

Viewpoint: Reconfiguring Lens Power for Improved Function

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Abstract

Typical compensating lens prescriptions are often different than those that support optimal visual function and development. It is often useful to consider modifying such prescriptions to allow for greater flexibility and comfort particularly when the wearer has non-acuity based signs or symptoms. This appears true even if this means short-term acuity reduction. The acuity often improves over time as the new lenses are worn consistently, especially with the inclusion of visual training. There is often much more flexibility in the visual process than is immediately obvious with people who have worn compensating prescriptions for many years. An interesting case study will be presented to illustrate these points.

Key Words

astigmatism, lenses, lens power, visual acuity

Bates and beyond

One of the reasons I got into optometry was the work of W.H. Bates.¹ I was intrigued by the different ideas he brought to the table, which seemed quite at odds with the “eye care” I had experienced between the ages of eight and twenty-eight. I wanted to rid myself of my ever-thickening glasses and help others do the same. I wanted to understand how to compare and contrast Bates’ ideas with those I had encountered and been subjected to for so many years.

Several things soon became apparent: 1) getting rid of one’s glasses is not nearly as easy as it sounds; 2) most people can significantly reduce the strength of their lenses with no significant loss of acuity while simultaneously improving their overall visual abilities; 3) most people wearing lenses need visual training (VT) to deal with the issues that preceded if not in fact precipitated the nearsightedness; 4) lenses can be used to prevent and reverse the loss of distance visual acuity: the appropriate plus at near is one of the most powerful means of preventing and reducing visual stresses that often catalyze nearsightedness. I know the research is not conclusive on this point, but being a clinician, I have to put my money on overwhelmingly consistent clinical results over 20 years.

Another idea that changed my approach to prescribing was the realization that most modern people do not use lenses prescribed for maximum distance acuity in the precise way they were intended over the course of a typical day. Most of us spend the majority of our time indoors. Emmetropes, myopes and hyperopes and even astigmats are all under chronic visual stress when there is insufficient time spent looking across long distances. I choose to look at most indoor activities as near work. The fact that most young people can use single vision lenses for most if not all of their common daily activities should not be taken as evidence that the practice is healthy. Of course, the nearer the task and the more chronic

the exposure, the greater the demand and stress, and potential for long-term damage to the system. The nearer the task, the less appropriate the distance lenses. This fact compounds the possible negative effects of the biologically unacceptable, socially compulsive demands of the twenty-first century. Evolution just cannot keep up with us.

I get the sense that most optometrists remain overly attached to refractive measurements taken, particularly when it comes to deriving compensating lenses. Most optometrists approach these measurements and consequent prescriptions too literally and perhaps imbue them with more influence than they deserve. Perhaps this is why my approach to modifying prescriptions upsets and bewilders so many of my colleagues. One of the first things the profession of optometry should do is educate the public (as well as most practitioners) to stop calling compensatory lenses “corrective.” The term corrective implies positive changes, when in fact they merely mask a late-stage symptom of an underlying functional deficit in many cases. We are not doing ourselves any favors by perpetuating this misuse of language. Neither are we adding to the level of public discourse or understanding when we are all too eager to provide a quick fix by addressing nothing other than acuity.

We Do As We Are Taught

It seems we are taught to measure refractive status as if we were “machines” measuring other “machines.” We are taught that the final solution to the refractive sequence is a singularity, the “correct” prescription. On our way to this final solution, we may suspect the other “machine” of being less than forthcoming. We may then rely on the application of pharmacological agents to increase the likelihood of getting the answers we believe we need or want; a little truth serum for our refractively deranged patients. While I believe that there should be a negotiation between doctor and patient, I am not

sure this negotiation should include the attempt to paralyze the patient's accommodative system.

Once we as doctors feel we have nailed down the final prescription, it is almost as if we begin feeling a little guilty and we feel compelled to ask the other "machine" its opinion of our findings (The Subjective) – "Which is better, #1 or #2?" This particular aspect of the interaction often causes significant anxiety for patients. Many of whom worry about giving the wrong answer and ending up with somebody else's prescription. I don't think it is common practice to inform patients that #1 and #2 are, and will likely appear, almost identical, though this little tidbit might go a long way in allaying the patients' concerns.

A refractive measurement, whether via retinoscope or autorefractor, and/or subjective responses, is simply one more piece of information amid what is hopefully, a thorough investigation into the developmental status, behavioral style and overall level of sophistication of the individual's visual process at that point in time. The ocular defects, as end products of deviations in the process, are relatively easy to understand.² The investigation begins with the history and ends in an agreement on how to proceed therapeutically. The agreement is based on a negotiation that hopefully takes place once both parties feel they have acquired sufficient information on which to base a decision.

In any event, I think it is important that we think more in terms of there being a range of lenses that support optimal function and comfort in the short-term. This will promote positive development rather than some precise, incontrovertible endpoint to be measured and prescribed mechanistically. This concept is by no means a new one.

Compensating Lenses Deal with the Past

The typical compensating prescription is derived using limited data to mask a single symptom, reduced distance acuity. This reduced distance acuity is, in almost every case, a reflection of adaptations made prior to the time of that interaction. It is unlikely that its presence appears in isolation. There are most assuredly other deficits in the visual process that predate the loss of standard distance acuity. Compensating lenses, since they are nothing more than a response to previous adaptations, have a strong tendency to hold the person in the patterns of the past.

Lenses must be modified in order to allow the patient to move away from these at least partially unsuccessful strategies. Appropriately learned and integrated new behaviors are more likely to enhance performance and comfort and minimize the potential for negative adaptations in the future. Skeffington stated, "When the case is in process, as nearly as individual conditions will permit, the lens indicative of an ocular defect is omitted from the prescription."^{2(p.7)}

Therapeutic Lenses Address The Way Forward

We can use lenses therapeutically as part of the foundation on which to build a more effective and efficient way for the continued development of the visual process. Therefore, when compensating lenses are involved, it is my intention to prescribe lenses that are maximally therapeutic and minimally compensatory. I don't want compensating lenses to do all the work that the natural system should be doing. For example, I

try to avoid prescribing so much plus that the accommodative system languishes due to lack of activity. I hold to this philosophy even when faced with an accommodative esotrope. I want this person to wear an amount of plus that reduces demands and stress but still requires a reasonable amount of work by a system that needs to learn how to manipulate its available resources to better advantage. This is unlikely to happen when the lenses are doing all the accommodative and much, if not all, of the binocular work.

I also want to make sure that compensatory lenses are only used for appropriate tasks thereby minimizing the negative impact inherent in such prescriptions. For example, minus lenses prescribed for distance acuity are simply inappropriate for viewing distances less than twenty feet; the closer the task, the less appropriate such distance lenses become and the more strain they place on the visual system. This, in my opinion, is a frequent cause of progressing nearsightedness as well as further adaptation. People looking through excess plus (and of course excess cylinder) are likely to suffer analogous fates as regards their visual development.

The fact that most people under the age of forty seem able to successfully wear single-vision minus lenses for all distances and tasks, should not be taken as proof of sound advice or practice. Accommodative amplitudes typically peak around age 12.³ This means that presbyopia begins much earlier than does our thinking about it with our patients. We should be much more cautious and considerate of the entire visual process and its development when prescribing any lenses.

Because of my direct personal experiences as a patient and a doctor, I am not beholden to a person's habitual prescription. This is especially so when I was not involved in the negotiation leading up to that prescription and perhaps most especially when compensating cylinder is involved. I believe that compensating cylinder is more of an obstacle to visual improvement than the spherical aspects of compensating lenses. Cylinder is measured and typically prescribed on a monocular basis, even though we are ultimately (hopefully) dealing with a binocular system. It is an uncommon practice to refine the cylindrical component of a compensating prescription binocularly during the subjective. This is bound to be a source of a significant amount of less-than-optimal lens prescribing.

My Personal Experience

During a methods lab in optometry school, I recall asking my partner on the doctor's side of the phoropter to remove the cylinder in front of me, cylinder that matched my current prescription. I repeated my request a second time because the chart in front of me hadn't changed in the least. After being assured that all of the cylinder had in fact been removed, I was aghast. Why was I wearing cylinder if it didn't afford the singular benefit it was intended to provide? There was a noticeable difference in acuity monocularly to be sure, but since I generally walk around with both eyes open, it seemed superfluous at best to be looking through these lenses on a consistent basis.

I soon had a pair of glasses made that simply had the cylinder removed. The most interesting development in my own case occurred after several years of not wearing any cylinder,

my refractive measurements showed little or no cylinder. I have not worn any cylinder in the 20 years since and subsequent refractive measurements continue to support this.

Artificial Acuity Can Mask Some Problems While Exacerbating or Creating Others.

I'm not opposed to good acuity, but I am cautious when that acuity can only be achieved by artificial means. I want to help people recognize, access and exploit their own inner abilities and deal with their own strengths and weaknesses to find more effective ways of using the visual process. Acuity that is measured at 20/20 is very useful for discerning detail and is the optimal tool for a variety of tasks. However, there are times when the prescription designed for nothing other than maximum distance acuity can be an obstacle to optimal performance and/or comfort. I think it is worth repeating that the amount of time spent doing the activities for which a distance prescription was truly intended is minimal in many cases.

Lenses do not merely make things clear but bring the image to the focal point of the lens. This is where clarity without the lens occurs. Therefore the person must make a move, a neurological and perceptual transformation, for compensating lenses to work as intended. Such a move is required for any lens to work. However, that move in response to compensating lenses may, and in my experience usually does, interfere with overall performance. There is a tendency for further deterioration of the very measurement that led to the initial treatment plan, not to mention any number of other adverse adaptations in accommodative and binocular function. We can use this knowledge to our (and the patient's) advantage or we can act like it is not happening. Just because the person outwardly appears to be doing well, we should not assume that they are. As a long-time wearer of very strong lenses (and long-time undiagnosed binocular deviant) I think it is important to remember that the stronger the lens, the greater the space/time distortion and the consequent adaptations. With a high prescription, one must move the entire head instead of just moving the eyes because of increased distortion when looking away from the optical centers of the lenses.

Skeffington stated, "If the embedded visual behavior is to be superseded by improved performance through the process of training, the cylinders may well be a deterrent."^{22 (p. 50)} My assumption is that a change in the habitual distance prescription (when present) is necessary at the start of any visual training program because compensating lenses are part of a person's past and can impede attempts to move forward in a new direction. This almost always means some level of reduced distance acuity, but it is not a capricious act. It is based on first-hand personal experience, and direct clinical experience repeated consistently over many years. Despite my level of certainty and my assumption that things that have worked in the past are likely to work in any given situation, I never impose my decision on a patient. It is my responsibility to present options and help people determine the best way forward via dialogue not fiat.

I am always open to revisiting maximum acuity once the visual process is operating at a more appropriate and sophisticated level. It is rare that either I or the patient feel the need to return to the original prescription, even if we decide to return

to the original level of acuity. The most important thing to me is that after having the opportunity to experience a variety of options, it is the patient that leads the way based on a much more in-depth understanding of the visual process and how they use it in their daily lives. After all, the visual process is pervasive in human behavior and not simply there to call out letters on an eye chart.

A Case Study

Giacinta, a 36-year-old female nurse anesthetist, presented on 19 May 2010 with few complaints other than wanting to improve symmetry in her workout routine. Her visual profile and habitual lenses provided significant optometric intrigue. She was referred by her workout instructor who noticed some asymmetry in her movements and noticed her left eye turning in.

Giacinta had no real complaints, that is, until we started delving into her visual history. She had strabismus surgery on her left eye for a left esotropia around age 2. She got her first pair of glasses shortly after that and wore a patch for about six months.

While there are many acuity measurements in what follows, I only include these because this seems to be the major stumbling block for most optometrists. The big question always seems to be centered on acuity and how the person is able to function with "reduced acuity." For me it is strictly a matter of helping people become more effective, more efficient, more comfortable and better prepared for whatever visual challenges lie ahead.

Giacinta's history revealed a few things you might not expect from a patient coming in without complaints. She reported frequent asthenopia, diplopia, holding reading material close, tilting her head and losing her place when reading, unsteady accommodation and drowsiness from reading and discomfort at the computer. Giacinta related that she knew these issues existed but had come to terms with them and just forged ahead.

Pertinent findings included:
Spectacle Rx: OD -2.00 -0.75 x 005 OS +2.50 -1.75 x 005
Contact lens Rx: OD -1.00 -0.75 x 010 OS +2.50 -1.75 x 010
VA: OU 20/20 OD 20/20 OS 20/25+
Cover test: 40+ left esotropia
Excessive BO ranges and suppression with BI distance and near
Frequent suppression OS throughout testing
Unaided distance VA
OU 20/30-2 OD 20/30-2 OS 20/30+1
Distance retinoscopy (w/ contacts) revealed: OD (-) OS (+)
Near retinoscopy (w/ contacts) revealed: OD/OS Plano
Keratometry: OD -0.75 x 176 AM 46.82 OS -2.00 x 16 AM 45.50

On 26 May at her first VT session we decided to try OD -0.50 (20/25) OS +1.00 - 0.75 x 10 (20/30) OU (20/20-3). At first Giacinta reported that it was "very challenging to see."

Two weeks later, 9 June with the same lenses, she saw OU 20/20 OD 20/20 OS 20/30. She reported that the distortion was greatly diminished.

At her fourth visit on 12 July, acuity with lenses was OU 20/20 OD 20/20⁻¹ OS 20/20⁻³. Giacinta reported that she was seeing better, and that depth perception was improved. She said she was reading more easily and the spatial distortion she initially experienced with the new lenses had resolved. She also indicated that her movements were more symmetrical. A near vision only prescription of +0.50 was dispensed on 29 July with instructions to wear them as much as possible over her contacts, especially at near.

During this time I tried to get Giacinta to experiment with not wearing the right lens, but she remained resistant. We also tried reducing the sphere, leaving the cylinder intact in the left lens. This is actually quite an unusual maneuver for me. Unfortunately, this did not meet with success; Giacinta didn't like the way things felt or looked with this variation. We experimented with spheres for the left eye and by 29 September she was wearing OD -0.50, OS +1.00 quite happily.

On 11 November Giacinta reported that she forgot to put contacts lenses in a few days prior and worked all day without a problem. Her visual acuity with contact lenses was measured to be OD 20/20 OS 20/25⁻³ OU 20/20⁺. Our work together continues in the treatment of her esotropia; the eyes look straighter, but the battle for stereopsis persists.

Conclusion

We should all doubt that compensating lenses provide benefit in the absence of undesirable repercussions, particularly when those lenses were prescribed with nothing other than maximum acuity in mind. There is or should be considerable flexibility within the visual process and therefore

a range of lens powers that will be acceptable for any aspect of performance. It is my assumption that anyone with visual complaints should experience life with lenses that provide the least possible compensation and the maximum available therapeutic value, at least for some period of time. Visual training to address the cause and not just the end result of years of adaptations should certainly be part of the treatment approach. Compensating lenses can and often do impede growth and development by inducing the wearer to remain stuck in patterns of the past. These patterns seem effective on the surface but in reality they limit flexibility and long-range adaptability. We would do well to break free of the allure of the quick-fix of improved acuity as the primary purpose of prescribing. This will serve to stimulate the creativity with which we use lenses, perhaps the most powerful tools available to us. Lenses afford us with the opportunity to bring quick and dramatic change into the lives of countless people while promoting long-term growth and development.

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