MODELS USED TO TREAT AND REMEDIATE LEARNING DISABILITIES In Belgium and the Netherlands And Their Relation to Behavioral Optometry

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Abstract

Optometrists in Belgium and The Netherlands were among the first in Europe to adopt and espouse behavioral optometry. Nevertheless, some 30 years later it is still not widely practiced in these countries. The author seeks to gain more recognition for and utilization of behavioral optometry, particularly with regard to learning disabilities. He discusses three models that are used by education and psychology in Belgium and the Netherlands and demonstrates how they are compatible with behavioral optometric philosophy and regimens. He proposes methods to apply and communicate these similarities and behavioral changes as the result of optometric interventions to the other involved professions and the patient's parents or agents.

Key words

basic function training model, behavioral optometry, Belgium, learning disabilities, metacognition, process analysis model, task analysis model, The Netherlands

Introduction

Although it was one of the first European countries to introduce the American know how and experience in the field of behavioral optometry some thirty years ago, this science and its range of clinical applications remains manifestly unknown in Belgium and the Netherlands. On the one hand I propose this is because Belgium is a country with a surplus of ophthalmologists who feel threatened by optometry, on the other hand ophthalmology rejects behavioral optometry because they consider it unscientific. Consequently, most Belgian and Dutch ophthalmologists feel that it will disappear if they ignore the entity and its potentialities. However, much of Belgian and Dutch optometry shares some of the responsibility for this lack of recognition: many of these optometrists do not consider, or fail to present behavioral optometric care as a viable option to their patients.

Thus, the application of behavioral optometric diagnosis and therapy to the treatment of learning disabilities remains quite marginal. Behavioral optometry is still fairly unknown, and even where established, it usually faces rejection. The most common argument is that behavioral optometry is an unscientific, outdated training of basic sensory functions that is unrelated or superfluous to learning disabilities.

In this article I should like to establish that the above viewpoints are unsubstantiated. I request more openness with all the involved disciplines, in order to promote a multidisciplinary approach, where the child with developmental delays and/or learning disability takes the central place. I propose that in order to do this, it is necessary for Belgian and Dutch behavioral optometry to be cognizant of several of the models that are currently used to treat learning disorders. This will result in the ability of the optometrist to treat diagnosed visual dysfunctions in the proper context, not as isolated and unrelated entities. I will further propose a method to establish and communicate the behavioral results of appropriate optometric intervention to the involved disciplines in a language all can understand. These proposals are based on my overwhelming experience that behavioral optometry can make a valuable contribution in providing care to learning disabled children.

Learning Disability

I propose that children with learning disabilities are those who, despite normal intelligence, have difficulties reaching the standard teaching goals through standard teaching methods. In the worst cases, they completely fail to do so. The difficulties reveal themselves in reading, spelling, as well as mathematics.

In Belgium and the Netherlands a system that designates primary and secondary learning difficulties has evolved. The secondary are those that are caused by another problem, for example an auditory, visual or physical handicap. A child with reading problems because of an isolated oculomotor dysfunction is thus considered to have a secondary learning problem. Learning difficulties are primary

when they are caused by more general neurological conditions. Thus, a child with minimal brain damage and accompanying developmental delays is regarded as having a primary learning disability. There may be accompanying secondary conditions, e.g., an oculomotor dysfunction or hearing loss. Common examples of primary learning or development disabilities are AD(H)D (Attention Deficit Hyperactivity Disorder), ADD (Attention Deficit Disorder), NLD (Non Verbal Learning Disorder), DCD (Developmental Coordination Disorder) dyslexia, and dysorthographia…

Quite often more than one developmental disability is diagnosed, such as NLD and the Autism Spectrum Disorder. However, these diagnoses are made separately, since the former is situated in the neuropsychological field whereas the latter belongs to the psychiatric realm.

Very often, it seems impossible to detect the causes of a primary learning difficulty. Sometimes the boundaries between primary and secondary learning difficulties are not obvious, but in the clinical domain this often has little importance. The distinction is theoretical and usually does not initially impact optometric intervention. However, this distinction can have importance to the prognosis of the effects of optometric intervention: the child with the isolated oculomotor dysfunction (secondary learning disorder) in our example above will usually improve reading skills, whereas ameliorating the oculomotor dysfunction may not transfer to the reading process for a child with severe neurological dyslexia (primary learning disorder).

Detection, Diagnosis, Remediation and Treatment

Usually learning disabilities are detected by the classroom teacher(s) who contact the child's parents. Next, testing is done by qualified individuals, either in the school or privately, with the goal of determining whether the condition actually exists. When present, remediation and/or treatment will usually follow. Strictly speaking remediation means adjusting the regular teaching methods in order to achieve the teaching goals for children with learning difficulties. Treatment means intervening in order to influence the course of the said disorder.[1] Treatment, very much like diagnosis, depends on the professional, who at this stage is usually a clinical psychologist or educational specialist. However, the physical therapist, the occupational therapist, neurolinguist, speech therapist and optometrist can also be called upon.

In this view and in actual practice, behavioral optometry classically enters as a treatment and at a latter stage can contribute to remediation.

In my opinion the diagnosis of learning difficulties is not in the realm of the behavioral optometrist. He can, however, diagnose any visual problems, that may be related to the detected learning difficulty. These can be designated as visually related learning problems. The behavioral optometrist will suggest an action plan, which does not necessarily relate directly to the learning difficulty, as does remedial teaching or – in my country – speech pathology. I propose that the optometric intervention is then best described as functional training according to the following models.

Models to Remediate Learning Disabilities

First model: Basic Functional Training

Not more than a few generations ago, the concept of learning disability did not exist. Those who failed in school were usually considered as simple and, as if bad grades weren't enough, the child often unjustly received punishment for lack of effort. Many children have been severely hurt by this non-recognition and non–identification of their problems. Luckily, things changed. Years ago I perceived that there had been an increasing awareness of the importance of human development and that this development sometimes is hampered by various internal and external factors. And perhaps most important was the connection of this faulty development as a possible contribution to learning disabilities.

Meanwhile, I perceived that the human creature was becoming understood as a dynamic entity, who had the amazing ability to adapt to increasing and diverse stimuli, environmental factors and physical and neurological impediments. I was struck by the fact that these assumptions had been previously, or concurrently proposed by Gesell[2] and his team at Yale University, as well as Skeffington,[3] and Getman.[4] The further elaboration of the importance of general development to visual development was the application of Piaget's theory by Furth and Wachs,[5] and Suchoff.[6,7]

Consequently, about thirty years ago, educators and psychologists in Belgium and The Netherlands started considering the knowledge of human development as the point of departure for the remediation and treatment of learning difficulties. It was proposed that assessing developmental levels in various areas of human function would uncover the causes of learning disabilities.

This approach[8] emphasizes what is considered to be the cause of the problem. The cause or causes are determined by the child's performance on standardized tests that measure the functions as a product of development. The basic functional training model (BFT) focuses on measures to address the detected deficiencies, rather than on the learning difficulty itself. The underlying principle is the supposition that by improving the basal functions, school performance will eventually improve.

However, many of the high expectations for BFT fell short. A child with a learning disability, who was diagnosed with a sensory-motor disorder, may have benefited from sensory-motor therapy to improve motor development, but very often gained little or nothing in school performance. Behavioral optometry often receives the same criticism; training visual skills, specifically oculomotor skills, not infrequently had little effect on reading problems and was therefore considered a waste of time.

Some of the responsibility goes to the optometrists who proposed that in every case there was a causal connection between the visual disorder and the learning disability. They then promised that their therapy would provide a "magic bullet" to the parents of these children.

The efficacy of the BFT model has received significant criticism. At the extreme, it was stated that the connection between the development of basal and academic skills is totally unfounded. As far as the Dutch-speaking regions are concerned, the research performed in 1977 by Jan Rispens, seems to be the most prominent in this regard.[9] Furthermore, some researchers have put forward the question whether the trained function actually did

improve considerably; they did not always receive positive replies[8].

I will elaborate later on this criticism as far as behavioral optometry is concerned.

A third argument against the BFT regards it's testing. Standardized tests are used and the performance of the child in question is compared to that of a normative group of peers. Research has shown that this kind of testing does not always reveal relevant information about the progress made by the individual pupil, nor about his or her learning strategy and cognitive processes.[8]

This kind of criticism did not confine itself to Belgium and The Netherlands in the seventies and, in general, psychology and pedagogy discarded the whole model. This was regrettable, as expressed by the Flemish developmental psychologist Hugo Casteleyn:[10] "During that period, functional training programs were treated much the same way as we (now) treat (bad) TV shows. Everybody criticizes them, but the majority secretly keeps watching them."

Fortunately, today, many authoritative institutions in the field of learning disabilities, have tended to moderate this 25 year old criticism. A prominent example is the Commission for Dyslexia[11] of the Dutch Health Council.[12]

Visual therapy as practiced by behavioral optometrists is partly a therapy for basic visual functions. In this regard it addresses functions that in many cases can be related to academic task(s) that are pertinent to the learning difficulty. I propose that although the connection between a reading problem and the general sensory-motor development of a child might be difficult to establish, there is a connection between various learning problems and compromised visual development. This is not necessarily a causal connection, and consequently, again, I propose that a behavioral optometrist, who claims to be able to cure dyslexia, oversteps her bounds. Nevertheless, my clinical experience over several decades indicates that faulty binocularity, sluggish accommodation or a latent hyperopia represent energy leakages that often lead to loss of concentration. I further propose that immature saccades can seriously hold back beginning readers, that a sluggish adjustment of accommodation from near to distance can result in an inordinate number of mistakes in copying material from the blackboard. Optimizing the visual function or the stimulation of its development by means of therapy will sometimes not ameliorate learning difficulties, but will serve to bring the function toward its full potential.

The criticisms of the BFT model, namely the lack of demonstrable connections between basic functions and academic performance, and that improving the basal functions cannot be upheld as far as visual function is concerned. Bowan[13] has recently documented studies that give convincing evidence of the linkage, along with others that support the notion that visual therapy to improve faulty visual functions has a beneficial effect on learning.

Second model: Task Analysis

This model, quite popular in the 80's, targets a totally different approach to learning difficulties.

The cause of the learning disability is considered to be insufficient control of the skills that are proposed to be prerequisite for the particular learning task. With regard to diagnosis, the Task Analysis (TA) approach utilizes criterion tests, verifying on the one hand whether a particular skill is sufficiently mastered, and on the other in documenting the child's classroom achievement of the particular task. Measurements are absolute in that the child is compared to him or her self, and not to other children. The ultimate goal is to improve the skills that are deficient in order to improve the targeted learning task.

This method can be criticized because of the limitations of the testing, and on the contention that certain tasks cannot be adequately accounted for by considering only a supposedly underlying set of sub-skills.

TA is no stranger to behavioral optometry. Visual therapy in general focuses on optimizing visual motor and perceptual sub-skills where deficiencies have been detected. For example I have found that some beginning readers show immature oculomotor function, and that a majority of children with learning disabilities have deficient accommodative function as well as flawed binocularity.

In assessing the implication of defective visual skills in dysfunctions of reading, spelling and mathematics, we should be cognizant of the TA approach to each of these academic areas. This will enable us to include an important remedial component in our optometric action plan. In all of these academic areas saccadic eye movements, adequate and flexible accommodation and binocular function, visual discrimination, visual closure, visual memory, visual sequential memory, visual imagery, visual analysis and synthesis, play a greater or lesser role. A case in point is research conducted by Drs. Anna Bosman and Janet van Hell[14] of the University of Nijmegen regarding the optimal ways to teach spelling. Of the several methods they used, visual dictation was considered the most adequate. In this approach, the children are presented with the words on individual cards. They closely look at each card and then write down the word. The role of the behavioral optometrist then would be to assure that the underlying visual sub-skills for this method of teaching spelling are intact.

Despite the fact that behavioral optometry has used TA and BFT, it did overcome – in a quite early stage - certain restraints of both approaches. This is demonstrated when we closely examine the third – actually very popular - model used to ameliorate learning disabilities.

Third model: Process Analysis Approach

This third model has many similarities to the TA approach: Process Analysis (PA) utilizes an interactive approach, criterion testing and direct remediation. The uniqueness of this approach is its attention to the cognitive processes one cannot directly observe, but which form the foundation of the teaching of the important skills such as learning strategies, attention span and memory. This approach emphasizes the cause of the learning problem in the study strategies of a child. Meichenbaum, as cited by Struiksma, had suggested in the mid seventies that task relevant strategies that are inadequate can be related to a lack of task appropriate strategies on the one hand, and the omission of task irrelevant strategies on the other.[8 (p.24)] Moreover, it is the only approach that concerns itself with metacognitive explanations. (Metacognition may be understood as all the knowledge we have and can communicate about cognition.) Hence, Meichenbaum spoke about the " cognitive strategies deficiency syndrome." Thus, PA can be considered as an expansion of TA.

I propose that Skeffington's model of vision utilized a PA method. Further, I propose that he was the first to introduce optometry to the relationship of vision and cognition. Birnbaum characterized it succinctly:

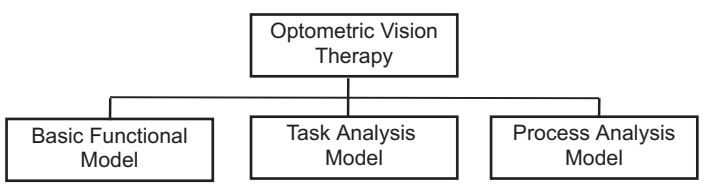
> *To appreciate the Skeffington model, one must be familiar with Skeffington's concept of vision as an organismic process inextricably associated with spatial, motor, and intellectual functions. Skeffington portrayed vision as a product of the interaction of four component subprocesses: antigravity, centering, identification, and speech-auditory. These subprocesses were depicted as four overlapping, intertwined circles, with vision emerging as a product of their interaction.*[15]

In the practice of behavioral optometry consideration of the basic visual functions has been extended to the perceptual/cognitive arenas. Thus, basic visual areas, such as ocular health, oculomotor, binocular and accommodative functions are the starting point. Then the visual perceptual, visual information processing, visual cognitive and visual attention areas are evaluated. Visual memory and visual sequential memory are tested and trained as perceptual 'processes.'And, perceptual skills such as visual figure-ground are considered to contribute to the child's attempts to structure the cognitive world and to expend minimal energy to irrelevant information. In this regard I propose that a major objective of visual therapy for children with learning difficulties is mostly learning how to accurately focus visual attention.

In addition, for many years we have used the principle of "loading."[16] Here, the visual task that is being addressed during the therapy is progressively made "heavier" or more cognitively demanding. A variation of loading is metacognition where the optometrist poses questions to the patient that relate to the cognitive aspects of the task. Both the use of loading and metacognition are done in the interest of the patient eventually using less energy (more automaticity) in performing the particular task.[17]

Lastly, in order to fully understand the role of cognition in remediation and therapy, an appreciation of the neurophysiological model of the brain is prerequisite. Birnbaum some 25 years ago wrote an article entitled "Holistic aspects of visual style: a hemispheric model with implications for vision therapy."[18] This seminal article provided me with an understanding of the interdependence of vision and cognition and was influential in how I determined to practice optometry.

Figure 1.
The components of optometric vision therapy



Summary

An aspect of optometric vision therapy is a close kin of the **basic functional training model**:

Thus, the visual skills that relate to the intake and initial processing of visual information and are basic to the reading and learning process are tested and, when deemed to be deficient, appropriate optometric intervention is provided. And there is increasing scientific evidence that these mechanical visual skills, e.g., oculomotor, accommodative, vergence and accommodative/convergence relationship, can be improved.[19] Further, there is ample evidence that when these skills are defective they can be significant contributing factors to learning disabilities and poor general academic performance.[13]

The **task analysis model** essentially pinpoints the skills that are most important in various aspects of academic performance. In practice the behavioral optometrist is aware of these relationships and emphasizes bringing these visual skills to an optimal level. It is fair to say that in terms of the provision of vision therapy, the lines can blur between this and the basic functional training model.

The application of the **process analysis model** to vision is, in my opinion, unique to behavioral optometry. It recognizes that in order to obtain maximal results in many patients the therapy should go beyond basic mechanical and task specific aspects and incorporate cognitive components.

Although the three models have been presented as individual entities, in actual practice many times all three are operative at the same time during behavioral optometric visual training and therapy. This is graphically represented in Figure 1.

Communication

Our experience at the Antwerp Center for Visual Training has been that more than 80% of children with learning disabilities are referred to us by the other professionals concerned with the remediation and/or treatment of these disabilities. These include neurologists and pediatricians, language and speech therapists, remedial educators, psychologists, occupational therapists and kinesiologists. My experience is that this phenomenon is not isolated to Belgium and the Netherlands. Indeed, behavioral optometrists from around the world have told me of the same condition, and often are concerned that significant numbers of optometrists are not included in the group. I believe that our ability to relate the child's learning and/or reading problems to diagnosable visual defects has been a major factor in continuing referrals from these sources. Further, knowing and understanding the three models that are currently used in Belgium and the Netherlands enables us to make the connection in an understandable manner that creates a common ground: we are able to more effectively state the case in "their language." This facilitates their appreciation that we are aware of the complexity and multi-factorial relationships between reading/learning and vision and that proposing simple cause-effect relationships are often inappropriate

A first level of communication is to make the other professions aware that the behavioral optometric evaluation goes beyond considerations of ocular health and refractive status. Many of these other professionals are aware that we are "doing something different." However, we do of-

Table 1.
Behavioral Optometric Evaluation

1. Visual skills (using OEP 21-point routine)
   a. Ocular health
   b. Visual acuity and functional refraction
   c. Dynamic retinoscopy
   d. Accommodative skills: accommodative flexibility and stamina
   e. Binocular skills: balance, reserves and flexibility
   f. Stereopsis: quantitatively and qualitatively (speed of stereo)
   g. Ocular motility and standardized oculomotor testing
   h. Ocular dominance and visual field preference
   i. Visual strategy: central, detail-oriented; global, diffuse, …
   j. Color vision
2. Visuomotor skills
   a. Gross: sensorimotor evaluation
   b. Visuomotor: walking rail with yoked prisms
   c. Fine: form reproduction quality and speed
3. Visual perceptual skills
   a. Visual (sequential) memory: with and without time constraint
   b. Visual discrimination, visual form constancy, visual closure
   c. Visual spatial relationships
4. Auditory - visual integration
5. Reading test[20]
   Visual analysis of reading and spelling errors
6. Behavioral prescription: compensatory or learning lenses when appropriate

Table 2.
Major Categories of Vision Therapy

1. Gross motor considerations to enhance the ego-centric position in space
2. Optimization of visual basic functions such as oculomotor, accommodative accuracy, flexibility and sustenance, binocular efficiency, speed of stereopsis: all done in a dynamic setting to build visual attention.
3. Improving the fine visuomotor processes: e.g., eye-hand coordination
4. Emphasis on the change in visual strategy, in terms of central or peripheral processing
5. Specific training of perceptual conditions, visual spatial manipulation, visualization
6. Visual learning, procedures which provide the integration of previous stages

fer the opportunity for them to observe our examination on children that they refer. Our protocol is summarized in Table 1

After the evaluation is completed a report is written and sent to the referring professional and the child's parents or other agent. Again, I stress the importance of avoiding statements of direct cause/ effect relationships between the reading/ learning problems and diagnosed visual problems. Rather, it should be put in the context that these visual problems can hinder and possibly contribute to the reading and/or learning problems. Thus, such phrases as " compromised focusing (accommodation) can contribute to inaccurate copying of material on the blackboard" or "inaccurate eye movements can be a major factor in losing one's place, or skipping lines when reading" suggest the possibility and, when worded in a stronger manner, the probability of the relationships without overstating the case.

When vision therapy is deemed appropriate, we communicate the major areas that will be addressed. These can be explained in terms of the applicable model or models. Table 2 summarizes these areas.

A third method of communication we use is based on my belief that an important outcome of the therapy should be based on observable behavioral changes. While we periodically monitor the child's optometric clinical findings and performance on a standardized reading and spelling test, after 15 to 20 sessions of therapy we provide parents with a checklist to assess any changes they perceive. This enables us to compare those changes with any we have more objectively determined. The items on the list are items we have found to be important in terms of reading, general academic performance, and overall behavior. The checklist is given to the parents again at the end of therapy. The checklist is shown in Table 3.

Table 3.
Behavioral Checklist

- ☐ Less tension
- ☐ Less quickly tired
- ☐ Better reading and writing posture
- ☐ Smoother eye movements
- ☐ Reads subtitles on TV more easily
- ☐ Increased working tempo
- ☐ Increased depth perception
- ☐ More agile
- ☐ Fewer copying mistakes
- ☐ Fonder of and better drawing
- ☐ Increased eye-hand coordination
- ☐ Increased ball control
- ☐ Better grades at school
- ☐ Positive influence on other therapy
- ☐ Increased concentration
- ☐ Less fear of failure
- ☐ More confidence
- ☐ Broader task span
- ☐ More positive learning attitude
- ☐ Increased comprehension
- ☐ More peripheral awareness
- ☐ Increased power of observation
- ☐ Increased reading speed
- ☐ Better reading comprehension
- ☐ Fonder of reading
- ☐ Improved posture

We have data on the observed changes for our patients over a one-year period. We are in the process of delineating this data into several categories and plan to report these in a subsequent article. This information will not constitute a scientifically controlled experiment. It will be presented as a means for us to better understand the role that vision plays in reading/learning disabilities, and as a means to communicate this information to the other involved professions and to the caregivers of those children whom we seek to help.

Conclusion

Behavioral optometry can have an important influence on the visual function and the behavior of the child with learning disability. This is the message we have to

transmit to our co-disciplines Visual conditions improve with visual therapy; that much has been established, but let us remain modest, and not make unrealistic promises. Honesty tells us that we ourselves do not always know what to expect after visual therapy because of the complexity of learning disabilities. Because of the importance of vision in the learning process it is optimal that we effectively communicate and coordinate our work with that of the other involved professions. Often others are able to treat the child further after our intervention. There too, behavioral optometrists carry the responsibility to see further than the end of their opto-olfactory organ and adequately refer children to competent professionals who, especially in the didactic field, can help the children.

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