

Visual Imagery and the Plateau Spiral in Myopia Control

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As far back as the 1940s, a number of key vision training procedures were popular for myopia control. Outside of the Skeffington approach to lens application and the use of prism as recommended by Ray Morse-Peckham, the major therapeutic approaches for myopia control aimed at improving ocular motility skills, fusion ranges, accommodative flexibility, plus acceptance and tachistoscopic blur interpretation. An interesting adjunct technique that was also in vogue in the 1940s involved the use of the Plateau Spiral.

The Plateau Spiral received its name because of the initial work of Joseph Plateau, a Belgian psychophysicist who described in 1850 how observing a rotating arithmetic (Archimedes) spiral would result in the perception of a reversed aftereffect. If the spiral was viewed as rotating inwards toward its center, the perceived-after-effect when one's gaze was redirected elsewhere (toward objects or letters in space) would be an expansion or enlargement of what was being viewed, making smaller details more discernible. The opposite perceived after-effect would occur if the spiral was viewed as expanding outwards from its center. Some visual scientists considered that this effect was due to eye movements as the track of the spiral was followed. Others considered that it was due to retinal adaptation since the effect also seemed to be achieved when fixation was kept on only one localized area of the moving spiral. Still others, noting that the effect could be transferred to a previously occluded eye, felt that higher cortical processes were also involved.

Optometrists who used this technique found that it was quite dramatic from the patient's point of view; enabling letters to be read that were unreadable only moments before. It was assumed by many that using this procedure might ultimately lead to improved blur recognition, relaxed accommodation and reduced myopia. Practically however, the after-effect was usually of short duration and did not appear to either increase overall blur interpretation or reduce myopia. It stimulated and motivated the patient but other procedures such as accommodative rock and plus acceptance seemed to be more directly related to either increased visual

acuity or to actual refractive change. In 1967, T.W. White attempted to probe the possible relaxing effect of the rotating Plateau Spiral on accommodation and found no “appreciable alteration in accommodative responses.” Unfortunately, White only utilized two subjects, both hyperopic rather than myopic, and investigated accommodative status using a retinoscope and haploscope while the subjects viewed the rotating spiral and not when they were experiencing the aftereffect.

A personal approach

Based on clinical experience, my early enthusiasm for the Plateau Spiral as a possible effective technique in myopia control waned over the years. I began to use it sparingly and mainly as a dramatic interlude for the patient rather than with the expectation that it would actually reverse myopia. My interest, however, was renewed about eight or nine years ago as I became involved with the subject of visual imagery and saw a way to use imagery to develop a novel and more fruitful method of applying the Plateau Spiral principle. The following is a summary of the key steps involved in this imagery approach:

1. The basic procedure starts in a traditional manner. The myopic patient is asked to observe a near or far Snellen chart to determine the lowest line that can be read comfortably. This is done without correction. The patient is then instructed to view a Plateau Spiral at a distance of between 16 to 30 inches, depending on the size of the spiral used. The spiral is slowly rotated so that it spins inwards toward its center with the patient being asked to experience the spiral as not only contracting inwards but to sense it going backwards in space as if it were a “time tunnel.” This is done for approximately 60 to 90 seconds, after which the instruction is given to look back quickly at the near or far target and note if smaller letters can now be read. With repetition, the patient is encouraged to try to consciously maintain the after-effect for longer periods of time.
2. The second stage of this procedure is to have the patient view a stationary, non-rotating spiral and mentally follow the line of the spiral inward while imagining that it is both rotating toward its center and also floating outwards in space. As the after-effect is achieved with the stationary spiral, the patient is again encouraged to try to maintain the effect for as long as possible.
3. The third and most important step involves the active use of visual imagery in the absence of an actual stimulus. At this stage, it is

important to determine if reasonable basic visual imagery ability exists and whether it can be controlled. This is done by asking the patient to sit with eyes closed and picture an airplane, first seeing it flying forwards and then backwards; seeing a chair, a cat next to it and then seeing the cat jumping onto the chair; seeing an apple being bitten into and then seeing a worm (or half a worm) crawling out of the bitten part. Doing this reveals whether the patient has the ability to conjure up static visual images and whether image action can also be self-generated. This ability is an essential prerequisite for this stage which requires the patient to sit before the near or far letter chart with eyes closed and simply visualize a rotating spiral that occupies the full field of vision and to image it vividly contracting inwardly and moving outwardly like a “time tunnel.” After maintaining this vivid visual image for at least 60 to 90 seconds, the eyes are opened and the extent and duration of the succeeding after-effect is noted as well as the patient's ability to read smaller letters. This step is then practiced until the achieved after-effect can be increased in magnitude and can occur more easily and effortlessly.

4. The last stage of this procedure involves practicing visualizing a rotating spiral with eyes open while the gaze is simultaneously directed at the near or far target. As this can be achieved, instructions are given to decrease the time the spiral is imaged as rotating while trying to hold onto the perceived after-effect. Finally, as efficiency is developed, the patient is encouraged to practice this open-eye imagery technique anytime, anywhere and anyplace better vision is needed. It could be while watching television, when observing a scoreboard at a ball game, while trying to read license plates or street signs when driving, while attempting to read the time on a clock across the room or when trying to copy from the blackboard in class. Some even reach the point of being able to self-generate the enlargement after-effect while bypassing the need to first image the inwardly contracting spiral.

The value of this technique is that it provides the myopic individual with a tool to voluntarily increase distance discrimination ability whenever it is needed. With practice, it tends to become more spontaneous, automatic and rapid. There have also been indications that this procedure alone may have a positive effect on refractive status. Although this aspect interests the optometrist, for the patient the ability to discriminate and identify more easily at will, has a tremendous practical value in and of itself.

The enigma of the circular disc

The following anecdote is only indirectly related to using the imaged Plateau Spiral procedure, yet it adds an interesting dimension to both the technique and the subject of myopia.

In the past decade I have been a proponent of what I have come to call a psycho-behavioral approach to visual function. One tenet of this philosophy favors the view that, for the most part, we are active participants in the selective adaptive outcomes (such as myopia) that so many of us end up with. In other words, this outlook suggests that we are highly involved in creating what we are and what we become, visually or otherwise. Based on this approach, one major direction in therapy is to attempt to set the stage for patients to begin to experience, whenever possible, that they have somehow, in some way and to some degree participated in the origin of their motility, binocular, accommodative or refractive difficulties and then to begin to experience that the ability to change and improve their status also rests with themselves: that they are in charge of both their vision and their lives. With this in mind, the following story becomes more powerful in its implications.

I was engaged in conversation with a young man in a non-optometric situation. In the course of our discussion, he mentioned that he was myopic and did not like it. I suggested that, if he were interested and wanted to try an “experiment,” I would show him a technique that, if it worked, might control his vision and let him see better, at least on a temporary basis. He was enthusiastic about trying. Since he turned out to be a good imager, I went directly to the third stage of this procedure. He first looked across the room to determine what detail he could and could not see clearly. Then, sitting in a relaxed position he was instructed to “let go,” close his eyes and picture a giant spiral “time tunnel” rotating slowly in toward its center while receding as if it were a giant cylinder going further and further into the distance. He was told to try to see this moving three-dimensional image so clearly and realistically that he would feel it was possible to physically go into it. He was also instructed to maintain this dynamic image until I told him to open his eyes at which time he was to look across the room and note if doing the procedure helped him see any better.

He closed his eyes and started to image the spiral. After about two minutes I asked him how he was doing. He replied that he was experiencing a somewhat disturbing phenomenon and wanted to stay

with it a little longer. After approximately four or five minutes, with a look of relief and excitement on his face, he opened his eyes. I will try to reconstruct what he said to me as accurately as I can.

“I must tell you what happened,” he said. “I was vividly imagining a giant slowly rotating ‘time tunnel’ as you told me to do and seeing it recede off into the distance. For some reason however, I just could not get to see the farthest end of the spiral. About three quarters of the way into the ‘time tunnel’ there appeared to be a circular gray disc that blocked my view and no matter how I tried or how long I worked at it I just could not get it to disappear. At first it was upsetting. Then as I thought about it, I began to recognize that since I was the one who was visualizing and creating the spiral in my mind, I must also be the one creating the gray disc that was blocking my vision. I was perplexed by this, when suddenly I realized that the persistent presence of that circular obstruction must represent my not actually wanting to see far away. It seems that although I vehemently dislike being nearsighted, at some deeper level I must want to be nearsighted otherwise I would not be setting up any blocks. Some part of me obviously does not want to deal with things off in the distance.”

To alleviate this sense of frustration in not getting past his circular disc, I suggested a few possible ways the problem might be solved. However, the essence of our discussion developed into how one, in general, could get around or through all sorts of impasses, whether they occur in one’s thoughts, one’s visualizations or in one’s everyday sensory-motor experiences. I also told him that he had undergone a very profound insight and that, in my opinion, this insight was one of the truly important steps in getting to the root of what functional myopia was all about.

I cannot guarantee that this type of spontaneous recognition will ever happen to anyone imaging a Plateau Spiral again but it was an exciting extension of using the imaging procedure. At the least, it resulted in my learning to ask other questions to those using the imaged spiral technique such as whether they can see the entire spiral, whether any part disappears or seems to be blocked, or whether anything appears to be unusual in any way. It is only as more appropriate questions begin to be asked that more revealing responses surface and often it only takes one insightful patient or one insightful interaction to open the door to new perspectives.