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**The Hypertracking Protocol and Rethinking O.E.P Analysis**

**Abstract:**

 This model and prescribing protocol honors the spirit of A. M. Skeffington’s case analysis but recognizes that uncompensated hyperphoria is a primary stressor in a majority of symptomatic patients. Small to medium angle hyperphorias are uniformly missed or overlooked by eyecare professionals. For reasons suggested below, the vertical phoria was still is overlooked in O.E.P. case analysis. This prescribing method provides dramatic and immediate improvement is patient’s visual comfort, performance and stamina. It can be performed in a single sitting using tools readily available to the practicing optometrist.

 In the Hypertracking Model the vertical is looked upon as a congenital or acquired (traumatic injury) structural condition, similar to other types of facial asymmetry. It is not considered a distortion or adaptation to stress such as myopia and anisometropia are in the O.E.P. model. Hyperphoria is taken to be very common, often symptomatic, stable in amplitude, and very amenable to prismatic correction.

 Adoption of this method necessarily affects how we select patients for vision therapy, as many visual-efficiency cases can now be more easily and quickly effectively treated as lens/prism cases at considerable savings in time and money to the patient.

**Keywords:**

Hyperphoria, vertical prism, vision therapy, Phi phenomenon, fixation disparity, Herrings Law of Equal Innervation

**Introduction:**

When I was an optometric student in the late 1970’s, Dr. Charlie Margach taught us about O.E.P. analysis and the nearpoint stress model of vision. His lectures enlightened me about my own problems with reading. I had been blessed with “perfect 20/20 vision” but I soon learned that my esophoria had created nearpoint stress which resulted in my lifelong problems with slow reading, poor comprehension and rapid eye fatigue. Over the following months I found that the 21 point exam and resultant low-plus glasses near prescription failed to adequately address my visual problems. I could read a bit longer, but still fatigued prematurely and read very slowly. For me the 21 point exam and graphic analysis model failed to fully address my problem.

 In O.E.P. case analysis the vertical phoria is overlooked. Only the #12A and #12B distance and near horizontal phorias are used. There is no accounting for any vertical phoria. In my senior year of optometry school I found myself in a panic studying for my board exams and not being able to sustain my study for the long hours it required.

 Even as child I had been aware of the vertical image displacement I saw when I alternately covered or winked my eyes. I learned that the vertical Phi movement I had observed indicated a vertical phoria. Yet this was never addressed when I was examined by my optometrist uncle, my fellow examining clinicians, clinic teachers or in what I learned about O.E.P analysis. Nor did anybody ever think to ask me about my reading skills.

 Then, with my future on the line, I self-tested and found that along with my near esophoria, I had a 1 p.d. L-hyperphoria. I grabbed a ½ p.d. prism out of my trial-lens case and scotch-taped it base down over the left lens of the +0.75 readers I was using. Amazing! Now I could read as long as I wanted, faster and with far better comprehension. I passed my exams. Thirty years later I am helped by the same prism component in my glasses and have helped hundreds of patients like myself, many of whom had struggled for years with a problem that nobody else seemed to understand.

**Text:**

 Fundamental to the understanding and practice of this prescribing protocol is the realization that phorias dominate our binocular vision experience. Hyperphorias are seen as structurally induced misalignments. As inherent in Herrings Law of Equal Innervation, one cannot easily or efficiently deal with vertical eye positioning asymmetry and phorias independent of the vestibular system and compensatory posture changes. We have all seen people cross and diverge their eyes at will. But, you have never seen anyone move their eyes up and down independently! We are not “wired” to do it! This underlying neurology is what makes even small angle hyperphorias so very symptomatic and troublesome for the patient.

 Once you begin to actively seek out vertical phorias in your routine patients you will be amazed at their prevalence. You will be solving problems that your patients did not realize were visual in nature. They are ubiquitous in the TBI and in the reading and learning disabled population. They are present in many chronic migraine sufferers. They can contribute to ADHD, anxiety, depression and behavior problems.

 Use of the Hypertracking method is powerful, straightforward, relatively quick, and yields immediate and dramatic results that delight both the practioner and patient alike. Adoption of this new method may require one to use a new case history format, take some different measurements, use the trial-frame more often, change some testing equipment and most importantly: change some commonly accepted beliefs.

***1. The B & L Greens Refractor must go, use an A.O. Ultramatic or equivalent***

 A question necessarily arises, “How could something new, like the awareness of vertical phorias, suddenly appear on a path as well traveled as optometric spectacle prescribing?” I believe the answer lies in the poorly designed the prisms found in the B & L Green’s refractor.

 This “Iron Lady” was a modern marvel at the time and was, and still is, used by most of our optometric predecessors, researchers and teachers. In looking through older and current publications of OEP and COVD it’s hard to spot anything other than Green’s refractors. This instrument (and even less sophisticated equipment available in Skeffington’s time) uses very crudely scaled rotating prisms. Using this and lesser instruments, it was virtually impossible for Skeffington and his cohorts to detect and measure small angle vertical deviations.

 I postulate that, collectively, they all simply failed to notice the ubiquity of small-angle hyperphorias and therefore could not even consider their contribution to visual stress. Perhaps this is why their model became so complex. Most optometrists who were trained in the 21 point exam, graphic analysis and case typing to find the “acceptable lens” quickly drop the method in actual practice. This is possibly only partly due to the complicated and generally obscure rationales involved. Perhaps the promised results were not as forthcoming as expected.

 Alas, our beloved A.M. Skeffington passed away in 1961, just a short time before American Optical introduced their Utramatic Phoroptor. Its ergonomic design remains a modern classic. But what really set it apart was its modern, finely calibrated Risley prisms. Scaled to be progressively more expansive in the lower ranges of prism measurement, one could finally, easily and accurately measure even ½ p.d. hyperphorias.

 Much like the discovery of bacteria awaited the microscope, so I believe the discovery of clinically significant, small angle vertical phorias had to wait for the Ultramatic ***Phor***optor (from the name alone it seems they knew that they had created a better instrument for measuring ***phor***ias). You simply *cannot* do the work described in paper with a Green’s instrument or even the finest auto-refractor.

***2. Fixation Disparity testing is of little clinical value***

A literature search for hyperphoria yields many papers dealing with vertical fixation disparity. But where in the real world does a person encounter a visual situation involving static, sustained bi-foveal fixation with a peripheral fusion lock? Certainly not in reading, classroom or sports activities. In real life, what we experience as vision is a constant procession of rapidly changing pursuits, saccades, fixations and accommodation all under the influence of postural dynamics and varying demand. During these movements, bi-foveal viewing is under constant stress and must be repeatedly re-established after saccadic movements. Visual efficiency skills dictate how rapidly one can regain bi-fixation. Phorias determine how far the eyes deviate during saccades. Prism makes the effective phoria smaller giving crucial assistance to the regaining of bi-foveal fixation.

***3. Vergence testing may not be what it seems***

 Vertical phorias exert a constant and clinically significant vertical “push” against horizontal fusion during forced the ductions in base-in and base-out vergence measurements. Are poor base-out ranges measured in the presence of a 2 p.d. vertical phoria meaningful? Should vergences be measured and evaluated with the compensating vertical prism in place?

***4.* *Convergence Insufficiency* *is often undiagnosed hyperphoria***

 Poor NPC measurements are to be considered a red flag for hyperphoria. A typical patient of this nature is one with a poor NPC of 12 inches who then measures only 4 exophoria at near and has BO ranges of 12/18/2. Too often this becomes a vision therapy patient labeled with CI. Look for a vertical phoria. Often as little as 1 p.d. vertical phoria can cause the poor NPC. Prismatic correction of the hyperphoria then immediately brings the NPC to the nose. For most of these symptomatic patients the same prism restores their other visual skills and ameliorates their asthenopia and other symptoms.

***5. “Prism is Poison” is an unfounded but persistent myth***

 The salient point here is that correctly prescribed prism is just as enthusiastically accepted as incorrectly applied prism is vehemently rejected by the patient. Far from being poison, prism can be the most powerful part of the prescription you write. The redo rate for prism Rx’s in my office is no higher than for general prescriptions, and exceedingly low. As you will see, there is no mystery in this method. Trial-framing assures the prism will be both effective and tolerated.

***6. Prism adaptation does not indicate increasing phoria***

 When prescribing vertical prism it is most common to find that less is needed to solve the problem, whether it be headache or tracking, than is measured with the phoroptor. In Skeffington-like terms, the “acceptable” prism is other than full correction. The patient has habitually been compensating with some combination of head-tilt, avoidance, or eyestrain and is grateful for any help with the burden.

 That said, most often the initially determined prism Rx remains stable and effective for years. However, some patients will become symptomatic again and accept having a greater percentage of their phoria being corrected. *This is not a worsening of their condition.* I cannot recall a case where the final amount of vertical prism prescribed was greater than the hyperphoria measured on the initial visit. Ex: a person with 4 p.d. vertical on initial testing is successful with 1½ p.d. correction but over the course of several years increases to 4 p.d.

***7. Prolonged monocular occlusion is not needed to determine the prism correction***

 There are some who advocate prolonged (overnight to a couple of days) of monocular occlusion before measuring the dissociated phoria. They then prescribe half the measured amount and the patient is asked instructed to “get used to it”. As you will see, we can accurately and reliably measure the direction and amplitude of the deviation with simple dissociated phoria measurements in the phoroptor.

***8. The Cover Test Illusion and Phi Phenomenon***

 Small angle vertical phorias are nearly impossible for the doctor to detect with cover testing. Too often, this is the only test of visual alignment done in a routine exam. We know it is also susceptible to variability due the patient’s level of accommodation on the fixation target. However, it can be a great way to get on the trail of vertical phoria early in the exam sequence. As in my case, a vertical phi-movement is often easily observed by the patient, especially at distance. For that reason, one should never do a cover test without asking the patient about how the image appears to move. It is generally futile to try and determine the direction of a vertical phoria due to the vagaries of communication. But, if you demonstrate with your occluder, even children can reliably tell you if it moves, up and down, side to side, or “at a slant”. However, if they do not see vertical movement, they may still have a vertical phoria. Not every patient is a good observer.

***9. Strabismic patients don’t benefit from prism corrections…a myth!***

 Alternating strabismic patients really enjoy prismatic support. By lessening the distance they need to “throw” their vision between the eyes they often find improvements in mobility, eye-hand coordination, balance and general well-being.

***10. Prism corrections hinder the healing process in TBI or stroke patients…a myth!***

 Supportive prism to regain fusion is crucial in helping these patients recover. It helps prevent further injury from falls and can helps all manner of mobility and reading. By getting the eyes working together again, new reflex arcs and binocular vision pathways can more quickly rebuild to restore what was lost in the injury. It will very often change over time, lessening as visual skills improve, hopefully to the point where it is no longer needed. This is not part of the medical model. The medical doctor and ophthalmologist is apt to tell these patients to simply patch an eye until the diplopia goes away. We know better and need to be the primary vision providers for this population.

**The Hypertracking Examination Protocol**

The following assumes a working knowledge of standard, hopefully behavioral, optometric examination procedure. These points are presented as possible changes or additions to things the clinician may already be doing.

1. The Case History: A “probing history” is essential since most people do not understand the important role vision problems play in everyday problems that they may have. The standard questions about blur and headaches obtain of course. For uncovering binocular vision problems in school age and older patients the very best inquiry is a two-fold question*. “Are you a fast, slow or in-between reader?”* followed by *“Can you sit and read for two hours, or do your eyes get tired very quickly, say after only 10 or 15 minutes”?* The person who identifies himself as both a “slow reader” and one who tires quickly has a binocular vision problem until proven otherwise! It is also likely to have a vertical component. Other useful probing questions include inquiries regarding: *tracking problems, skipping word or lines of print, motion-sickness or dizziness, chronic headaches or migraines, closing one eye to focus or when reading, head tilts in photographs, poor depth-perception or fatigue when driving at night and poor eye-hand coordination in sports.*
2. Phi Movement during cover testing: As previously described this can be a sensitive test that is very demonstrative to the patient that something is visually amiss.
3. Measure both horizontal and vertical dissociated phorias using the Von Graffe method: From this data and your refractive measurements determine an appropriate distance and near correction. Measurements should be taken at distance and near. The vertical is almost always in the same direction at both distance and near, but the amount higher at near. OEP “expected” measures are very important. Mild near exophoria of 6 p.d. is normal. With consideration of measured AC/A ratios, add plus to the near Rx to achieve mild exophoria (or nearly ortho in the highly esophoric patient). This follows OEP theory.
4. Trial-framing for vertical prism prescription: Any small amount of measured vertical phoria is significant in the symptomatic patient. From your phorometry you know the direction of the hyperphoria and have a good estimate for the amount. The art is in determining the precise amount that will be both comfortable and effective for the patient. This method uses different trial-frame techniques at distance and near. Symptomatic hyperphoria is usually a nearpoint problem. However, for many TBI and migraine sufferers for instance, full-time vertical prism can be life-changing.
5. Nearpoint vertical prism determination: With the patient’s best near Rx in place, compensating as previously described for and esophoria or accommodative lag, begin introducing prism in small amounts base down, then splitting and balancing the prism as you go stronger. ***This must be done while the patient reads silently and aloud in down-gaze at their habitual working distance or more straight ahead to simulate computer use. The importance of this cannot be overstated. The phoria measurements obtained in the phoroptor are not to be assumed the same as those experienced by the patient in down-gaze****.* I use age appropriate reading material or often a simple 5 x 7 index card printed with rows of random letters and numbers. This card is most helpful with reading and learning disability patients so their observed tracking fluency is not affected by their word recognition skills. Helpful questions while inserting and removing prism from the trial frame are; *“Which way feels more relaxing on your eyes, when I put this in…or take it out? Is it more disruptive, or mess you up more, when I take this lens out…or put it in?*”Instruct them to keep reading either silently or aloud and not look up to answer as you apply and remove the prism in ½ p.d. (or larger) increments.
6. Distance vertical prism determination: With their best distance Rx in the trial-frame have the patient track every letter quickly and out loud from top to bottom of a projected chart of 20/40, 20/30 and 20/20 lines of letters. Have them do it a few times and listen for any hesitation on their part indicating visual confusion or that they have lost their place. If it is obvious take a moment and make them aware of it (his task is somewhat akin to night driving in that small saccades are needed in a darkened environment). Then, progressively add prism, starting base-down (or on the relatively amblyopic eye) asking the patient if it’s easier with or without the added prism and listening to the speed and accuracy of their tracking. You can also have patients who

have balance problems or motion-sickness watch cars drive by, look around the office and generally move around to see how the prism affects them.

 You will find that endpoints are easy to determine and what you see is what you get. People respond positively, reading faster and more accurately, foreheads and shoulders relaxedand they can feel that the glasses are really doing something. I love to have parents in the room when their struggling child jumps 3 grade levels in reading in 20 minutes! The TBI patient who straightens up. The migraine sufferer who feels instant relief.

**Other considerations:**

1. Discourage the patient from looking for changes in the “clarity” of the words. They should be noticing a feeling more than a seeing. That said, sometimes poor readers just are not aware of how smoothly or accurately they are tracking. In that case it is easy for the doctor or parent to hear the differences as they read aloud and rely less on their subjective responses.
2. You know the direction of the hyperphoria from your photometry. Don’t confuse the patient (or yourself!) by introducing prism in the opposite direction, “just to make sure”.
3. If the patient has some degree of amblyopia, the prism is often better tolerated before the amblyopic eye. This is fine and will produce some unusual looking Rx’s with the prism unevenly split before the eyes and the base-up portion larger. For example OD+1.75 1 ½ p.d. BU 20/25 BVA

OS +1.00 ½ p.d. BD 20/20 BVA

1. Amblyopia will usually passively diminish over time with this sort of correction, as now the prism is allowing more constant and steady bi-foveal viewing with less need for suppression.
2. Less is more. Huge performance gains can be had from small amounts of vertical prism. You will often find a patient is “cured” with 1 p.d. when they measure 3 or 4 hyperphoria.
3. The patient should not have to “get used” to these prescriptions. They should feel and work great right from the start. I explain this to patients and encourage them to come back in if they have trouble using the Rx. This first prescription then becomes an excellent platform to trial-frame any changes.
4. Advise your patients to close their eyes momentarily before and while they are removing their glasses. This will minimize the transient dizziness they may experience. This diminishes over time.
5. Use different glasses for near and distance or general-purpose glasses. The ideal prism is usually significantly more at near.
6. Vision therapy cases proceed more easily and quickly with the appropriate prism in place. This may be eliminated over the course of therapy, but often remains a component of their glasses Rx.
7. Many elderly patients with chronic, hard to describe visual complaints have suffered minor, sub-clinical strokes affecting some aspect of the visual-vestibular pathways. They tend to exhibit a common combination of acquired low esophoria and hyperphoria at distance as well as near. They very much appreciate help with the distance esophoria by way of as little as 1 or 2 BO total.
8. If you measure hyperphorias in opposing directions at near and distance during your initial phorometry, use the higher value direction or the direction found at near as your starting point for trial-frame testing. Once you have found a good near prism correction you can try that direction at distance also. It is frequently the case that the distance is orthophoric in the vertical plane when rechecked in this manner. It is exceedingly rare to find hyperphoria in opposite directions at distance and near.
9. Some have professed reluctance to use prism due to induced spatial distortions. This is interesting on a theoretical basis, but I do not believe it presents any problem for us. If there is any problem like this I have not noticed it. If they do exist for some, they must readily adapt to the induced spatial distortions in much the same way they do to the spatial distortions found in any new pair of higher power glasses or progressive addition spectacles. The induced pincushion or barrel distortions, or areas of distortion in progressives are bothersome for a while and then are not noticed. Small amounts of base-out and base-in to aid in fusion for the elderly or TBI patient are also well accepted.

**Conclusion:**

 Without thoughtful and probing investigation of our patient’s symptoms and prescribing powerful prescriptions that address their symptoms, we set ourselves a too low a bar for meeting their expectations. Many routine patients leave our offices with the same binocular problems they came in with because they didn’t recognize them as visual issues so did not bring it up in the history.

 Likewise, because their subtle but significant visual imbalances were missed by their doctor, many who present with real problems go undetected and untreated, believing that vision has been ruled out as a possible cause of their problems. Then they go on to suffer with the myriad of visually based symptoms the behavioral optometrist know so well. Too often, they are erroneously referred up into the medical maze of needless MRI’s and prescription medications. We are the only profession with the answers to their problems and we must be inquisitive, creative and bold in using all the tools at our disposal. That is art of real “full-scope” optometry.