

Additional Topics To Original Visual Conditions of Symphony Musicians

Paul Harris, O.D., F.C.O.V.D.

STRESS AS A FACTOR IN ELEVATED IOP

The following is only a hypothesis which needs to be fully tested and was reached by the author after following the symphony members over the past four years. The lives of symphony musicians are full of stressor agents, including having to put themselves on the line day in and day out in front of their colleagues, audiences, and their conductor. The nervousness felt by the author prior to solos in rehearsals, performances, or at auditions was always far greater than anything on a day to day basis at the office. The magnitude of such stresses which, for certain members of the orchestra are similar, to that of the golfer needing the putt on the 18th to win the tournament or the basketball player needing to sink both free throws to win the game. At times, under direct medical supervision, a systemic beta-blocker is prescribed for musicians to help with the nervous conditions which arise. The beta-blocker will allow the musician to perform better and to feel more in control of the stressor agents acting upon them. Generally, the only side effect is a "dry mouth."

The author has observed that in the relatively small number of musicians he has seen (N=45), a much higher percentage of them at ages below what are considered the normal level to even routinely take intraocular pressures, that elevated pressures are not uncommon and even treatment for "glaucoma" is seen. Three of the 45 are being treated for glaucoma, all of whom, are under the age of 35. None show visual field defects nor do they show abnormal disk cupping. Pressures of these three people typically vary from 18 up to 30 depending upon a myriad of factors.

The hypothesis that the author proposes for further testing is that the ocular hypertension which may be treated as a glaucoma may instead be a job-related, stress-induced, medical problem associated with being a symphony musician. Further, if this is the mechanism for elevating pressures in this population then stress management techniques should be looked into as a method for reducing the elevated pressures. This type of intervention, if effective, should substantiate the first hypothesis.

VISUAL IMAGERY AND STRESS MANAGEMENT FOR THE MUSICIAN

No discussion of Dr. Forrest's contribution to behavioral optometry can be made without mentioning visualization and visual imagery. As a behavioral optometrist working with musicians, athletes and all types of patients including children with spelling problems, the power of utilizing visual imagery techniques for changing performance has been overwhelming. In his book on visual imagery, Dr. Forrest stated that a person's ability to image and to utilize visual imagery can be enhanced at any time. This author has used Dr. Forrest's techniques for enhancement of visual imagery and visual rehearsal techniques with all patients, and in a very specific way with the symphony musicians.

As stated above, the nervousness felt by the author prior to playing solos was very extreme. When a musician with a similar type of difficulty is seen, visual imagery work has usually proven to be an effective way to change the reaction of the person to the stressor agents. Two different approaches have worked well. Which method works with any one patient seems to be a trial and error type of thing at this point.

The first approach is to get the individual to utilize visual imagery to help him reach a state of relaxation in the practice room and to practice this over and over again while there. Then, just prior to going out on stage or prior to playing the particularly hard or exposed passage, the musician is to conjure up the

imagery used in the safe, relaxed atmosphere of the practice room. For some, simply doing this a few times is enough to help them relax on stage and to help them whenever they begin to "lose control." The second approach is to get the musician to constantly visualize as if he were playing in front of a huge audience all the time. He is to see, feel and hear in the imagery as if playing at his peak performance ability. This is similar to much of the work done with athletes. The musicians are always practicing, and even when they do not have their instruments in their hands they can be seeing, hearing and feeling themselves playing well and relaxed in front of the audience.

IMPROVE THEIR VISION ANY THEY WILL HEAR BETTER

Several years ago, Dr. Walter Kaplan of Gaithersburg Maryland, stated that he noticed that as a result of vision therapy, many of his patients were able to carry a tune much better than prior to therapy. This paper will touch on just two very small aspects of that statement and show that in general, he was on the money.

A number of members of the Baltimore Symphony have undergone a program of behavioral optometric vision therapy. An aspect of the therapy that is stressed with the musicians is expansion of their internal space world, meaning an expansion of the amount of information currently being utilized by the person from which to derive meaning and direct actions. Much of this work might be termed central peripheral awareness activities, but it also includes near and far simultaneous types of awarenesses. By allowing the musician to be more aware of relatively larger spaces, he can then better direct attention to places within that larger space world.

As an example: a person playing a part in the orchestra may at one moment be in unison with the violins and the next moment dovetail with the flute or trumpet. A musician with a small space world is not as adept at making those attentional shifts and at times may be accused of poor musicianship. Nuances in phrasing, intonation, dynamics and such would be missed if the person were unable to zero his attention in to that which is relevant and to make quick changes of attention from place to place on the stage at a moment's notice. Vision therapy has given the musicians a larger space world and has helped immensely their ability to create a better ensemble as a result.

Along this line is the concept of projecting one's sound. This is different than simply playing loudly. One can play loudly and not project sound to the last row in the hall while another may be able to play very softly but project sound to the person sitting in that same last row. By developing a larger space world for the musician their ability to project their sound to fill the hall is significantly enhanced.

Another important aspect of being a good musician is accurate rhythmic ability. This ability also seems to be significantly improved through the use of vision therapy. In order to shed some light on the mechanism for such a change, the analogy of a computer is called upon. Inside every computer is an internal clock. The job of that clock is simply to subdivide every second into many many small portions. From that internal clock's small subdivisions every action inside the computer is coordinated. Without an accurate clock the results of the computations and actions of that computer would be unreliable at best.

It has been noted over and over again in the therapy room the number of people, adults included, who when placed on a Loman tilted walking rail and asked to take one step every two beats of a metronome beating at 120 beats per second, cannot perform such a task. Those who cannot perform this task usually begin by trying to listen for the click and having this outside noise trigger their foot movement. Performed this way the person can never be on time or in step. This author postulates that here is an internal clock in the human similar in function to the clock in a computer. When the therapy patient finally masters the metronome and can match and subdivide many different speeds he is certainly not waiting for the outside noise to trigger movement. Rather, he has begun to keep track of time internally.

From his internal clock, coordinated and rhythmic movements are initiated and executed. Current auditory input is used only as a reference for adjusting the internal clock to the outside metronome. The process of vision therapy seems to bring that internal clock to a level of conscious awareness and allows the musician to improve his rhythmic ability. In general, musicians have a clock that divides time into many smaller parts. Long notes are thought of and executed as larger numbers of small clicks of the clock bundled together. Musicians with finer rhythmic abilities seem to subdivide to finer and finer degrees. Where the routine vision therapy patient will be counting internally, "One, Two, One, Two." and stepping on every, "One", the musician with excellent rhythmic ability may be subdividing each beat of the metronome in 8 or 16 or even 32 parts.

The finer the subdivision kept, the smaller the margin of error for miscalculations. Thus, if a person with no subdividing is walking the rail and his just noticeable difference (JND) is plus or minus ten per cent of the beat, then to anyone with a finer JND he will seem to be off most of the time even though he may think he is right with it. The highly rhythmical musician may also have a ten percent margin of error but this might be about one subdivision. Therefore, his performance will be much more accurate than the non-rhythmical person. Again, this is mentioned here because significant improvements in this area of the internal clock are seen with nearly all patients who are part of a vision therapy program.

A question frequently asked in the therapy room is, "What relation does that metronome and timing have with vision?" The answer becomes evident upon looking at the simple physics equation which states that the distance traveled equals the rate of speed of movement times the length of time the object was moving. Vision is a mediator of space for the individual. The accuracy of the internal space world is dependent upon many factors. One major one is movement. It has been stated that vision is acquired through movement. Movements at specific speeds for specific amounts of times can be translated into a relative distance sense. Over time the movements made can become less overt and more covert. If the timing mechanism and speed awareness mechanisms are more finely tuned, then the resulting internal space world constructed by the individual will be more closely aligned with reality. Thus, the relationship between rhythm and vision is a fundamental one.

EYE MOVEMENTS FOR MUSIC

Very little research has been done in the area of eye movements in reading music. What has been done, however, has been very enlightening. Thomas W. Goolsby, of East Carolina University, has written an as yet unpublished paper entitled, "Eye Movements While Reading Single-Line Melodies: An Exploratory Investigation." The study utilized the facilities of the eye movement laboratory at the Center for the Study of Reading on the campus of the University of Illinois at Champaign-Urbana. The recording devices, which record both horizontal and vertical eye position simultaneously, and then feed this information into a computer system reconstruct the exact location of each fixation on the music following the testing. The Bowles Singing Achievement Test was used to separate the subjects into good music sight readers and poor ones. Each group was given easy, intermediate and difficult melodies to sight sing while their eye movements were recorded. Some startling results were obtained.

The accurate sight singers had a significantly higher ratio of regressions to fixations than the poor sightreaders. The ratio for the good singers was nearly 55%, while for the poor singers was only 22%. Other significant findings included the fact that the good sight singers had fewer overall fixations and a much longer average length of saccade than the poor sight singers. Thus, it can be stated in general that the poor sight readers in music have eye scan or eye movement patterns that resemble the standard eye movement patterns observed in normal reading. This is characterized by a left to right motion across a line of print with a return sweep to the beginning of each new line. On average, according to a table of norms distributed with the EDL Reading Eye I and Eye Trac as developed by Dr. Stan Taylor of Huntington, New York, the normal ratio of regressions to fixations at college age is 15 to 90, or 16.7 per cent. The average duration of fixation at college age as derived by Dr. Taylor was 240 milliseconds.

The average duration of fixation for the poor sight readers was 450 milliseconds. Here then, at least for the poor sight readers, is the biggest difference between normal reading and music sight reading. The poor music reader uses the normal scan pattern from his everyday reading but slows the whole process down. This points out the fact that in general reading words is self-paced and music is read at the pace at which the music is performed.

However, good music sight readers do not follow a normal scan pattern. Typically, more than 50% of their eye movements are regressions. Their eye movements tend to be very large in terms of average angular shift. The scan does not in any way resemble the eye movements or scan pattern used by the same individual in normal reading. In essence, instead of staring at long notes or easy parts of the musical passage, they are constantly looking ahead for trouble spots and then checking back to where the actual action is taking place. In this manner they are not caught unaware and have "done their homework" by the time they reach a particularly difficult passage. This way, more time and energy can be devoted to solving the tricky rhythm or interval problem before it must be turned into an action.

CONCLUSION

In many ways the visual demands of the symphony musician are both unique to them and at the same time very similar to the demands of all people who use their visual systems in today's stress filled society. The symphony musician provided an excellent laboratory to demonstrate the effects of posture on vision, particularly on astigmatism. For the most part the postures taken by the musicians are perceived by them as being part of what actually makes them sound as good as they do and cannot be changed or altered. As an example, E.P., the bass clarinetist, has tried a number of times to alter his head position in reference to the bass clarinet. Every time he quickly reverts back to his chronic posture due to the fact that he perceives that his sound begins to suffer.

The use of visual imagery and visualization enhancement techniques were discussed as they relate to helping the musician deal with the stress of performing on a day to day basis. Vision therapy, and in particular, central peripheral and rhythmical aspects of the therapy, were related to enhanced performance characteristics. A theory which needs further testing was forwarded about the relationship between the stress of being a musician and elevated intraocular pressure. Finally, a study was reported on that showed that good sight reading musicians have significantly different eye scan patterns when reading music versus their normal scan patterns for reading printed material. That study also showed that poor sight readers read music with a scan pattern very similar to the one by them in normal reading.

Symphony musicians continue to provide an excellent laboratory type of setting which demonstrates many of the relationships between stress and its effect upon vision.