

# Vision and the Visual Process

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OVER and over again in current literature we hear of a boy named Johnny. "Johnny," for the uninitiated, is the contemporary generic name for the child who cannot read or who may not be academically fit. His name is usually preceded by the word WHY, and almost every book publisher and game manufacturer has developed a "gimmick" to make Johnny a better achiever.

The editors of *Newsweek* have stated that ". . . We Americans don't want to move the world. But we don't want anyone else to, either. So Johnny *had better* learn to read. Because you can bet Ivan is spending a lot of time on *his* books."

So poor Johnny, because of the political climate today, is in the spotlight. At last, stimulated by Johnny's problems, there is a dedicated movement to make each child achieve to his own optimum potential.

Modern, functional optometry, in turn, is dedicated to improving the performance abilities of each and every child through an understanding of the problems caused by visual deficiencies.

## *Vision—a Process*

By "vision" we consider more than just eyes and eyesight. Since reliable sources indicate that at least 80% of learning occurs through the visual pathway, we must consider vision as a *process* that includes the retina of the

eye as a sense receptor, the brain as a control center, and the muscles of the eye and the body as mechanisms to express the behavior responses triggered off by the sensory stimulations. This increases our scope to include vision and visual problems as part of the complete child as he performs in his everyday environment.

It has not been very long since a visual problem was considered to be solely a "sight" problem. If the child was able to see normally (at least to the satisfaction of those around him), and if he had a visual acuity somewhere around the universally recognized 20/20 norm, he was assumed to have good vision and no visual problem.

As the stigma against wearing glasses diminished, a new factor came to the fore as a possible cause of a visual problem. This factor, to this day, is couched in an almost indefinable symbolism known as "eye strain." This has become the general term that envelops the visual headache, the occasional blur, the "pulling" sensation, tearing when reading, squinting, and the poor ability to concentrate on visual tasks.

To those of us who have been exposed to the classical concepts of vision, the explanation for poor acuity and eye strain became related to certain structural "eye defects" such as farsightedness, nearsightedness, astigmatism, and muscular imbalances. The only problem in the use of these categories is that

over the years they have served their purpose so well that a complacency had been built that resisted change.

### *Not Like a "Camera"*

We must firmly understand that the human eye is not analagous to the camera. There is no doubt that a similarity exists between the optics of a camera and the optics of the eye, but here the similarity ends and it is at this point that *vision* and the *visual problem begin*.

The stimulation of the retina by light does not cause a picture to be projected in the brain. It does, however, trigger off electrical impulses to the integrative centers of the brain where they are decoded, stored, co-ordinated with past experiences, integrated with the incoming impulses from all the sense organs, monitored by feedback controls, and where undesirable impulses are suppressed.

Effective integration implies an ability to have matching relationships between one sense receptor and another as well as a matching behavior response to the total stimulation. These matchings and the subtleness of the final responses are learned and are dependent on the proper exposure to experiences that will aid in their refinement. In other words, experience plus the biological mechanisms for integration enables the developing child to organize his perceptual space world so that he increases his awareness and his ability to operate more efficiently in his environment.

In these terms, then, *vision* is a complex process that enables us to discriminate objects, localize and center our attention in order to get meaning. It

involves a process that includes all the mechanisms that fulfill the requirements for getting knowledge. Through the high-order integration that this process undergoes, we can vicariously project our ability to taste, touch, and smell into a visual world beyond our body limits. Without this high-order interaction we could not get meaning from symbols and, therefore, we would be unable to read.

### *The Visual Problem*

A *visual problem*, on the other hand, is caused by an inadequacy anywhere in the total (sensory-integrative-motor) process.

We know that all children are different. They vary in their genetic make-up, in environmental exposure and in the effects of various diseases and traumatic experiences. Therefore, not all children can be expected to react in the same manner to the stressful pressures of restriction and prolonged meaning-getting concentration required from them in the school situation.

There is no doubt that improper diet will, in some measure, interfere with a child's retentive ability, or that emotional difficulties will decrease concentration and comprehension ability. Likewise, if the child cannot hear well, or if his visual acuity is below normal, he will miss essential work in the classroom.

However, in the light of the modern concepts of vision, there are many achievement problems that relate directly to visual inefficiencies. Just as with any other function, there are certain abilities or skills in vision that are necessary for an adequate performance on tasks that are visually oriented.

### *Visual Abilities*

These visual abilities are learned. The basic mechanisms that comprise the visual process are innate, it is true, but the way we use these mechanisms is learned.

Learning, of course is related to environmental exposure. Therefore, during the developmental years, the richer the environment and the more real the experiences, the more the child will be given the opportunity to integrate all of his sensory-motor modalities (seeing, touching, smelling, tasting, crawling, balance, etc.). A deprived environment leads to inefficient visual integration and therefore results in an inefficient ability to use the visual process for getting maximum meaning from visual tasks. It is at this early stage that the movement patterns and learned associations, so essential to proper integration, form the basis for adequate recognition and interpretation of forms. This, in turn, is basic to reading readiness.

### *Role of "Stress"*

Another factor affecting the action of the visual process is the role played by stress. Hans Selye has reliably shown that stress is co-existent with life. Each individual, however, reacts differently to different stresses and has a different stability level to withstand stress.

Prolonged, concentrated close work, excessive glare, insufficient lighting and poor posture when reading are some of the stresses that affect the visual process specifically. Emotional upsets, systematic infections, dietary insufficiencies, social isolation, and immobilization are stresses that affect the visual process indirectly.

If the total load of stress is intense, or persistent over prolonged periods of time, the normal adaptations to stress become conditioned and cause structural distortions. In this case, a child exposed to excessive visual stress, or a child who is not capable of withstanding a so-called average stress, may well develop structural "eye defects" as an adaptation to the stress itself.

### *Vision Is Trainable*

Dr. A. M. Skeffington, Director of Education for the Optometric Extension Program, has long pointed out that since vision is learned, it must be capable of being trained. Any learned function is capable of being enhanced by practice.

The proper use of lenses and training, separately or in combination, becomes an effective tool in preventing the effects of developmental deprivations and the effects of stress from interfering with the optimum efficiency of visual performance. It aids, likewise, in remedying the distortions and inefficiencies in performance already present in those children who are seen professionally after the problem has begun.

Lastly, it can aid in a palliative manner those who through injury, disease or neglect have irreversible structural defects that need help in order to perform the basic acts of vision.

This constitutes a superficial glimpse into the thinking behind the philosophy of vision today. With these changes in optometric concepts and methods of practice and with more dedicated interdisciplinary activities, we are all aiding "Johnny" and his non-achieving friends to come closer to their optimum achievement level. This benefits not only them, but all of us as well.