If you analyze this, you will note that most diseases of the choroid and retina are the direct result of some systemic toxemia or focal infection.
3. Choroidal – direct source of infection – examples:
   a) Abscessed teeth.
   b) Tonsillar infection (acute).
   c) sinusitis (acute).
   d) Poisoning, e.g., alcohol, paint, drugs, foci of infection.
4. Retinal – general infection.

III. Red field

A. In general systemic infection (chronic) the red field will be constricted and may overlap into the green field. This can happen when a focal infection develops into a general infection. In cases where the green and red fields are involved in combination with a muscular imbalance and low convergence, every attempt should be made to remove this source of infection before any attempt to correct the imbalance. If this is not done, it will not hold. You will also find a leukocytosis or increase in the white count where there is a field of this type. It is not

uncommon to find a retinitis in a toxemia of this type. If this condition has progressed to the point of a retinitis, the form field will also show a constriction and distortion.

IV. Toxic amblyopia

A. Form and color fields differ due to different types of Poisoning or toxemias:

1. Exogenic or exogenous. The exogenous are from outside the body, such as tobacco, coffee, tea, alcohol, drugs etc. When the amblyopia is due to the exogenic type, you will have:
   a) Distortion and constriction of the form fields.
   b) marked constriction of the color fields, sometimes interlacing.

B. Examples of some of the exogenic toxins:

1. Tobacco
   a) Color fields affected first.
   b) Constriction and interlacing of red field.
   c) Distorted form recognition in the peripheral field.
   d) Careful charting of the area between the blind spot and fovea for dim areas and scotomas should be done. The scotoma for color will appear long before the scotomas for white.
   e) The red will be most marked in tits constrictions, especially in the upper quadrant.
   f) The blind spot will be enlarged.
2. Coffee
   a) Affects mainly the red field – constriction and interlacing with green.
3. Quinine and aspirin
   a) In the first stages there is a marked enlargement of the color fields with constrictions with in the lower or upper area, possibly toward the nasal side.

VI. Field constriction

A. It is very important to study the color changes, as they sometimes furnish a more delicate test than those of form. Restriction of red and green is earlier and more rapid than white in primary diseases of the optic nerve. In diseases of the neuroepithelium and choroid, the blue and green change earlier. The concentric contraction is very marked. The sense of orientation suffers greatly, even with normal central vision. This happens in the tubular fields of retinitis pigmentosa. In eccentric constriction, the field is constricted detachment of the retina.

VII. Scotoma – positive/negative

A. Negative scotoma – three types:

1. Absolute: form, color and light absent.
2. Relative – white is present, but one or more colors is absent.
3. Indistinct – fading: indistinct demarcation: white and color are present, but blurred or indistinct. Sometimes an absolute scotoma may be surrounded by an indistinct type.

VIII. Scotomas vary in importance as to their location

A. Central scotomas develop in the macular area in diseases of the papillo-macular bundle as in retrobulbar neuritis and toxic amblyopia. Macular inflammation or degeneration can be seen

with the ophthalmoscope.

B. Peripheral scotomas are often the disseminated scotomas in choroiditis.

C. Paracentral scotomas are on the side and near the center.

D. Annular or ring scotoma – in the intermediate zone, e.g., in syphilitic choroiditis.

IX. Enlargement of blind spots

A. The direction of the enlargement is import.

1. In myopia and toxic amblyopia – toward point of fixation.
2. Glaucoma – above and below and toward center of fixation (Seidel).
3. Sinusitis – concentric.

B. These enlargements are found in diseases of the optic nerve as papillitis, choked disc and atrophy. Any increase of the blind spot of 2°or more, or a difference in the blind spot of one eye compared to the other is considered pathological.

X. Glaucoma

A. One of the earliest changes in the visual field in glaucoma is a nasal constriction due to vascular destruction in the early stages and nerve head block or degeneration in the advanced stages. Scotomas appear at the upper and lower ends of the blind spot (Seidel Sign). Very early scotoma for red which starts from the blind spot. The visual fields for white may still appear normal. The three outstanding signs are:

1. Seidel Sign.
2. Bjerrum Sign
3. Roenne nasal step

B. Field manifestations in chronic glaucoma

1. Early loss of nasal field.
2. Sector-like defects in the upper or lower nasal quadrant.
3. Enlargement of blind spot (Bjerrum Sign)
4. Concentric contractions of form and color.
5. Preservation of central vision for form and color.
6. Almost complete loss of peripheral field with only a small central island of vision.
7. Total loss of central vision.

C. Important things to keep in mind when charting fields:

1. Marked constrictions or contractions
2. Marked enlargements.
3. Constrictions of one meridian
4. Overlapping or interfacing.
5. Areas of dim vision.
6. Areas lacking color recognition.
7. Areas blind to light (absolute scotomas)
8. Distortion or constriction of form fields.
9. Enlargement of blind spot.
10. Small sharp blind areas extending from blind spot –often an indication of glaucoma.

D. To detect the first indication of a Bjerrum sign, the use of a small green stimulus is best. (The scotoma is first indistinct, then relative, then absolute) In a chronic, non-inflammatory type of

glaucoma, the patient may not suspect trouble, due to the retention of central vision.

XI. Optic atrophy
   A. Due to pathology of various causes. Examples are rabies or syphilis.
      1. Early and rapid loss of green fields.
      2. Concentric contraction of form and blue fields.
      3. These changes usually occur in the nasal field first.
      4. Negative central scotomas may occur, then becoming positive.

XII. Anopsia
   A. Non-use of the faculty of vision; amblyopia due to:
      1. Confinement in dark cells.
      2. mature cataract.
      3. Extreme refractive errors
      4. Pathological involvement.

XIII. Sector defects
   A. Hemianopsia = one half blind. They can be irregular, altitudinal, nasal or temporal; and are sometimes binasal, Bitemporal and both upper or lower fields. Each specific type of visual field loss is indicative of a distinct type of eye or neurological anomaly.
   B. Quadrantanopsia = loss of vision in a part – approximately a quarter – of the visual field. Again typical areas and types of field loss indicate specific anomalies. It is in this identification that visual fields are of so much value in making an accurate diagnosis and location in neurological involvement.