

ESSAY

THE STOPWATCH USED AS A VISION THERAPY INSTRUMENT

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Abstract

Optometric vision therapy (VT) is recognized as an effective way to treat many vision problems, including ocular motor, binocular, accommodative and perceptual dysfunctions. Compliance and participation are essential if VT is to be successful and many times these factors are missing. The therapist, as part of the therapy regimen, must be inventive in developing both compliance and participation. The procedures should be both challenging and interesting as well as being able to develop higher levels of demand as the patient's skill improves. This paper discusses the use of a stopwatch in the motivation of the patient and its use in increasing the demand of VT procedures. Specific recommendations are made to help the therapist improve the speed and effectiveness of the VT program. The appendices will be helpful for the reader to begin to introduce the use of a stopwatch into their therapy regimen.

Key Words

attention, avoidance, compliance, fight/flight, motivation, vision therapy

The purpose of vision therapy (VT) is to provide the patient with the opportunity to have the necessary meaningful experiences to either acquire new visual abilities or to enhance existing visual abilities.¹ These improved abilities allow the patient to meet a wider variety of visual demands in the workplace, in academics and at play.

In some circumstances, a patient may not engage in an activity as deeply as a therapist would like. By the patient committing fewer resources to the activity, they tend to lower the probability that the activity is as meaningful as possible. Therefore, the therapist has less chance of helping the patient acquire new abilities. When the patient is not fully involved in VT there will be a lessening of the potential benefits from the treatment. In addition, as the patient develops visual abilities, it is valuable to begin to “upload” the task as an additional challenge. Uploading tasks helps the person to respond more easily and more quickly with the appropriate behavior when faced with similar stresses in his/her daily activities.

A tool used by vision therapists to help fulfill both of these roles is the stopwatch. Different VT techniques can be enhanced with the use of a stopwatch. The potential benefits of these various techniques to the patient are many. A major benefit from VT includes the patients' marshalling of their resources to meet the time demand caused by the stopwatch. This, in turn elevates the level of commitment to the task, increasing the effectiveness of the activity to elicit change. I propose that another benefit is to restore the natural competitive spirit that is part of a person's motivation and life force. Different VT techniques employing a stopwatch are described in

this paper. The potential benefits of these techniques are also discussed.

The Stopwatch as a Driving Force for Change

One of the prerequisites for learning is to provide situations that pose solvable problems to the person. These problems provide conflicts to be resolved and requires a flight, a fight, or a freeze response. This phenomenon was first described by Cannon in 1915.² Others have elaborated upon the stress response as to its physiology and relationship to the visual processes.³⁻⁵ Freezing elicits no response, while flight is characterized by avoidance of the behavior. Fight responses, the most desirable response in VT, include behaviors that involve the patient working towards the resolution of the problem.

In theory, the fight/flight paths are black and white, diametrically opposed and clearly distinguishable behaviors. In reality, it is often difficult to detect the behavior a person is using when dealing with a particular task. Overt flight, or avoidance, takes the form of physically leaving or visibly resisting involvement in a task, i.e., arms folded, staring at the floor. This behavior is easily recognized. However, when avoidance takes the form of a person physically going through the motions, but performing with low tone and a lack of involvement in the task, avoidance can be very difficult to detect. The person can sit in front of a task, with his eyes directed in space at the proper location but with his mind elsewhere. This poor commitment to the task leaves little opportunity for the patient to actually change, develop or grow. When there is good commitment of attention to the task, then chances for change to occur increase and this leads to the “Ah-ha” or “Eureka” moment.

Marshalling Attentional Resources

A person has finite attention to distribute at any given moment.⁶ The VT task becomes one of marshalling resources to solve the problem, a commitment of attention to a task. There is no easy way to measure attention while actively involved in a VT procedure. Neither can a therapist measure the patient commitment, nor observe in real-time, the fluctuation of attention over the course of a problem solving situation. There are ways, however, to encourage the allocation of attention to the task. It is critical that the therapist recognizes the degree that the patient uses attentional mechanisms, and should reward the patient for that commitment. This allocation of attention is often more important than achieving the specific micro goal of mastering the VT procedure at that moment. The procedure may simply be a means to the end of acquiring better control of visual attention and concentration. The mastery of the specific activity would be secondary, or possibly even of no consequence, in the overall treatment protocol.

Timed procedures can help focus attention and improve the spirit of competition. The stopwatch can help to motivate the competitive spirit to win, whether the goal is a territory, a mate or food.

Setting Realistic Targets

The use of the stopwatch, to be effective, must be introduced at the proper time in therapy. The most difficult aspect of being an effective vision therapist is being very sensitive to setting the demand (load) levels of the current task in VT. Constantly setting the difficulty of tasks too high can discourage the patient and lead to drop out from VT. Setting the task demands of the activities at too low a level bores the patient and wastes time and other resources. Thus, it is critical that the interaction of the therapist and patient results in the setting of realistic goals. These goals should be those that the patient thinks himself/herself capable of achieving, rather than what the therapist thinks the patient is capable of doing. A proper level of demand will improve the patient's self-image. It develops the patient's sense of her potential and insures her control of the competitive demands. That is, it insures the patient is not overwhelmed.

The Use of a Stopwatch

To accomplish a realistic goal, the therapist must first discover the patients' base-

line performance. Timing behavior with a stopwatch is one way to measure that performance. Do not try to set goals during the trials to establish a performance baseline. An example of this initial interaction may be; "Let's see how fast you can go on this. Don't worry about being too perfect. Just have fun seeing how fast you can go." The therapist should time the performance with a stopwatch and note the degree of commitment to the task by the patient.

One activity with the stopwatch is called column jumping. We use the standard Hart Chart (Figure 1) on a vertical surface and the patient stands about three feet away from the chart. The patient begins by calling the letters from two of the columns, alternating columns going in a left to right, top-down sequence. A typical set would be column two and seven (Figure 1). They would begin with the letter "F" and then jump to the "T" and continue to the "B" and the "Z" respectively. When they reach the bottom they are first asked how they think they did. Look for feedback from the patient, not just about how quickly they think they did, but also on how accurately they performed the task. Did they end up in the wrong column, or did they skip some letters, miscall some letters, etc? We are looking to see if they are aware of their performance. Generally, the more aware the patient is of the specifics of her performance, without the therapist pointing these things out, the better the stage is set for future development.

Some patients may maintain a need for perfection that hinders them from being able to value speed during the activity. They may be seen as slow, deliberate performers in many other aspects of their life. If this behavior is seen, invent a short side activity that emphasizes that it is OK to make mistakes. Suggest "perfect" performance is going faster and actually making some mistakes. As an example, with the Hart-Chart in a Near Far Rock technique the discussion might sound something like this. "Be 70% certain, this means missing some letters, but 70% is still a 'perfect' score."

Some patients never release perfectionism to go for speed. If, after a reasonable period of time working towards this, it may be best to move on. There are some occupations that require a high degree of perfectionism and the world needs people who have these attributes. The goal, however, is for a person to go for speed and let go of perfectionism at times. At other times,

O	F	N	P	V	D	T	C	H	E
Y	B	A	K	O	E	Z	L	R	X
E	T	H	W	F	M	B	K	A	P
B	X	F	R	T	O	S	M	V	C
R	A	D	V	S	X	P	E	T	O
M	P	O	E	A	N	C	B	K	F
C	R	G	D	B	K	E	P	M	A
F	X	P	S	M	A	R	D	L	G
T	M	U	A	X	S	O	G	P	B
H	O	S	N	C	T	K	U	Z	L

Figure 1. Hart Chart for Column Jumping.⁴

when the situation calls for it, they should be able to become highly detail oriented and emphasize accuracy. This balance is a laudable goal that is not always attainable and an astute therapist will recognize when certain personality characteristics will come to the fore and trump others.

One way that appears to assist developing more speed is to have the patient begin moving quickly. Get them to quickly call all the letters in a single column and to repeat this with the stopwatch several times, emphasizing speed. At times I have asked them to count to 10 or 20 as quickly as possible so that they know that their mouths can speak quite fast and that speaking is not the limiting factor. After several very quick, sequential actions, particularly when the therapist is acting in a high energy manner, the patient may catch the fire of the moment and try harder than they have tried at any previous time.

Once a baseline time is found, begin working towards faster and faster times. An example of your discussion might be, "You did this in 55 seconds. That's great. That's the best you've done so far. How fast do you think you can do it next time?" {Pause... If no response, ask} "How about trying for 50 seconds? Do you think you can do that?" If there is loss of interest or an outward display of "flight," then the goal was probably set too high. If they totally lose interest, ask if they can repeat their previous high score, or consider shifting to another procedure. Return to this procedure at another time, either later in the session or during a different session. I have observed that after a maximum of 8-10 minutes of working on the same procedure almost everyone will

have reached their maximum capabilities for that training session. If you desire to continue incorporating the stopwatch in therapy, use it on a different procedure during that same therapy session.

Karni professes two time scales for learning and development.⁶ The fast learning phase occurs in a few minutes or less when trying something new. Very large gains are typically made during this period. The second phase of learning or development is characterized by a flattening of improvement. After a period of time, if one continues at that same task too long during a session, performance can actually deteriorate. Be sensitive to the patient beginning to plateau on an activity. It is important to finish each VT session and each portion of the therapy session on a positive note.

Overload

Timed behavior used as an uploading technique can also cause an overload. Signs of physical stress can occur. This may be seen, for example, in body tension, facial tension, breathing changes and verbal expressions. A discussion with the patient about concentration being something that one can do with their mind, while their body is relaxed, may be beneficial. Encourage deep, relaxed, rhythmic, effortless breathing by letting go of the tension in the shoulders and neck during the activity. A more relaxed attitude will generally allow the patient to make more gains in performance.

According to the Principles of Effort (Appendix A: Dr. Marc Grossman),⁷ to organize movement one should maximize the signal to background noise ratio. The "signal" in VT is the sense of purposeful movement through space with vision leading. The "noise" is any distraction to the signal. Tension within the body is one component of noise in the system. Relaxation of the body helps reduce the background noise, thereby emphasizing the feel of the new movement patterns. The final result is to refine new movements more quickly. The stopwatch in VT ultimately encourages a relaxed manner while channeling visual concentration.

Restoring or Building Self-Esteem with a Stopwatch

I have observed many patients entering into VT have negative self images of themselves. This is particularly true of the learning-related visual problems, as well as some amblyopia and strabismic cases. In those situations, often a goal of the VT

program is to help rebuild the patient's damaged self-esteem.

Groffman states, "Self-esteem is a fundamental human need. It is defined as 'confidence in our ability to think, confidence in our ability to cope with the basic challenges of life; and confidence in our ability to be successful and happy, the feeling of being worthy, deserving, entitled to assert our needs and wants, achieve our values and enjoy the fruits of our efforts.'"^{8(p. 50)} I propose that people who perceive their successes and failures to be the result of personal characteristics are willing to choose challenging tasks (e.g. VT). They will persevere when confronted by adversity. However, individuals with disabilities, such as strabismus or learning-related visual disability, are more likely to believe their successes and failures to be the result of factors outside their personal control. They are less likely to persevere in challenging tasks. These maladaptive self-referent thoughts cause one individual not to take credit for the good things that happen to them and to blame themselves for their failures.²

I have noted that many VT patients have a poor self image and low self esteem. They feel they are not smart and wonder why people keep pushing them to achieve above what they know they cannot accomplish. After countless episodes of attempting a task and failing, perceiving negative feedback from non-supportive peers, self-esteem becomes damaged. They withdraw from competitive encounters. During playground activities they avoid team activities, not being chosen or being chosen late is a continual reminder of their inferiority. Thus, they tend to avoid situations where they perceive they will fail. They lose the desire to compete with peers. They escape to play with individual games or personal computer-based games. These tasks, against a virtual foe, can be played for hours, without peers to watch or criticize them.

A stopwatch, properly introduced, can set the stage for the child to first compete against him/herself while in the presence of the therapist. As long as the VT room and activities remain a positive and *safe* place for the patient to work, this can act to rekindle the normal competitive spirit of the patient.

The World Record

Over time, with positive experiences, the patient will be willing to attempt to go faster. This is the time to introduce

the "World's Record Sheet." A list of the names of the five fastest performers by age and gender are kept in the office, for several different activities. (Appendix B-D; Figures 2 & 3) The important point to emphasize is that the patient has something within reach, to best the fifth place name on the list and work their way up. This serves to improve motivation and allows more and better commitment to attention. It also sets the stage for further competition, in a safe environment. Now the patient is competing against another individual but without that person being present. There is safety within the therapy room; safety from ridicule if the patient does not reach the record the first, second, or even the third time.

Patients who previously displayed little interest in their therapy program suddenly want to "try for the record" and share their accomplishments with parents, therapists and other staff. Such achievement should be considered a "breakthrough" for the patient. Some, even after years, come back to the office for care and want to see if their name was still on the list.

Clinically, the patient will begin to spontaneously re-engage in activities once avoided. They are more secure in their self-image and will have greatly improved their ability to channel attention. Both factors bode well for improved life experience performances that will in turn lessen the negative comments from peers. The child begins to come out of his shell but this is often not in a smooth manner. Because of a lack of experience the patient may transitionally appear as a behavior problem. Help the parents/authority figures involved to understand that, with more life experiences and using new abilities, the child's behavior will settle down into a more "middle of the road" style.

Conclusion

The stopwatch is more than simply a tool to load the difficulty level of certain activities. It can be a major tool to help one direct the patient's attentional resources and encourage the commitment to tasks in a more concentrated and productive manner. It also may help to restore positive self-esteem and the natural competitiveness in patients.

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Figure 2: Older Model of Wayne Fixator with Remote Pad for Near-Far-Near Fixation Therapy.^b

**APPENDIX A
 GROSSMAN, MARC, "PRINCIPLES OF EFFORT"⁷**

1. The quality of conscious awareness is dependent on how relaxed you are. When you are relaxed you are maximally sensitive.
2. If you want to feel how you organized a movement, you have to be relaxed. If you want awareness, take the effort out of whatever you are doing.
3. The Weber-Fechner Law in psychophysics states that you are only as sensitive as the background noise lets you be. Ex: The brighter the room, the larger the change in light you need to notice that a change has taken place. Therefore, sensitivity depends on background noise, much of which comes from tension.
4. The effort and the tension are the noise. They decrease sensitivity.
5. Sensitivity is the signal to noise ratio or signal divided by the noise.
6. The higher the signal and/or the lower the noise, the greater the sensitivity.
7. To get better reception and better information flow, you need to either increase the signal strength or lower the background noise.
8. When the noise is lower, a smaller signal can get through.
9. Therefore, removing the effort puts you in touch with the quality of the experience.

**APPENDIX B
 HART CHART^a COLUMN JUMP WORLD RECORD**

The following is a sample listing for some activities and the actual times from my office:

RECORDS FOR TIMED ACTIVITIES

NOTE: Column jumping is performed with a Hart Chart. The child stands one meter from the chart. In two-column jumping the patient may be asked to call out all the numbers in columns 3 and 7 alternating columns in a left to right, top-down sequence.

We do not use the outer edge columns for "worlds' record" attempts. Three column jumping would be, as an example, on columns 2, 4 and 8 for example.

2 COLUMN JUMPING			3 COLUMN JUMPING		
AGE	PATIENT	SECONDS	AGE	PATIENT	SECONDS
13 & Older	DW	5.1	13 & Older	AM	11.9
12	MM	6.1	12	DB	14.3
11	JB	7.8	11	CS	14.8
10	BK	8.3	10	MD	13.8
9	NM	12.9	9	MG	18.4
8	SW	9.4	8	CP	15.0
7	AP	13.0	7	WB	20.1
6 & Under	JF	19.0	6 & Under	JF	34.6

APPENDIX C

The "Liteboard" is an old style Wayne Saccadic Fixator^b (Figure 2). A remote switch box is attached by a cable to the Liteboard. The switch box contains letters that correspond to the letters on the Liteboard. The near far task (approximately 12 feet) is performed for 60 seconds with the patient pressing the letter in the switch box that corresponds to the letter illuminated on the Liteboard.

LITEBOARD N-F

AGE	PATIENT	SCORE
13 & Older	BT	52
12	KH	46
11	JT	42
10	JA	40
9	HS	47
8	WS	33
7	MC	31
6 & Under	AP	30

In the near setting patients are given one minute to touch as many lights as possible. The old-style board has only 16 lights in a large circle. The best ever recorded by an adult was 88 lights in 30 seconds. For comparison, this translates into 176 lights in one minute.

LITEBOARD - NEAR

AGE	PATIENT	SCORE
13 & Older	KR	150
12	MM	125
11	DM	130
10	CS	121
9	BS	122
8	BW	91
7	AP	82
6 & Under	AP	82

**APPENDIX D
ANN ARBOR^a TRACKING WORLD RECORD**

The Ann Arbor Letter Tracking paragraph (Figure 3) requires a patient to find the hidden alphabet as quickly as possible by the underline/loop method. They draw a line under all letters with a single continuous movement of the marker and as they locate each letter in alphabetical order they loop around that letter. These times are achieved without assistance.

LETTER TRACKING

AGE	PATIENT	SECONDS	AGE	PATIENT	SECONDS
13 & Older	MR	18.4	13 & Older	LK	19.8
12	KA	25.9	12	DB	28.9
11	JM	23.6	11	LG	31.2
10	RP	18.0	10	EF	35.4
9	BT	33.0	9	AB	41.0
8	SC	35.4	8	BC	35.6
7	ZW	37.0			
6 & Under	SH	48.9			

Iln chako evi nomd zeby thipg nare.
 Zuth pirm nuroc dif stok. Nileg myt
 lof. Tixs nom raus zab tuin lugah.
 Marb sewt rotsir puje. Yonak nesud
 voz alee. Xart chod bugm turh sref
 trea gen foru. Vab reps tique kowj.
 Dagh meulb fwer ilg sida. Ubc they
 bouf yed neoph vaik Wolen kig peab
 nad tenc xerb. Rait rebey fal zibt.

Figure 3. Letter Tracking Paragraph with Hidden Alphabet, Letter Tracking Books, Ann Arbor Publishers.^a (See Product News on page 139.)