DEVELOPMENTAL VISION

A multi-sensory

approach to vision

by

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DEVELOPMENTAL VISION

The author would like to extend his appreciation and gratitude to the staff of the Optometric Extension Program section on Child Vision Care and Guidance, for their tremendous effort in bringing about our present day concept of developmental vision. Their approach has not been narrow but one which encompasses the research and thinking of all professions dealing with the growth and development of children.

As we in Optometry have integrated this research into our current thinking, the concept that we are working with a single organism, which we label a human being, has become firmly established. Furthermore, whatever we do to that human being will affect his total being. The biological principle that the organism is a product of its environment takes on more meaning. Gestalt psychology has done much to further this concept. It states that the whole is not the sum of its parts but that it has a unique value all its own. As we change the relationship of its parts the value of the whole changes.

Our work with children and their visual problems has brought about two basic desires: one, to learn more about the effect of the environment on the child as a whole; and two, to determine the basic visual processes to be used in helping the child to more successfully communicate with his environment. These visual processes involve an area of learning about which, in the past, little has been known. Kephart and Dunsing, in the book LEARNING DISORDERS VOL.1, state, "With all the test instruments and skills the psychologist brings to bear in his diagnostic procedure, he does not have any effective measure of the learning ability." As one reviews the literature he finds a definite lack of information concerning the basic process used in learning. This field we hope to enrich.

Developmental Optometry has contributed much in the area of vision that may be related to how a child learns. There must be a coordinated effort on the part of all professions to integrate their knowledge. Helping the child

to realize his greatest potential should be the ultimate goal.

Perception appears to be a common ground where the various professions should meet in mutual understanding of what each has to offer. Past research has followed the lines of studying each area as a unit, instead of the integration of all sensory stimuli into a single function. The Gestalt concept supports integration.

Optometry is concerned with vision. If we are to understand the function of vision a study of the human organism's ability to visually process information while performing under the influence of each of the other sensory stimuli is in order. The prescribing of lenses or visual training therapy must be related to the patient's visual performance as he functions in a constantly changing sensory environment.

DEVELOPMENTAL VISION

Section 1

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Section 4

MODEL OF VISION

MODEL OF VISION

Our research, over the years, has shown that there is an integration of all sensory processes. One process cannot be separated entirely from all the others. This concept is not new, but it seems we have been lacking in the knowledge of how the individual integrates the various sensory stimuli into meaningful experience. This is the basis of this study.

This manual will be dealing with the ability of the practitioner to identify the visual processes and integrate the various sensory stimuli into basic visual patterns which will enable the human being to learn. This concept is the multi - sensory approach to vision which was presented in "A Model of Vision and Basic Principles Involved", in the Nov. - Dec. 1965 issue of the Oregon Optometrist. The Model of Vision has evolved out of our association with the visual problems of children and has been basic in developing the testing and training procedures we use.

This model of vision is based upon the state of the visual system as the organism is visually centered and is processing information derived from the sense of sight. The large circle in the center represents the area of visual perception.

As the organism changes his centering from sight to auditory, the central circle now becomes the area of auditory perception. The central perceptual area changes accordingly, as the organism continues to change his centering to each of the other areas.

In general, when the organism is centered upon a certain sense area, the sensory stimuli from that area becomes figure. All the other sensory stimuli then become ground.

As optometrists we should concern ourselves with the visual functions taking place as the organism processes information derived from the sense of sight. As we study other areas, we must determine what effect they have upon the function of vision. If we find areas that are inhibiting the visual performance of the organism, then we may refer the problem to qualified individuals who are trained in that area.

FIGURE - GROUND ORGANIZATION

The newborn infant's first awareness of his new environment is through his "six senses." A good way to visualize this would be to think of the various senses as antennae, each "sending in" a stimulus to the perceptual area. To survive in this new world the organism must develop the ability to center on one sensory stimulus, and be able to delegate the others to a secondary or supporting role which we will call ground. The primary stimulus will be referred to as figure.

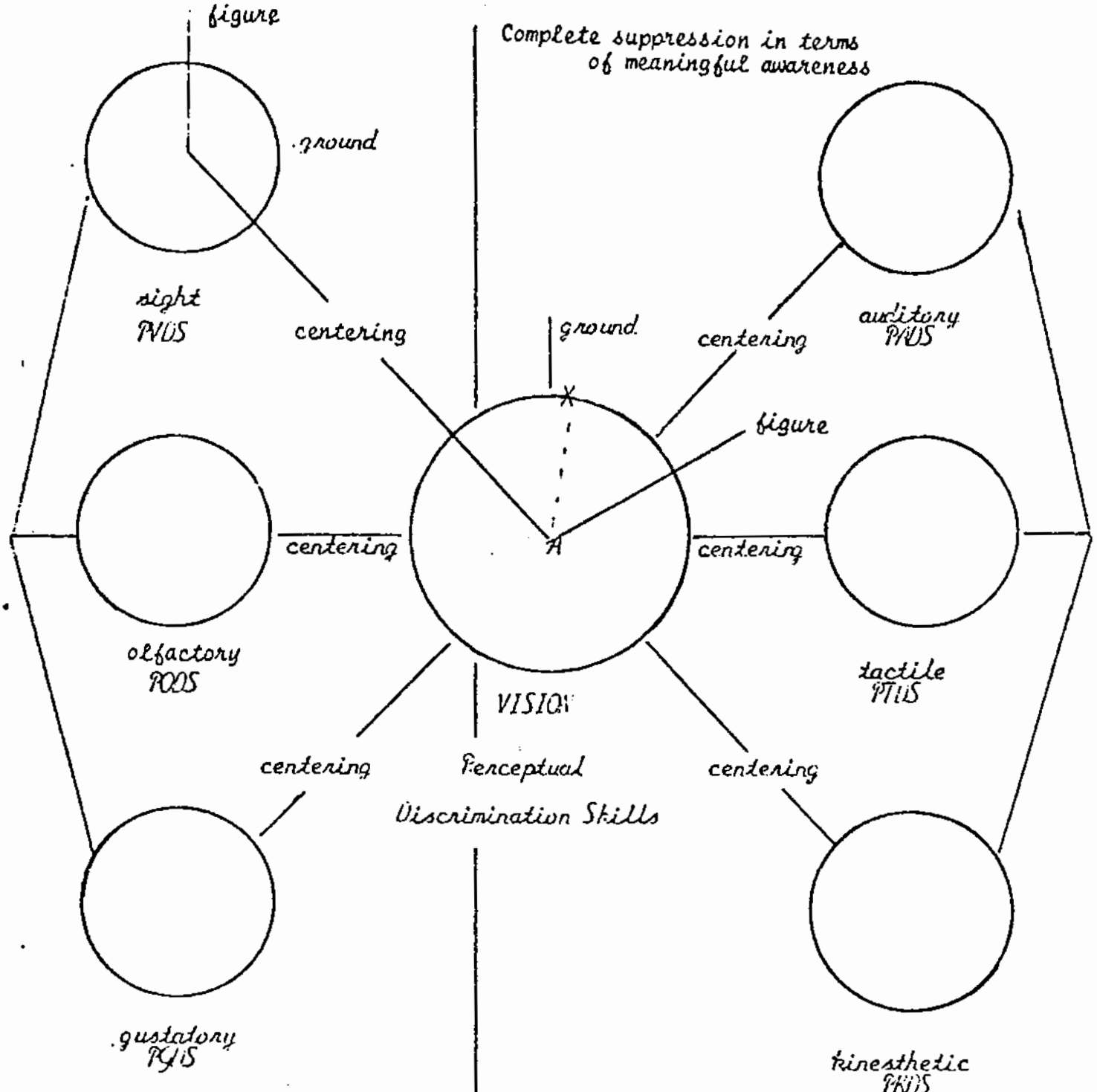
Figure-ground organization is a learned process and can be seen functioning throughout the entire perceptual system. Figure-ground is the perceptual ability of the individual to center on one sensory stimulus and delegate the other stimuli to the background. An example of this in the auditory area would be the attempt by the individual to center and identify a single sound against a background of noise. Each of the sensory areas, illustrated in the model, involve figure-ground organization.

VISUAL PROCESSES

Over the years our relationship with children has brought about an awareness of the presence of certain visual processes and their function. A team approach has been used. It is with the aid of a trained assistant, recording the movement patterns of each child during the training sessions, that we have been able to gain a deeper insight into the function of the visual process.

Various factors involved in the function of the visual process must be clearly understood. Based on the model the definition of vision would be: "The function of the total visual processes whereby the organism is able to interpret its environment in terms of meaningful experiences." Further clarification of the factors involved in vision would be as follows:

MODEL OF VISION



Area X A = degree of figure-ground organization or degree of environmental awareness control

Performance Levels
1. Nonself - directed
2. Self - directed

Learning process
1. Recall - meaningful experiences
2. Relate - centering - attention span

C. Direct - The visual directing of a response based upon the Recall - relate. The response will be either nonself-directed or self-directed.

As we establish communication with the child, the learning process of Recall-Relate-Direct takes on more meaning. The observation of his movement patterns as he relates to his environment allows us almost to pinpoint and follow his visual processes. We may not be aware of the child's past experience, but by observing his reactions to the environmental stimuli, we can almost visualize his experiencial background.

4. Performance Levels are of two kinds and there are various degrees of profiency in each level.

   A. In the nonself-directed level, the stimulus to perform the act originates outside of the body. The individual reacts to the stimulus in a manner which he has previously learned and does automatically. This involves a lower neurological process.

   B. In the self-directed level the stimulus to perform the act originates from within the body. This involves a higher neurological process. One may think of this as being a problem solving or reasoning level.

5. The Principle of Reversal Performance can be illustrated as follows:

   A. An individual is asked to self-direct a movement pattern which he cannot do automatically and as he is performing this act, a sensory stimulus is induced into the perceptual area. Next, the stress

demand of the stimulus is increased slowly until the frustration level is reached. At this point there occurs a breakdown of the figure-ground structure. This may be observed as a sharp reversal back to that movement pattern he does automatically. When the stress reaches a point where he cannot self-direct his performance, there is a reversal back to the non-self-directed type of performance.

By observing the eye movement patterns, we are able to study the function of figure-ground as it is related to the visual area. These movement patterns are:

1. In the normally learned eye movement pattern, the eye moves to the point of fixation automatically (nonself-directed).

2. In the self-directed eye movement (not learned) the organism directs the eye to its fixation point.

B. An illustration of the reversal phenomenon would be as follows:

1. The patient sits on a stool, facing a 30" diameter rotator, mounted on a stand three feet away. Mounted on the face of the 30" disc are four picture targets in the cardinal positions of up, down, left and right (see illustration). A star is in the center for beginning fixation.

2. The patient now fixates on the star located in the center of the board. He names, aloud, the target he is going to direct his eyes upon; pauses for one second, then looks to th target named. He then continues self-directi this pattern.
3. As he is self-directing the above eye movements, a stress stimulus is induced. When the stress becomes so distracting that it breaks down the figure-ground structure, his eye will reverse the pattern by looking to th object before he can name it. In other words there is a reversal from self-directing to to nonself-directing.

6. Frustration Level is that point where there occurs a complete visual breakdown in the figure-ground structure in the perceptual area. This level may vary from one time to another and from one sensory area to another. It is directly related to the figure-ground organization.
7. Visualization is the process whereby a mental image is perceived by the individual. The degree of visualization will be based upon the efficiency of the entire visual system. The figure-ground organization of the moment will be the determining factor in his ability to visualize
8. Perceptual Discrimination Skills are those means whereby an individual may differentiate the differences and similarities of the detail in his space field. These are divided into groups and listed as follows:

A. Perceptual Visual Discrimination Skills

1. Direction
2. Size
3. Form

4. Space

5. Color

B. Perceptual Auditory Discrimination Skills

1. Pitch test - - The subject indicates whether the second tone is higher or lower than the first, decreasing the difference in pitch.
2. Loudness test - - The subject determines whether the second tone is stronger or weaker than the first.
3. Rhythm test - - Requires the comparison of rhythmic patterns that are either the same or different within each pair.
4. Time test - - The subject records whether the second tone in each pair is longer or shorter than the first.
5. Timbre test - - Calls for the discrimination of tone quality; the two tones in each pair being either the same or different in this respect.
6. Tonal Memory - - Short series of three to five tones are played twice in immediate succession. During the second playing one note is changed and the subject must write the number of the altered note in the first, second, etc.

Reliability co-efficients - .55 to .85*

Pschological Testing, Anastasi, The Macmillan Company 1961

Carl E. Seashore, University of Iowa

C. Perceptual Olfactory Discrimination Skills

1. Musky
2. Etheral
3. Pepperminty
4. Camphoracous
5. Floral
6. Pungent
7. Putrid

D. Perceptual Tactile Discrimination Skills

1. Texture
2. Thermal
3. Humidity

E. Perceptual Kinesthetic Discrimination Skills

Motor Functions

1. Control Precision - the ability to make fine, highly-controlled, but not over-controlled muscular adjustments; important in rapid and accurate operation of controls by hand, arm, and foot movements.
2. Multi-limb coordination - the ability to coordinate gross movements requiring the simultaneous use of more than one limb in any combination.
3. Response orientation - the ability to select the appropriate response under high speed conditions, identified in complex coordination tests in which each pattern of signals requires a different choice of controls and direction of movement.

4. Reaction time - speed with which an individual is able to respond to a stimulus when it appears, found to be independent of specific response required and of whether the stimulus is auditory or visual.

5. Speed of arm movements - speed with which gross arm movements can be made, regardless of precision.

6. Rate control - ability to make continuous anticipatory motor adjustment relative to changes in speed and direction of a moving target, the common factor in pursuit and tracking tests.

7. Manual dexterity - the ability to make skillful, well controlled arm-hand movements in manipulating fairly large objects under speed conditions.

8. Finger dexterity - the ability to make skillfully controlled manipulations of small objects involving primarily finger movements.

9. Arm-Hand steadiness - the ability to make precise arm-hand positioning movements where strength and speed are minimized.

10. Wrist-Finger speed - traditionally called "tapping", this ability is best measured by paper and pencil tests requiring rapid tapping of the pencil in relatively large areas.

11. Aiming - a narrowly defined ability measured chiefly by paper and pencil "dotting" tests which require the subject to place a dot accurately and rapidly in each

of a series of small circles.

Other factors

1. Limb strength
2. Trunk strength
3. Limb flexibility
4. Trunk flexibility
5. Energy mobilization
6. Static balance
7. Dynamic balance
8. Gross motor coordination (involving trunk and limb)*

F. Perceptual Gustatory Discrimination Skills

Taste sensations:

1. Sweet, the taste buds on the fungiform papillae at the tip of the tongue are receptors for sweet.

2. Bitter, the taste buds on the circumvallate papillae in the posterior part of the tongue are the receptors for bitter.

3. Sour, the taste buds on the foliate papillae in the posterior part of the tongue are the receptors for sour.

*Psychological Testing, Anastasi, The Macmillan Company 1961
Conducted by Fleishman using Air Force data.

4. Salt, the taste buds on the fungiform papillae in the lateral border of the body of the tongue are the receptors for salt.

Nerve Supply:

1. Bitter and sour taste are mediated by the glossopharyngeal nerve.
2. Sweet and salty taste are mediated by the intermediofacial nerve via chorda tympani.

Section 2

PERFORMANCE

Vision is not just a single percept of momentary understanding, but it is the "total meaning" perceived from performing a visually directed activity. Visually directed movement patterns, such as those used in catching a ball, involve visual processes that are basic to all performances.

ILLUSTRATION OF "CATCHING A BALL"

A schematic illustration of the sequential steps that take place in the act of catching a ball would be as follows: (relate this to the Model of Vision)

1. There must be present an overall readiness or perceptual set of the subject. The subject will be visually centered and the field organization will be such that the ball will be perceived as figure, against a background of space detail or ground. As the sight stimulus enters the perceptual area it is first perceived as ground, then as it penetrates toward the center it takes on more meaning. At the very center it becomes maximum figure. The perceptual organization is such that other sensory stimuli form a background of meaning which gives support to the sight stimulus. The subject initiates the process of recall and then relates to the present; next, he stimulates the kinesthetic area and visually directs a movement pattern to catch the ball. The kinesthetic-tactile stimulus of holding the ball confirms the act.

2. If we now have the subject continue the act of catching the ball and then induce an auditory stimulus we will gain an insight into how the subject visually learns in an auditory environment. As the auditory stimulus enters the visual area it will increase in its tendency to become figure as we make the stimulus more meaningful to the subject. In order to keep the act of catching

the ball intact, the subject will have to increase the figure-ground organization. The auditory stress is increased until the frustration level is reached. At that point the subject can no longer resist the auditory stress and it becomes figure and we have a breakdown of the old figure-ground structure which kept the act of catching the ball intact. Therefore, we would observe the subject either dropping or missing the ball completely. One might think of this as being a short circuit.

ORGANIZATION AND STRUCTURE

The terms organization and structure should be kept separate. Organization refers to a process, namely the integration of certain parts into the cohesive wholes. Structure refers to the product of the organizing process.

1. With these two terms in mind we can now again review what happens as the subject catches the ball and auditory stress is induced into the visual area. Auditory stress induced below the frustration level will first bring about an increase in perceptual organization and then, when increased to the frustration level, will cause the immediate breakdown of perceptual structure.

   There appears to be a relationship of this figure-ground breakdown to a learning disability recently termed "developmental dyslexia." In the past it has been call "word blindness," "strephosymbolia," and "specific language disability." Developmental dyslexia is a physiologically based learning disability that makes it difficult, if not impossible, to learn reading, writing, and spelling under normal classroom conditions.

   A person avoids an area of performance, such as reading, where he cannot visually achieve, and in so doing he gradually builds up a fear associated with that specific task. Later, when he is

confronted with the visual task of reading, he feels a high degree of stress which in turn causes a general constriction of space meaning.

The development of dyslexia can usually be traced back to poorly developed perceptual visual discrimination skills. Later in this manual this effect of stress on the perceptual visual discrimination skills will be discussed in relation to the flannel board procedures.

PERCEPTUAL SET

The same visual processes involved in the act of playing catch are also functioning throughout an individuals entire daily performance in varying relationships. Centering involves a "perceptual readiness" or "set", whereby the subject will respond to a minimum clue stimulus. The perceptual set may be thought of as having two phases:

1. Nondirectional - there is an overall readiness to act, but as yet there is no selected goal.
2. Directional - the individual has identified the goal and will now attempt to relate the environmental clues in support of the goal.

An excellent example of the directional set is illustrated in the article, "A Thing Called Early Blur", in the Nov. 1965 issue of the OUTDOOR LIFE. The article brings out the probability of deer hunters seeing blurred objects as deer. They do this because they are thinking deer and will try to interpret a minimum clue as deer.

TACHISTOSCOPIC TRAINING ILLUSTRATIONS

The perceptual set may be found in tachistoscopic training. When using 35 mm. color slides at 1/100 of a second flash exposures, it has been observed that once the patient has made his initial response, he will, on subsequent flashes, tend to support his original identification.

1. If the individual has highly developed visual skills and has made an inaccurate response, he may correct himself very quickly.
2. Those who have low visual skills will continue to relate to the original error even though the exposure time is increased.
3. By observing the patient's ability to respond in terms of quality and speed, we can now record his visual organization.

In the case of Molly, age 12, who had difficulty with the same material as flashed at 1/100 of a second, it was observed that if the words were exposed first for familiarization she could then respond correctly. In so doing, the directional set was developed to the point that when we continued with new words she was able to continue the correct identification.

With Richard, age 14, who also had difficulty with the same material as Molly, it was found that if we gave him a continual math problem his response increased in quality. The continual math problem is one that is used throughout many of the training procedures and is as follows:

1. Just before the flash exposure, the patient is given a math problem such as, 2 + 3. He must first answer the math problem correctly and then identify the flash exposure.

2. Using the same flash procedure as in the #1, the patient is presented with a continuation of the original math problem (the clinician says, "plus three", and the patient answers, "eight"). The procedure may be continued and the performance is recorded.

3. The perceptual set is the figure-ground organization which is present before stress begins to interfere with figure-ground.

TION OF SPACE WORLD

Organization: When a child builds his perceptual space world, he starts with his immediate environment. Based upon his past exper- he then extends it outward.

1. He utilizes all his visual skills in the building of perceptual space and the organization of the detail within.

2. He explores and relates to himself the environment through his movement patterns.

3. He is able to visualize space and its relationships in terms of activity and the movement patterns required.

are many factors which are involved in the perception of space. As ned previously, there must be an overall perceptual set. As a child a farm scene he is perceptually ready to see farm activities. In the f sight, the five processes of size, space, direction, form, and color e used to differentiate the similarities and differences. If any one se five skills is not functioning properly there will occur a decrease ce meaning.

discrimination of space is tow the meaning which is derived from tivity of the cow relating to its environment will be inhibited. The itself has a certain meaning; but the cow performing an activity different environment will have a different meaning. There are arrangements or spacial relationships that denote a particular

a single word has a particular meaning, but when used in a sentence it may take on a new meaning. The figure twenty two is seen as 22 only when the correct spacial structure is present. A young child visualizes his space world in terms of:

1. The movement patterns he uses to go from one place to another
2. The energy he expends in performing the movement patterns
3. The time involved in performing the previous factors

As he plans his activities and sets up certain goals to achieve, he perceives space in terms of the above factors. In structuring space he most likely will develop his vertical space organization first. The anti-gravity factor plays a leading role in the very early growth of the young child. He learns the act of balancing, observes objects falling, and develops the concept of up and down. The terms up and down he hears often and is able to relate them to his own movements. The concept of left and right are more sophisticated and are developed later. The observation has been made that in nearly all low achievers when stress is induced the concept of left and right will drop out first.

Let us return for a moment to the child's perception of space and give an example of the functions of the three factors mentioned. We know it is fifty miles from the child's home to the coast. Now we ask the child how far it is from his home to the coast if:

1. He goes in a car to the coast
2. He goes by walking to the coast
3. He goes by crawling to the coast

The perception of space changes in each situation. Therefore, when planning the events of the day, he must be able to correctly visualize the activity so that he can finish within the time alloted. Quite often a young child

has been heard to say, "I am going to do this and this and this," all of which will actually take three times as long as he thinks it will. This will be more meaningful if we ask a person how many seconds it will take him to walk across the room. The following should be recorded:

1. His original response
2. The actual time it takes him to perform the act
3. The time he takes to perform the act when asked to do it in twice the time recorded in #2
4. The time it takes him to perform the same act when asked to do it in one-half of the time recorded in #2

This information will be most revealing in terms of how this individual visualizes his space. This performance is very basic in the self-directed performance. In order for a child to function successfully in the self-directed level, he must set up his goals based upon his knowledge of the movement patterns he must make, the time involved, and the energy expended. If he fails in this act he will be aware of a sense of frustration; this in turn will develop stress. The stress may be such that it inhibits the visual performance. As time progresses, the outward manifestations of this condition may be observed in the form of an Embedded Dependency Behavior.

The Embedded Dependency Behavior may be defined as that performance a child makes in seeking security. He will develop the self confidence he needs only when he is able to visually self-direct his own performance. If tasks are always done for him or he is always told what to do, he will be under great stress when asked to perform them on his own. This embedded dependency behavior is only one of the several manifestations that go together to formulate what might be termed a "Low Achiever Behavioral Syndrome."

LOW ACHIEVER BEHAVIORAL SYNDROME

There are five areas which can be observed in the performance of a low achiever. Some will be able to function more efficiently in one area than in others. If any one of the areas is low there will be a restriction in his visual performance, which in turn will restrict learning. The five areas of low achievers are as follows:

1. EMBEDDED DEPENDENCY BEHAVIOR

   In the early development of the child this behavior can be seen in the form of seeking security. There are close parental ties, such as the mother-child relationship (the child depends on the mother for security). As he develops further we find him turning to, or depending on, certain familiar objects such as a blanket or a doll for security. In some children we may see the physical act of thumb-sucking coming into the picture. Later, he may use the "I can't do it" type of behavior, which is again a form of seeking security.

   Throughout a child's life he must be able to transfer his security freely from one person to another and from one object or activity to another. There must be a transfer at the proper time in order to enhance growth and learning.

   When observing children for the first time as stress is induced, we watch for movement patterns and reactions that would indicate dependency behavior. Under the stress-demand does he face the problem and show self-confidence or does he seek security and ask for help?

   One approach to breaking a dependency pattern is to have the parents give the child a choice of two things as often as possible. For example, at breakfast he may be given the choice

of hot or cold cereal. Once he makes his choice he should be expected to carry it out to the end, whether the results are good or bad. The next time he is confronted with a similar choice, he will probably go through the basic process of recalling meaningful experiences, relating them to the present situation, making a decision, and performing in a visually directed manner. Later, when he is confronted with a problem he may be able to reason it out and solve it. His confidence in his ability to perform should be increased and learning will be enhanced.

The choice demand should be started very low and then gradually increased in difficulty, always staying within the ability of the child. Given a choice of ice cream or a spanking, the demand is very low and there is little doubt what the choice will be. If given the choice of vanilla or chocolate ice cream, it is more similar and therefore a much greater demand. The principle involved here is; the differentiation of differences is easier than that of similarities.

2. LOW KINESTHETIC MOVEMENT PATTERNS

The ultimate in coordination would be that performance involving the least amount of movement with the greatest amount of meaning while utilizing the least amount of time and energy.

Well coordinated individuals are those whom we identify as having "poise". They have the ability to visually direct in a rhythmic manner the correct movement patterns in recognition of the environmental demands.

A. To understand the movement patterns of an individual we must first know what the immediate environment asks

of him. Each object in his space contact produces a certain demand which is based on its relationship with the space detail present.

As we change the relationship of these objects, the space meaning or central theme changes. A good example of this would be lumber. When tossed on a pile it would be thought of as a wood pile. These same pieces of lumber when assembled in a certain manner become a house or a barn. This central theme, which Gestalt psychology refers to as "whole", is very basic in bringing about the perceptual set of an individual.

This state of readiness now allows the individual to respond to a minimum visual clue stimulus. This may be termed environmental communication and must be a two way function if learning is to take place. The environmental demand is constantly changing. If the person is communicating he will now make the correct movement patterns in reply to this demand. The movement patterns must be visually directed and performed with meaning and efficiency.

B. Coordination takes less energy to perform a task. A new movement pattern must first be self-directed. The movements will be slow and tedious and a great deal of energy will be expended. As the act is repeated, it becomes a learned pattern which will now function under nonself-direction. The result will be an increase in speed and less energy will be required.

Coordination is basic for learning. In a well planned activity the person must know the movement patterns involved in the performance of the activity. When a teacher or parent is able to visualize a child's abilities in terms of movement patterns, he will communicate instructions at a child's level of ability. The child in turn will respond with a maximum learning effort.

3. SHORT ATTENTION SPAN

The attention span is the maximum length of time an individual is able to center and process information while performing a selected task. Factors involved are as follows:

1. Figure-ground organization
2. Ability to utilize stress stimuli
3. Function of the learning processes of Recall-Relate-Direct
4. Interest factor

An example of how the figure-ground affects the attention span can be illustrated by a recent training case of Tommy, a retarded boy, age eleven. This child had an attention span of about three seconds. He was distracted by the slightest stimuli in the field of sight. Before any patterning in his visual performance could be established, the sight stimulus had to be reduced. This was done by using a blindfold. Upon the application of the blindfold, his attention span increased to approximately forty seconds. The decrease in the sight stimulus allowed him to organize figure-ground to the extent that he was able to center on a task for forty three seconds.

4. INABILITY TO SELF-DIRECT

There are specific factors that must be present to permit a child to successfully self-direct an activity.

1. There must be a goal established and this goal must be within the child's ability to achieve.
2. The child must be able to visualize and understand the various concepts and principles involved in achieving the goal.
3. The movement patterns and the time and energy used in execution must be understood.
4. The child's space awareness plays an important part in visualizing the activity.
5. He must have self confidence gained from his previous experience of self-directing. With self confidence there will be less stress, allowing figure-ground to remain intact. When figure-ground breaks down, visualization is inhibited, thus resulting in a decrease in the ability to visually process information.

A child who has had most of his thinking done for him will function more comfortably in the role of a follower than in that of a leader.

The lack of self-direction can become so embedded that it will impair a person's whole perception of space, especially in the continuity of events. In the case of Martha, age 16, the school changed her lunch period to a later time. The teacher reported that for two weeks Martha had two lunch periods. She could not visualize the change of events in terms of time and space.

This same girl, after several hours of training, was only able to do four self-directed eye movement patterns. Upon the completion of these four eye movement patterns, the following observations were made.

1. She appeared exhausted
2. Her face was flushed
3. Increased respiration
4. Increased perspiration
5. Change of body posture from sitting position to slumped over

5. LOW FRUSTRATION LEVEL

This is one of the easiest areas to observe. As the child is introduced into a stress situation he will either achieve efficiently or he will show the following signs of frustration:

1. Change of body posture
2. Increased respiration
3. Increased perspiration
4. Increased inability to center
5. Quality of performance drops and there will be a decrease in information processing

As mentioned previously, the frustration level is that point where there occurs a complete breakdown in the figure-ground structure in the perceptual area.

Stress which inhibits the figure-ground organization will cause a decrease in information processing. Stress which does not inhibit figure-ground organization will bring about a better centering and perceptual structure.

INFORMATION PROCESSING AS RELATED TO FRUSTRATION LEVEL

A decrease in information processing in the area of vision can be seen by the changes in field organization. Perceptual space meaning is based upon the individual's perception of field organization and can be observed in the following procedure.

FLANNEL BOARD PROCEDURE

1. Materials include two complete sets:
   Two flannel boards of the same color
   two sets of sixteen flannel pieces, various sizes and forms of the same color
   One flash card, 9" X 11", to be used by the clinician

2. The patient is seated on a stool, and the flannel pieces are arranged on a tray directly in front of him. The flannel board is on a stand to his left. This position allows him full view of the clinician's flannel board.

   A. The clinician holds the flash card in front of his flannel board in such a way as to obscure the patient's view as he places one of the flannel pieces on the board. Using manual flash he quickly exposes the scene. The patient

must then select the matching piece from his tray and place it on the board in the exact position as the clinician has placed his.

The clinician continues this procedure, gradually increasing the demand by adding one piece at a time, until the patient is no longer able to match the exposure exactly. When this point is reached we see the placement of the wrong sizes and forms as well as errors in direction. The quality of the performance has dropped in terms of field organization. The patients performance is recorded by an assistant for further analysis

B. The continual math problem (see page 17) is now applied to the procedure as outlined in A. This shows the effect of stress on the ability to visually process information. The patient will respond in one of three ways.

1. The quality and quantity of the response may increase over that done in A. The stress will have brought about a better visual response (figure-ground).

2. The weakest of the perceptual visual discrimination skills will drop out sooner and the field organization (Gestalt) will be fixed at that point. This point is indicated when the patient is no longer able to match the flannel pieces exactly under the stress of the math problem.

3. We may notice that some of the perceptual visual discrimination skills may drop out, but that the patient will be able to expand his field organization. When either the perceptual visual discrimination skills or the field organization is impaired there will be a definite restriction in space meaning. The patient's performance is recorded and compared to the record taken of the performance in A. This will show the effect of stress on the patient's visual performance.

Section 3

COMMUNICATION

COMMUNICATION

Communication is an exchange of meaningful information between an organism and its environment. We must not think of it as being limited to the exchange which takes place between human beings. Actually it serves as the basis of the "life" which makes up the world that surrounds us. In order to achieve, we must learn to communicate with <u>that</u> which surrounds us.

It is not possible for two individuals living in the same physical environment to perceive it with the same meaning. Each person's communication will be based upon those experiences which he alone has experienced previously. These events are not just dropped into a pot from which he draws information. They are held together in an orderly manner by concepts that are related by time and space.

One of the basic factors involved in communication is the Recall-Relate-Direct process. This process is based upon the function of the visual system. Another factor in communication is directionality. Directionality is the ability of the individual to visually direct his thought process in three directions.

1. Towards the Past (recall)
2. Towards the Present (relate)
3. Towards the Future (direct)

In the early development of directionality in children, there occurs a reversal process that must be present in order to develop concepts. This process was observed when a child was confronted with two balls. He could say that one was smaller than the other; the reverse process of determining that one was larger than the other was much slower.

In each tense the thought process must be goal oriented. The individual must be able to visualize the sequence of events and the direction they take. A person who sets up his goal and then visually directs his movement patterns in that direction is said to have directionality.

As a person initiates the act of recall, the searching process must pass through ground in order to reach figure. This process can be observed in many ways. One observation of this was made during a tachistoscopic training session. The word "above" was presented to a patient using a flash of 1/100th of a second and he responded by saying, "below".

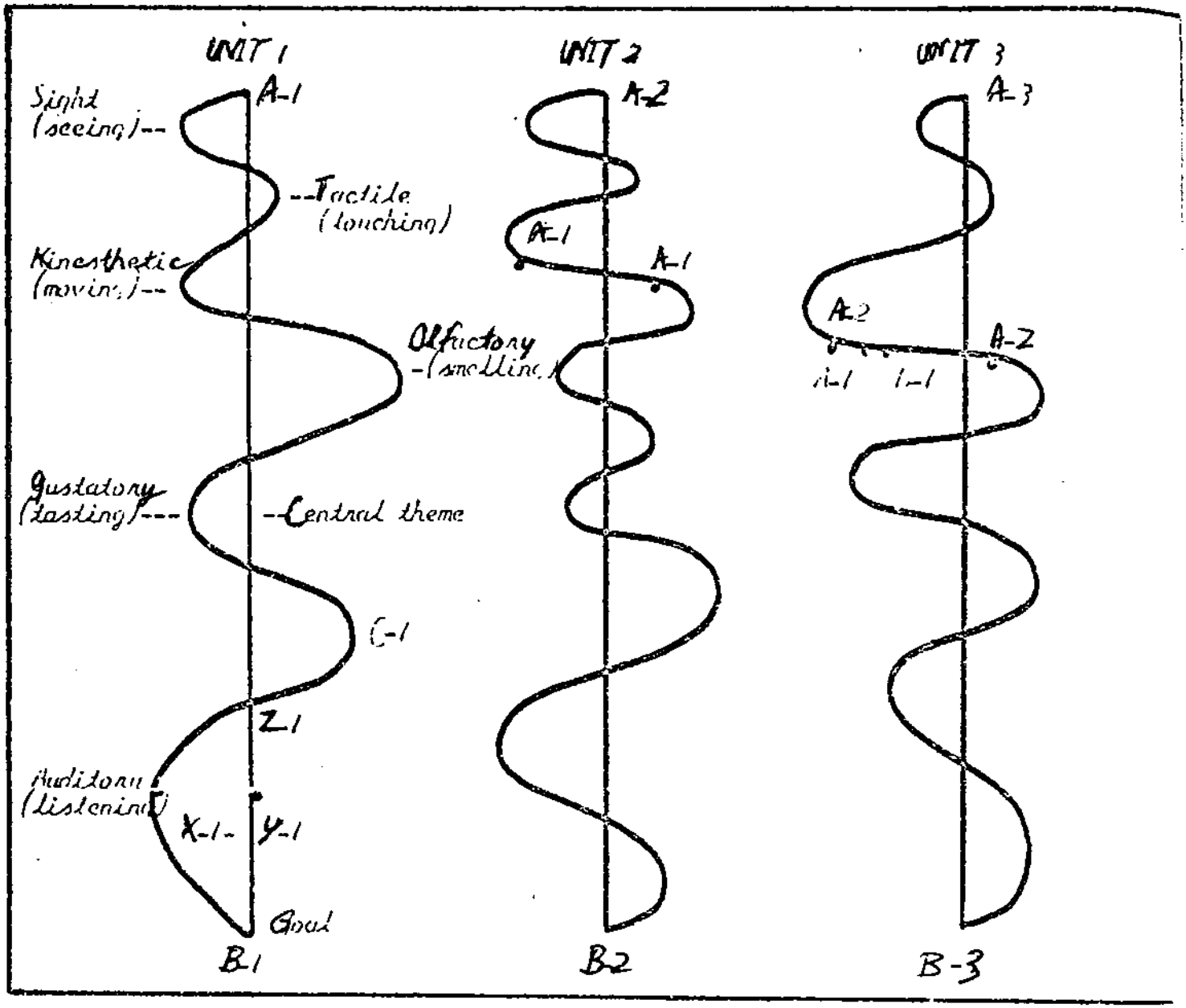
In the searching process he was able only to get as far as the concept of position (ground); therefore, not able to identify the exact position, (figure) designated by the word, above.

How efficiently each individual processes information and directs his movement patterns in the process of learning will depend upon the efficiency of his visual system. An attempt to illustrate graphically an individual's communication pattern in terms of environmental meaning is made in the following diagram.

The units, 1, 2, and 3, represent an individual's communication pattern of three different designated time periods. Unit two is composed of units of unit one, and units of two become unit three. Units 1, 2, and 3 could be assigned time periods of one hour, twenty four hours, and one week.

An explanation of Unit A is as follows:

1. The straight line represents a central theme of the activity (A1 - B1).
2. The distance from A1 to B1 is the time space factor.
3. A1, C1, B1, represent the change in the continual sensory experience as related to the central theme.



4. Z1, X1, B1, is the amount of experience perceived from an activity based mainly on auditory centering over a fixed period of time (Z1, B1).
5. X1, Y1, is peak of maximum sensory experience. This will vary with the environment.

OTHER FACTORS OF COMMUNICATION

1. Perceptual Set

This has been explained in detail on page 16. In general it relates to the overall readiness of an individual to participate in a visually directed activity.

2. Moment of Readiness

This may be observed in young children as being a certain moment when cognition suddenly takes place. It is as though a light is suddenly turned on. At this time the child is most receptive to learning. This moment of readiness will be recognized by an instructor only if he is communicating with the child. If it is not recognized, or is passed by, the opportunity for increased learning is lost.

3. Figure-Ground

Figure-ground organization is a perceptual process which enables an individual to perceive his environment in terms of meaningful experiences. A multi-sensory approach to this subject is very basic if we are to understand the function of vision.

There are certain Gestalt principles that underly differentiation and unification which are functioning in each sensory area. Anna Berliner in her book, "Lectures in Visual Psychology", lists the following five as functioning in the area of sight:

A. Good figure and continuation

The more regular the contour, the more the enclosed region tends to become figure.

B. Closure

An uninterrupted line that returns to its starting point determines a unit. This demand for closure has been observed in the block building of three and four year old children.

C. Proximity

That which is close tends to unite and become figure.

D. Equality

That which is equal tends to unite and separate from that which is different.

E. Movement

Weak contours which remain without influence upon the organization may suddenly assume great importance if they are desplayed against one another. An illustration of this principle would be a child, in a class of children, suddenly raising his hand, and becoming figure against a background of other children. *

There has been extensive research of the function of figure-ground in the area of sight. The principles found here, if basically true, should be applicable to all sensory perception. An effort should be made to visualize these principles operating in an individual's performance, as he communicates with his environment.

4. Space Organization

Space organization is the process whereby the individual structures his perceptual space world. There must be an integration of all sensory perception into meaningful experiences. In each sensory area the individual differentiates meaning by utilizing the perceptual discrimination skills unique for that area.

5. Space Continuity

The activities of the day and their relationships in time and space may be likened to the relationships found in reading a story. In reading a story a single word can give a minimum clue that speeds up the thought process and brings more meaning to the reader. The same process must be functioning as the individual moves through his daily activities.

* Max Wertheimer "Untersuchungen zur Lehre von der Gestalt" Psych. Forsch., 4, 1923

There is a central theme which binds the events together and develops a perceptual set which allows the individual to respond to a minimum clue stimulus. Speed reading is a good example of this speeding up of information processing.

In terms of figure-ground, the awareness of ground produces the supporting structure for environmental communication. Children who become entirely centered on figure (the T.V. set) may lose the awareness of the ground stimuli. The process of figure-ground organization must be functioning so that both ground and figure are perceived with maximum meaning simultaneously.

The environment is an important factor in developing communication patterns in children. As mentioned previously, children process information from all sensory areas.

The figure-ground organization will vary for each area. Some individuals respond more efficiently to one type of stimuli than another. For example, those who have learned to achieve in an auditory environment will learn best by listening.

Children must be given the opportunity to achieve in all sensory areas. This will allow the child to develop the figure-ground organization necessary for future sensory demands. This is extremely important for young children, because of the change in the pattern of instruction over his school years.

In the early years, the classroom instruction demand is centered more in the area of kinesthetic and sight. Later, as lectures become more and more the main method of classroom instruction, the pattern of learning becomes more auditory centered.

VISUAL TESTING AND TRAINING PROCEDURES

The currently used testing and training procedures may be revised or altered to meet the new requirements for measuring and training the basic visual processes. The following discussion, of the function of a testing and training procedure, will be most helpful in designing new procedures and revising old ones.

TESTING PROCEDURES

1. In the test procedure the demand is started below the individual's level of ability. The demand is then increased slowly until the frustration level is reached. The test demand and performance is then recorded.

   It is necessary for the test demand to start low and be increased slowly as the change demand brings about a perceptual set or readiness for the test.

   Additional information may be obtained by continuing the test demand just below the frustration level. This procedure gives us the additional information as to how the child will function under a sustained visual task demand.

TRAINING PROCEDURES

1. The task demand is started in the same manner as in the test procedure, except that when the frustration level is reached the demand is maintained just below the frustration level. As visual organization develops, the demand is increased. This demand is continued until fatigue is observed and the frustration level begins to become lower.

   In both procedures the clinician must always be aware of the environmental demand and the perceptual set of the individual.

Section 4

VISUAL TESTING AND TRAINING PROCEDURES

PRINCIPLE OF CHALLENGE

It is of utmost importance when introducing a testing or training procedure to start way below the child's level of ability. The stress demand is slowly increased until the frustration level is reached. The demand is then continued just below this level.

The feeling of a gentle increase in the task demand brings about a challenge which produces a perceptual readiness to perform within his ability. Never start above and then work down to find his level of ability. This would produce a feeling of failure and encourage the development of lack of confidence.

If you start low and do not reach his frustration level, there will be very little challenge developed. The challenge brings about a better centering ability.

VISUAL ANALYSIS

In analyzing an individual's visual performance, two things must be kept in mind:

1. The state of the visual system as determined by a visual examination
2. The area of stress that is causing a restriction of information processing

A visual examination should consist of the following:

1. Case History

   Record all background information pertaining to

   A. The patient's health
   B. The patient's past, present, and future environment
   C. The patient's present performance based upon the Low Achiever Behavioral Syndrome

D. Patient's complaint

2. Standard Optometric tests

These tests are designed to investigate and measure the accommodative convergence relationship and the ability to process information, derived from the field of sight.

3. Visual Processes Tests

This is measured by a group of tests designed to investigate the patient's ability to perform visually in a multi-sensory environment. These tests should explore the following areas:

1. Figure-ground organization and structure
2. Frustration level
3. Performance levels
4. Centering
5. Perceptual visual discrimination skills
6. Field organization
7. Visualization
8. Directionality
9. Speed of recognition
10. Learning process of recall-relate-direct
11. Ability to visually direct movement patterns
12. Ability to visually process information while under the influence of other sensory stimuli

Upon completion of the examination, the patient's visual performance is analyzed in terms of his ability to communicate with his past, present, and future environment. If the patient's vision is such that he is not able to perform up to his potential, then it is necessary to determine the area of stress that is causing a restriction of information processing.

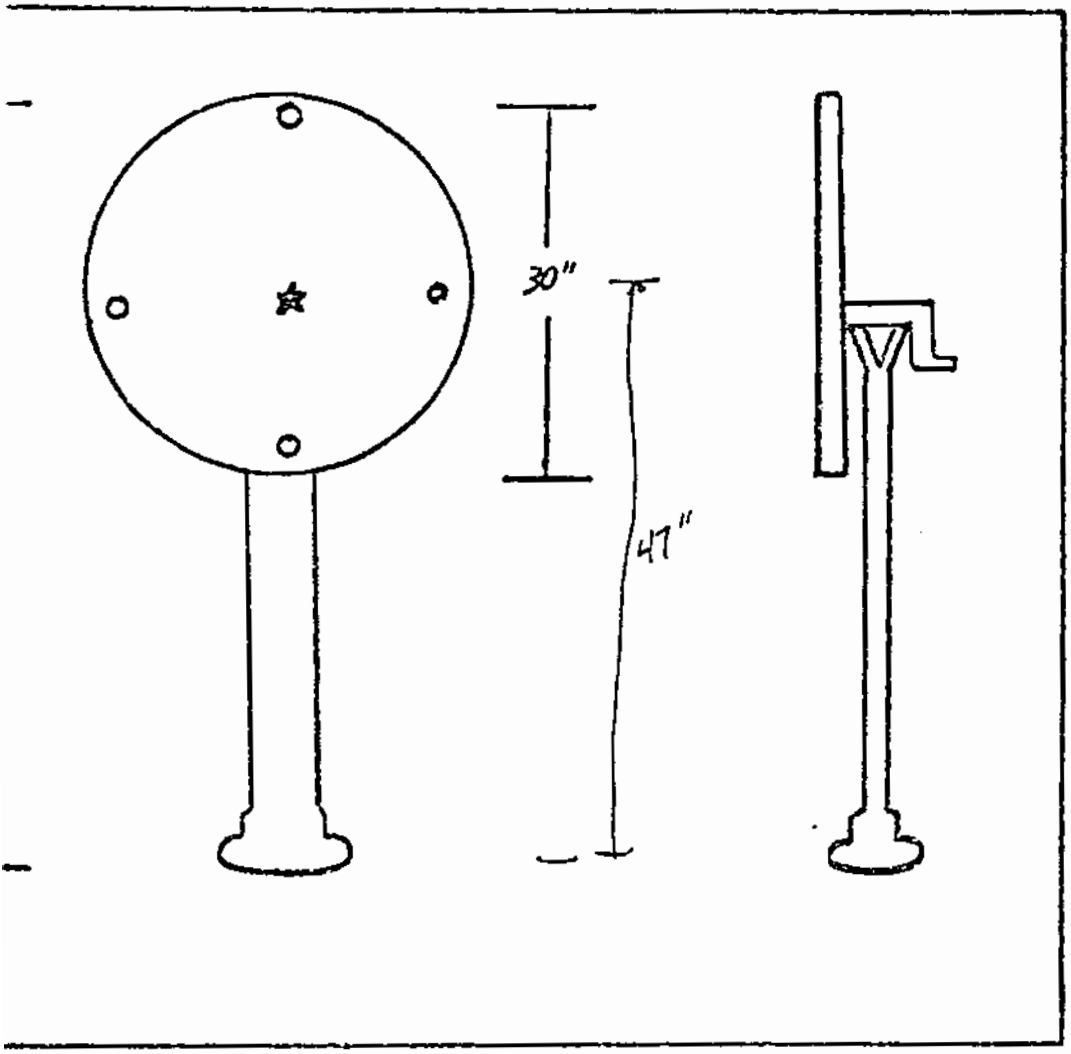
If this area does not lie within the field of optometric therapy, an intelligent referral, based on the information derived from this type of examination, should be made. If it does lie within the field of optometric therapy, then a visual therapy program of lenses and training designed to enhance the patient's ability to visually process information can be recommended.

DESIGNING PROCEDURES

In designing procedures for both the testing and training, it was felt that the same materials should be used for both procedures. The difference would lie in the manner of presentation. Thus, by altering the demand, the procedure could be used with patients of all ages. Presented in this manner the material would then meet the requirements of both testing and training.

The following illustrations will give a description of some of the equipment specially designed for the purpose of testing and training the visual processes.

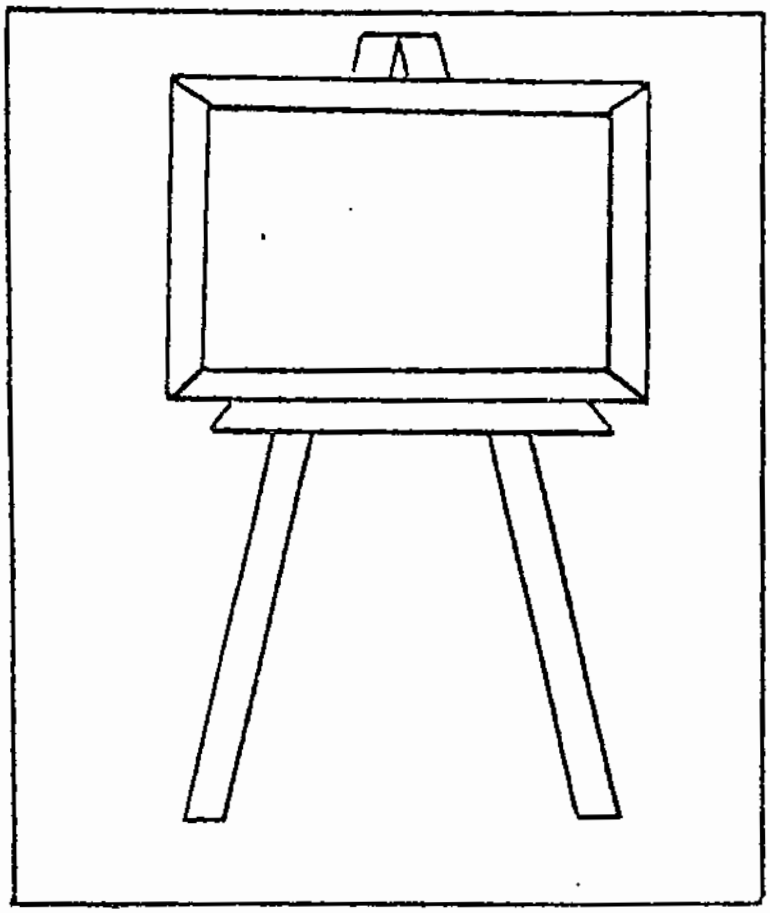
In all the training procedures training lenses should be considered, when with the use of training lenses the patient will ultimately become visually oriented to the task of seeing.

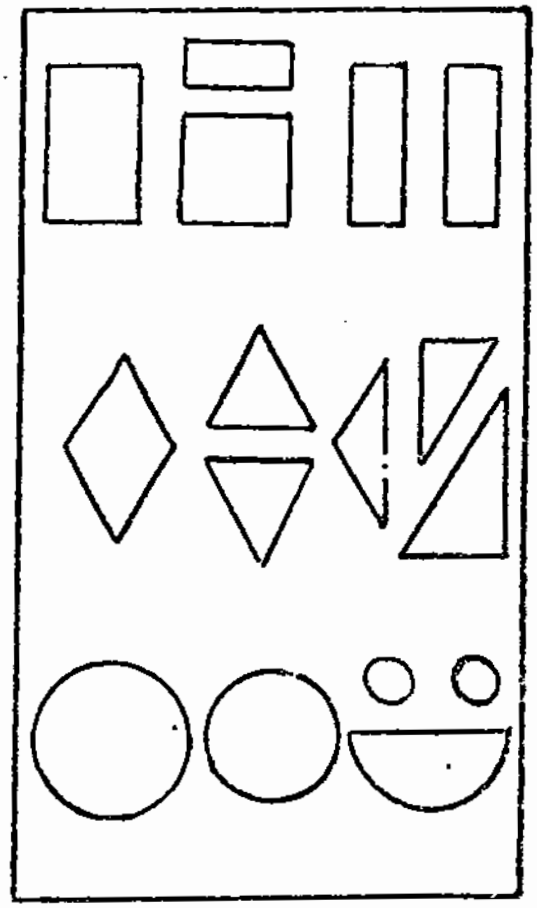


R

tient sits on a stool in front of the rotator. The hands are on the knees and the body is erect but relaxed. The star center of the 30" disc should be at the eye level. Picture s are placed 1 1/2" in from the edge, in each of the four al positions.

cture targets are allowed to remain in an upright position he disc is manually rotated. A large selection of targets essary to vary the demand of the procedure.

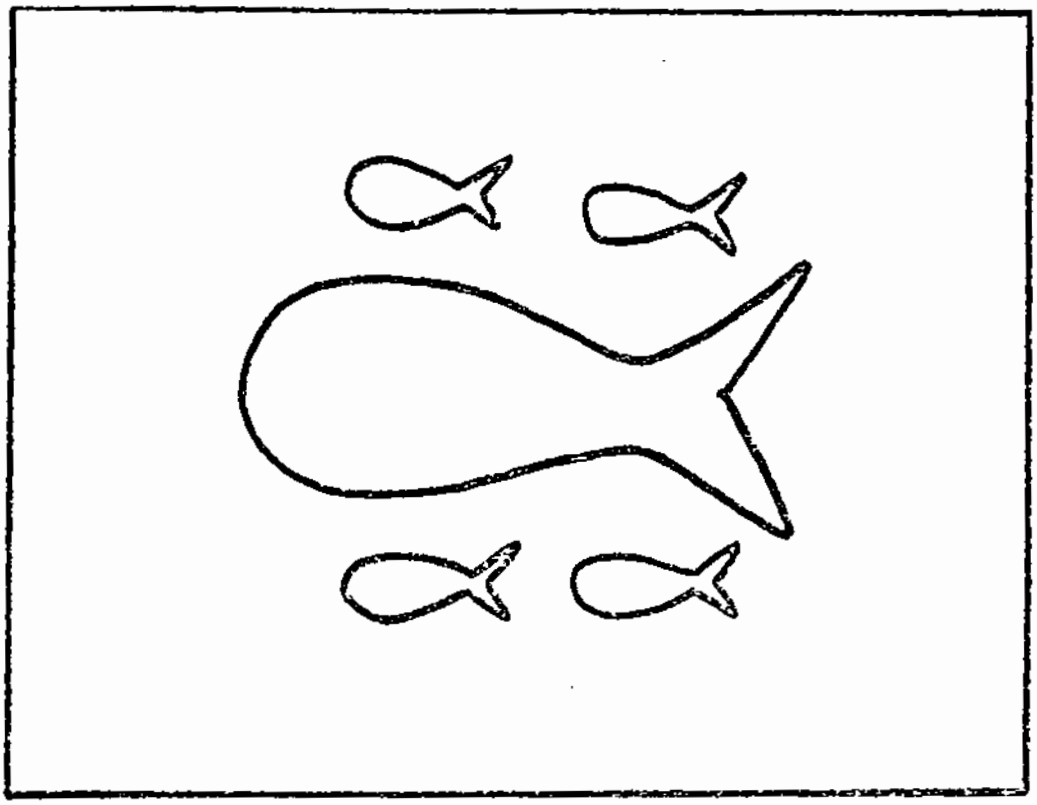




2. FLANNEL BOARD

Kit #1 includes:

1. Two flannel boards, 20" X 28". The front surface of each is a medium blue felt. The back sides have a chalk board surface.
2. Two sets of sixteen geometric shapes which are made of a pile lining material. The color must be the same for each set and must be a good contrast to the blue felt on the flannel board. Cool colors give the best results.
3. One tray, upon which the patient's sixteen geometric shapes are placed prior to his placing them on the flannel board.
4. One 6" X 10 " box which contains the clinicians sixteen geometric shapes.
5. One 9" X 11" flash card.



Kit #2 includes:

A. DIRECTION

Two identical sets of fish. All fish are of the same color.

Each set contains:

1 large fish

4 small fish of the same size

B. SIZE

Two identical sets of circles having the same color.

Each set contains:

One 5 1/2" diameter circle

One 3 1/4" diameter circle

One 2 3/4" diameter circle

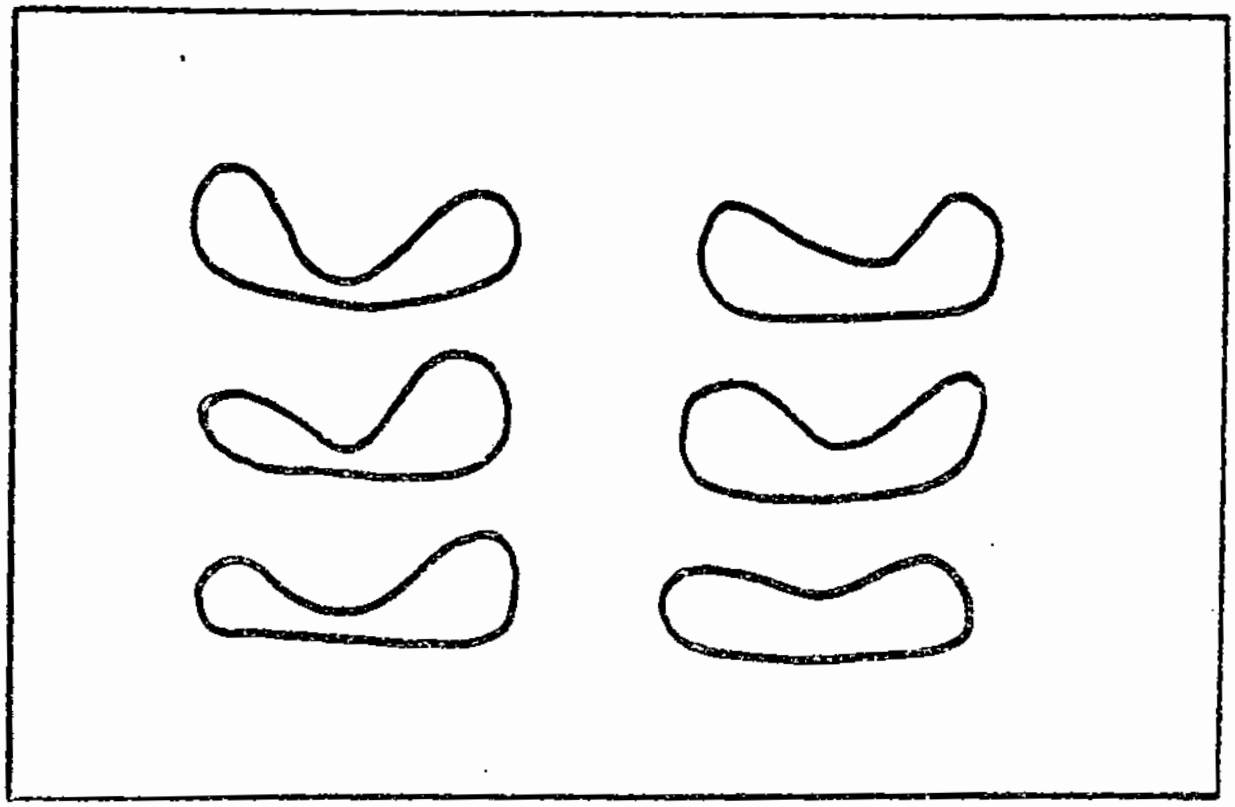
One 2 1/4" diameter circle

One 1 3/4" diameter circle

One 1 1/4" diameter circle

C. SPACE

The same targets which are used for training size are used for training space.



D. FORMS

Two identical sets of forms, both the same color.

Each set contains six different forms

E. COLOR

Two sets of eighteen colored discs.

Each set contains eighteen, 2 1/2" colored circles.

Green - 3 circles of different shades of green

Blue - 3 circles of different shades of blue

Orange - 2 circles of different shades of orange

Brown - 2 circles of different shades of brown

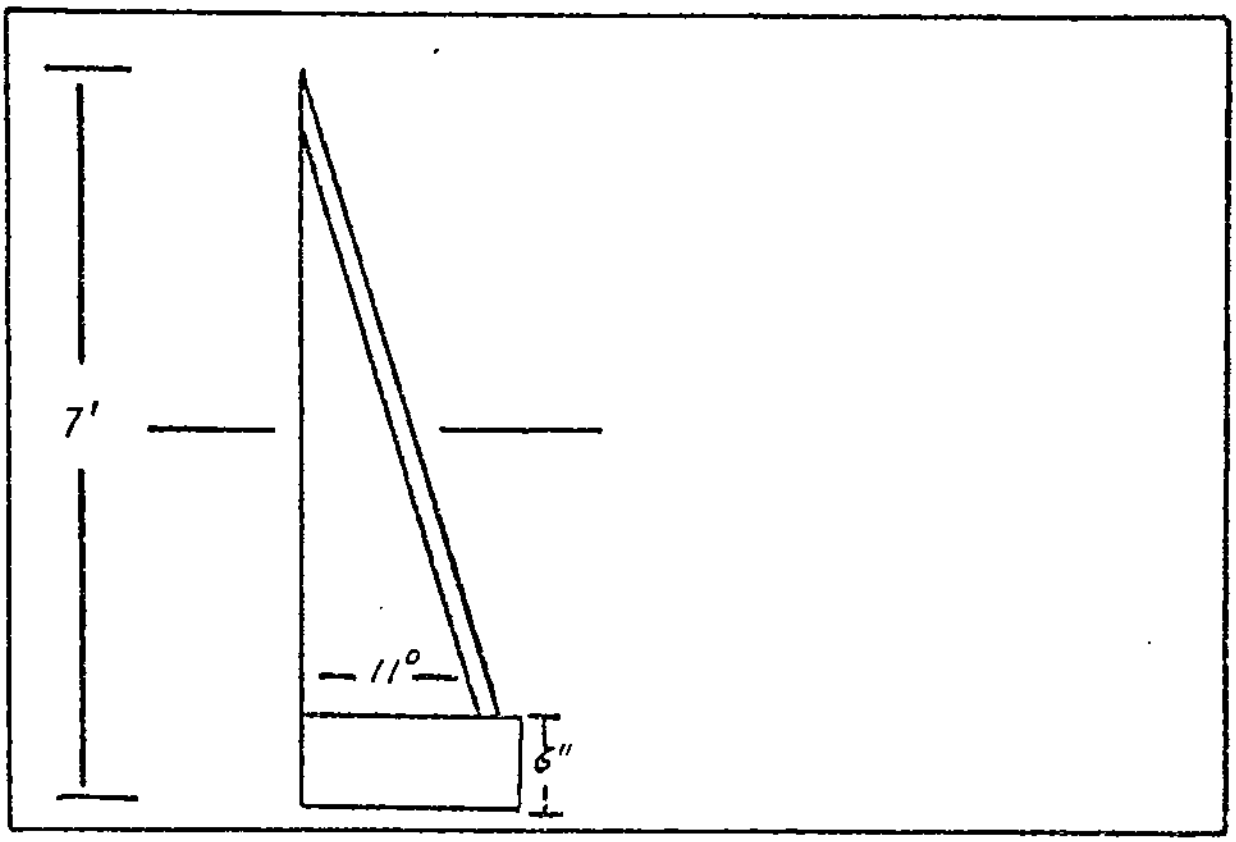
Violet - 2 circles of different shades of violet

Pink - 3 circles

White, Yellow and Grey - 1 circle of each

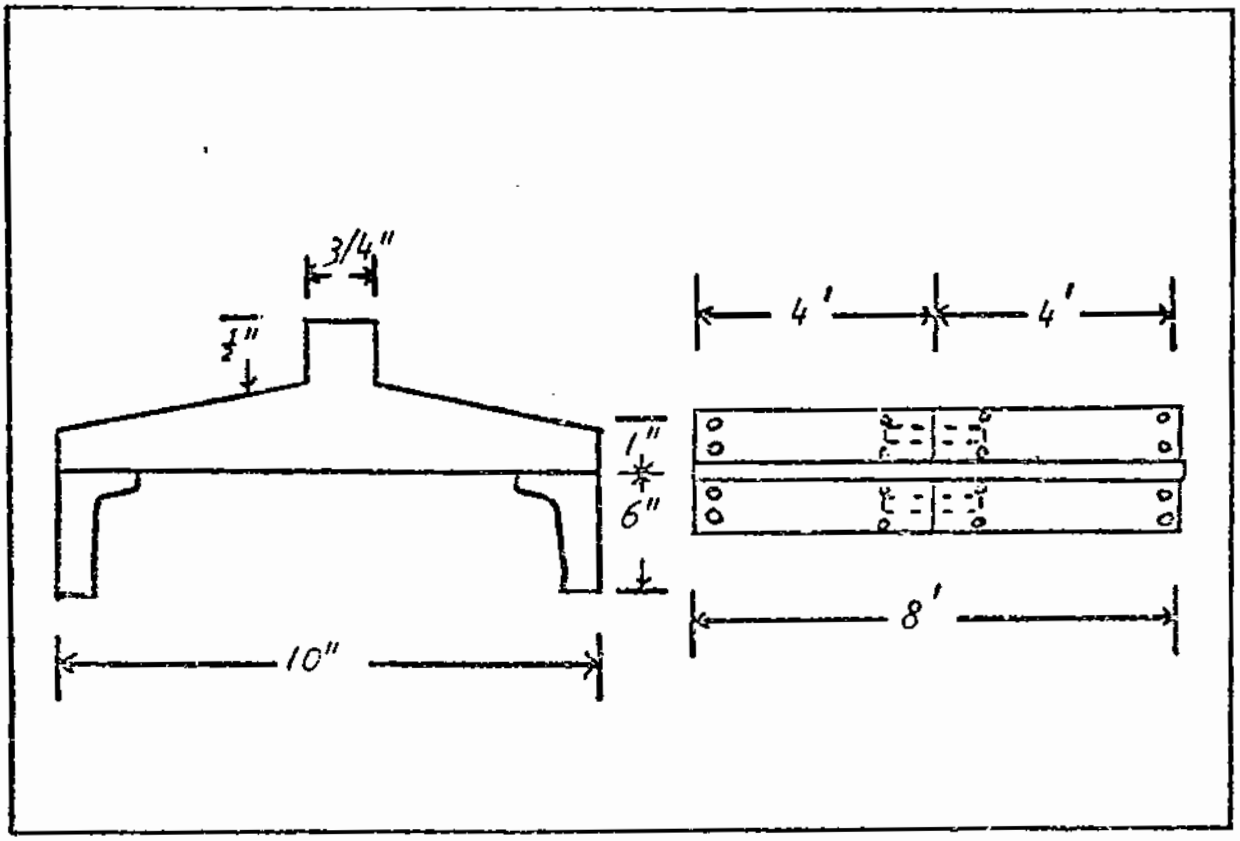
3. TRAMPOLINE

A 4' X 6' nylon bed, pit trampoline, manufactured by Leflar of Portland, Oregon, has proved to be extremely successful because it has allowed close supervision of patients.



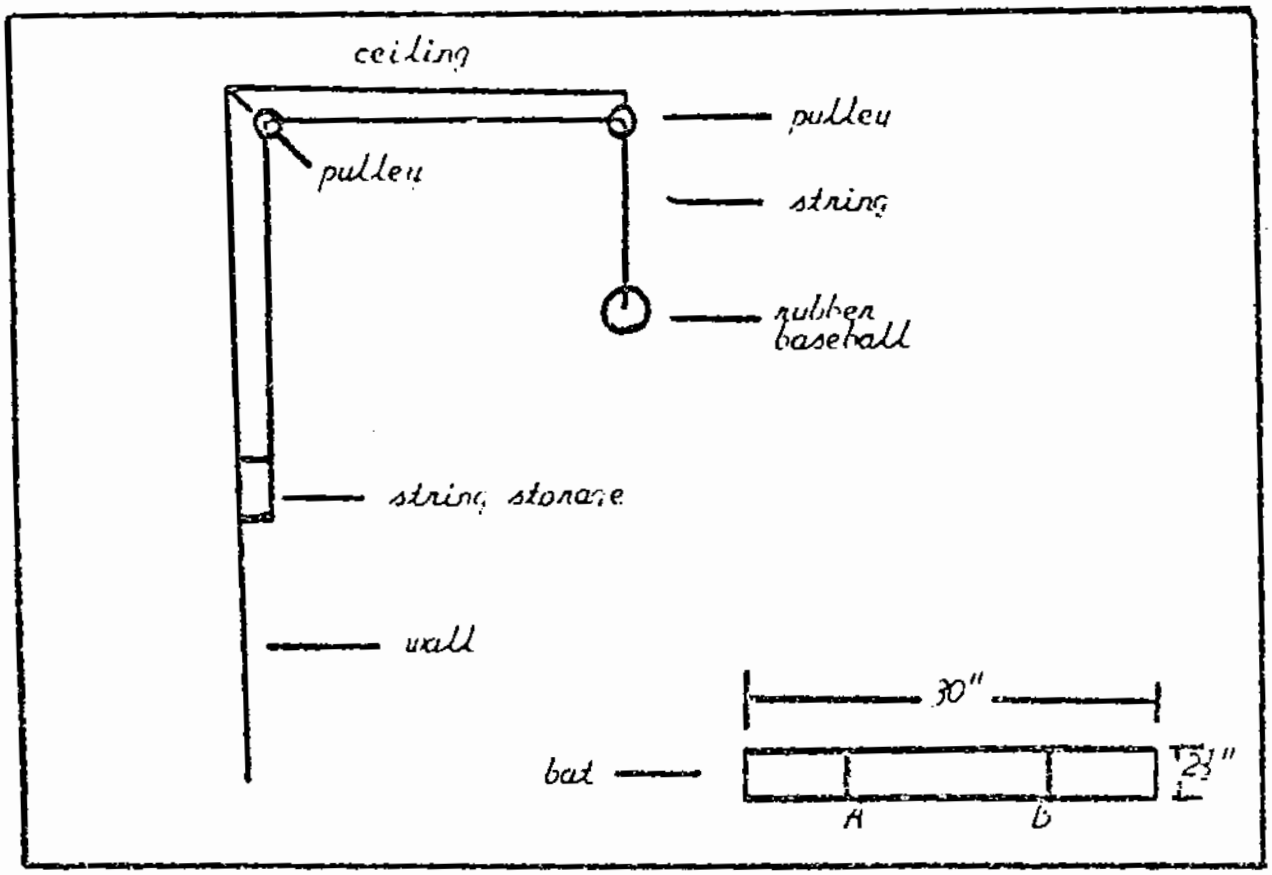
4. CHALKBOARD

A 7' X 4' chalkboard mounted on a 6" base, is placed against the wall in such a way as to form an angle of 11°.



5. WALKING BOARD

The Lowman walking board is made up of two four foot sections which fasten together. They may be taken apart for storage.



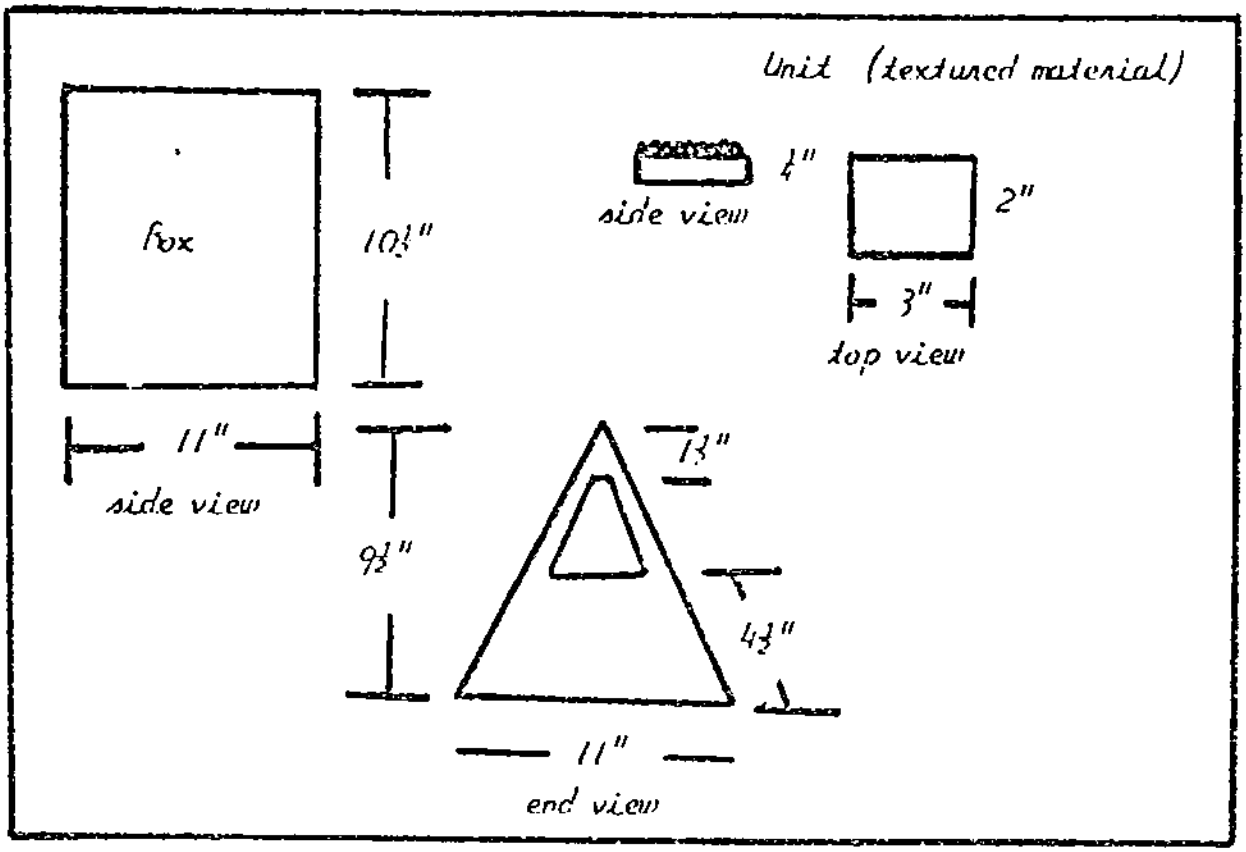
. SWINGING BALL

The patient stands facing the ball which is chest high and arm length away (primary position). His left hand holds the bat at position A, and the right is at position B. The ball may be raised or lowered at the discretion of the clinician.

. TACHISTOSCOPE

A standard overhead Keystone Tachistoscope and the attachments for projecting digits, words, phrases, and 35mm colored slides, is used.

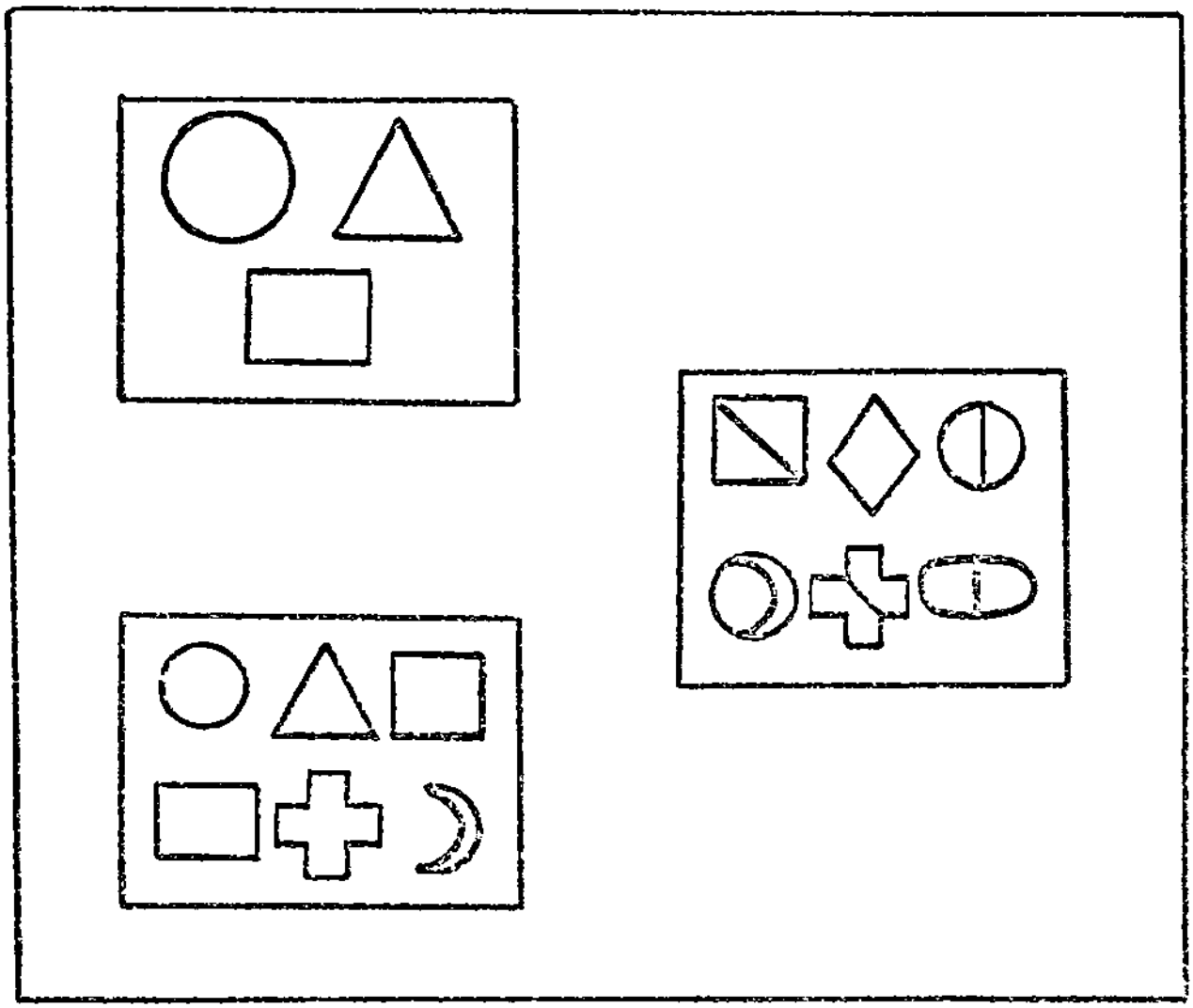
The Phrase-o-scope and slides, which come in a kit, is used for near point tachistoscopic training. This kit may be ordered from Better Reading Program Inc., 20 W. Jackson Blvd., Chicago, Illinois.



8. TACTILE DISCRIMINATION UNIT

Each 2" X 3" X 1/4" unit has one smooth side and one textured side. there are twenty four paired units. Each pair has a textured surface which is different from the other tventy three pairs.

The box is placed on a table in front of the patient to allow him to reach into either end of the box. One unit of each pair is placed inside the box and the remaining units are placed in a row between the patient and the box. The box and the units are placed to allow him to feel the units in the box with one hand and the units on the table with the other hand simultaneously.



9. SPLIT FORM BOARDS

The geometric shapes fit into recessed cutouts in each of the three form boards.

ROTATOR PROCEDURE

TESTING NONSELF-DIRECTED

The patient directs his eye movements in response to the clinicians commands. The insertion of a basic control by having the patient pause for one second before performing the movement pattern, is used throughout the procedure. Early inhibition of figure-ground organization may be observed by the patient's inability to maintain the correct pause pattern. In general the test demand is started low and increased slowly until the frustration level is reached. At that time a record of the movement patterns and stress symptoms is made.

Commands given:

1. Up, down, left, right, etc.
   The patient, in turn, looks to each of the named directions and fixates on the target. The demand is continued, with no set pattern to the commands, until an observed pattern of the eye movements can be established. The performance is recorded.

2. The patient is now directed to move his eyes to the target located <u>opposite</u> to the direction of the command. The patient's response will show the degree of visual organization present. The performance is recorded.

   Normally, the kinesthetic movement of "upwards" is closely associated with the auditory sound of "up". They are linked together and it requires an effort to separate the two. This bond is broken in terms of meaning by having the patient look to the opposite of the direction named. When visualization is inhibited, the patient will respond by looking to the target located in the direction named, in order to become oriented, he will then be able to look to the opposite direction.

Section 5

PROCEDURES

3. The patient is now asked to direct his eyes to the target named.

   The command may include a target which is not on the disc. When this happens, the patient is to remain fixated on the target previously named. If the visualization is low, the patient's fixation will break and the eye will go into a searching movement.

   The test demand may be changed by using targets which are either similar or different in meaning. This involves the principle that the differentiation of differences is easier than the differentiation of similarities.

   As in all commands the demand may be changed by varying the speed of the delivery of the command.

4. The patient is now asked to repeat the performance of #3. This time, he is to direct his eyes to the target opposite of the one named. The performance is recorded.

5. The patient again repeats the pattern of #3. The test demand is changed by the clinician slowly rotating the disc, while the patient is performing. This introduces movement into the visual area. Can the patient visualize an activity, or does he have to stop all movement in order to see. The ability to direct the eyes smoothly and accurately is recorded.

TESTING SELF-DIRECTED LEVEL

The patient fixates on the star and says aloud where he is going to look. He pauses for one second, then directs his eyes to the direction or to the target named. The patient gives the commands instead of the clinician.

Those individuals who have difficulty in self-directing their movement patterns will find this procedure rather difficult. The stress may become so great that there will occur a breakdown of the figure-ground structure (frustration level). This may be observed as the patient's eyes will break fixation and move to the target before he can give the command.

Procedure:

1. The procedures one through five of the nonself-directed level are now repeated with the patient giving the commands. The performance is recorded.
2. The patient repeats the #3 procedure on the self-directed level. As he continues to perform, the clinician introduces the continual math problem (see page 17). The performance is recorded.

   The continual math problem is a test of the patient's ability to retain meaning while self-directing new movement patterns. Does the act of doing make him lose his original goal? Can he remember what he starts out to do? Is he able to start a task, stop in the middle of it, go to another; and when that is finished, return to the original task and pick up where he left off?

3. The number three procedure is again repeated. The clinician asks the patient a very simple question. The patient stops his eye movements and fixates on the last named target. He answers the clinician's question and then as quickly as possible returns to directing his eye movements to the target he names. The performance is recorded.

   In this test procedure, we are testing the patient's ability to change his pattern of centering from sight to auditory and back to sight.

The following procedures are designed so the clinician can evaluate the patient's ability to perform visually in a multi-sensory environment.

1. The procedure of #3 again is repeated. The clinician introduces an auditory stimulus. The patient is to continue to function in spite of the auditory stimulus. The auditory demand is started with low meaning and gradually increased until the frustration level is reached. The more meaningful the stimulus the greater it tends to become figure. The performance is recorded.

2. The procedure of #3 is repeated under a tactile stress stimulus. The clinician touches the patient and gradually increases the meaning of the stimulus. The performance is recorded.

   The test will give information relating to the ability of the patient to perform in environments involving temperature, humidity, and texture stimuli.

3. The procedure of #3 is repeated. The patient is asked to do a very deep knee bend while directing his eye movements. The performance is recorded.

As the kinesthetic stress increases, the patient will have to increase the figure-ground organization. As seen throughout all the self-directed procedures on the rotator, the eye pattern will break when the frustration level is reached.

4. The patient again repeats the #3 procedure. The clinician introduces a sight stimulus by bringing an object into the patient's sight field. The performance is recorded. The demand of the sight stimulus may be changed by the following:

   A. Movement

      If an object is moving, it has more tendency to become figure than it does if it is stationary.

   B. Changing the objects

      The object used for sight distraction may be varied in terms of the meaning it may hold for the patient.

ROTATOR TRAINING PROCEDURES

The same procedures are followed that were used in the testing. The only difference lies in the presentation of the demand. In each case the mechanics of the training procedure (as previously outlined) can be followed. Close observation of the frustration level and all outward manifestations of stress must be observed and recorded. At no time should the training therapy be carried beyond the frustration level.

In general the training demands are presented in such a way as to enable the patient to develop figure-ground organization. This in turn will allow him to visually process information derived from the sense of sight while under the influence of tactile, kinesthetic, auditory, and sight stimuli.

FLANNEL BOARD PROCEDURES

The basic procedure for flannel board presentation has been outlined previously on pages 27 and 28.

This procedure is used primarily to gain information relating to the patient's ability to process sight stimuli into meaningful experience. This involves the perceptual visual discrimination skills of size, space, form, color, and direction. Induced stress which inhibits figure-ground organization will bring about a "dropping out" of that skill factor least learned. An example of this in the visual area would be as follows:

Use the printed word L O V E. Under each letter list the skill factors used by the patient for its identification.

L	O	V	E
size	s	s	s
space	s	s	s
form	f	f	f
color	c	c	c
direction		d	d

Let us assume that direction is the patient's weakest perceptual visual discrimination skill and mark out the direction factor in each letter. The word could now be perceived by the patient as ⅃O∧3. This dropping out of direction may occur in varying degrees.

1. There may occur a change in direction of the whole or its parts or both.
2. In tachistoscopic training using words, digits, and phrases the direction factor is easily observed. Individual letters within a word may change direction either horizontally or vertically.

This direction factor, along with the rest of the perceptual visual discrimination skills may occur in varying degrees. It does not follow an "all or none" law.

If the space factor drops out, that information derived from spacial relationships is affected. The size factor can be seen in the drawings and early writings of young children.

The flannel board procedure has made it possible to record the perceptual visual discrimination skills in the order of the patient's ability to utilize.

FLANNEL BOARD TRAINING PROCEDURES

Perceptual Sight Discrimination Skills

DIRECTION

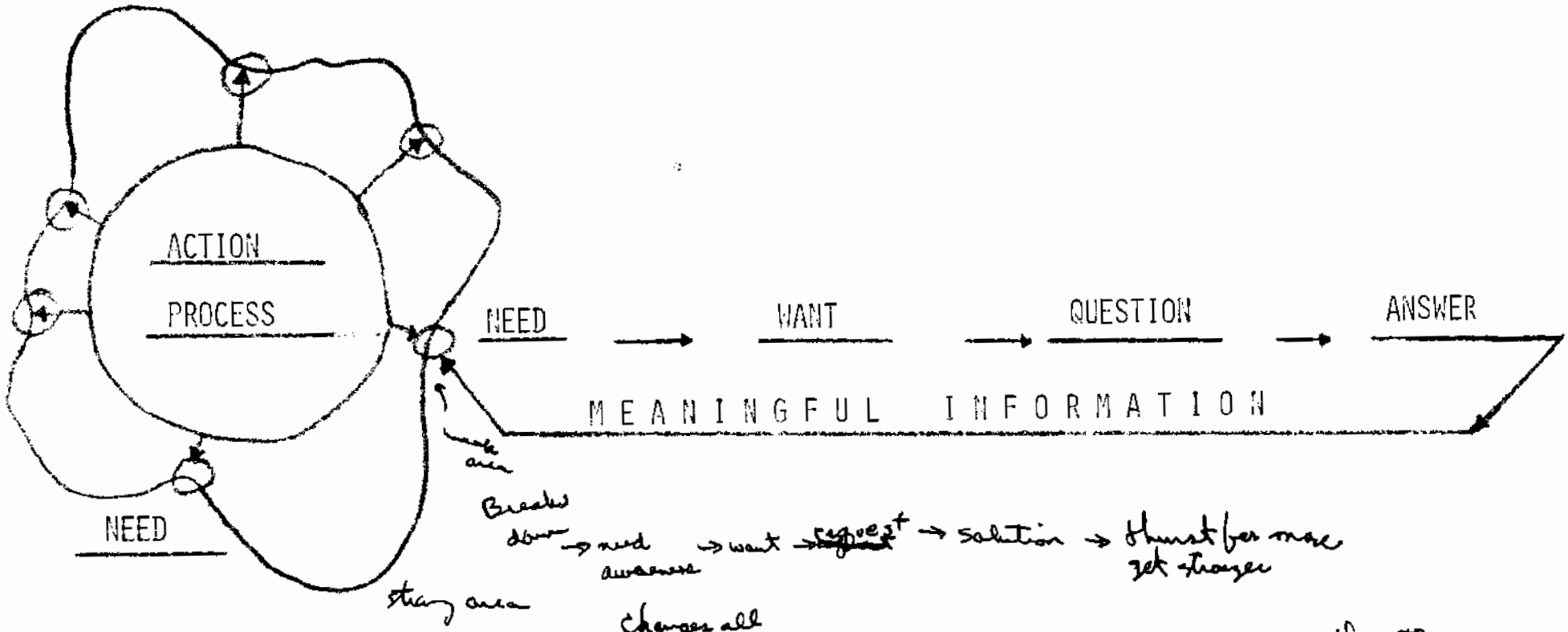
The patient identifies objects by direction of the whole, then by direction of the parts.

1. Equipment: Two flannel boards and two sets of targets Each set contains one large fish and four small fish
2. Constant: Color, space, form and size
3. Variable: Direction
4. Procedure: All targets are presented using manual flash. The patient is asked to duplicate the placement of the targets presented by the clinician.
   A. The procedure is started by presenting one large fish as follows:
      1. In the vertical meridan
      2. In the horizontal meridian
      3. Return to the vertical meridan and gradually decrease the vertical component. When the fish is placed in the 45° meridian the horizontal and vertical components are equal.
   B. Place the large fish in the horizontal meridian. Add one small fish, keeping the space between the two constant. Move the smaller fish to various positions around the larger fish.
      1. The small fish can be placed first in the vertical meridian, next in the horizontal and last in the diagonal.
   C. Add a second small fish changing the direction of only one small fish at a time. Next, change the direction of both small fish.

TESTING

TRAINING

PROCESS



Breaks down → need awareness → want → ~~request~~ → solution → thirst for more get stronger

stay area

Changes all the time.

How much how long

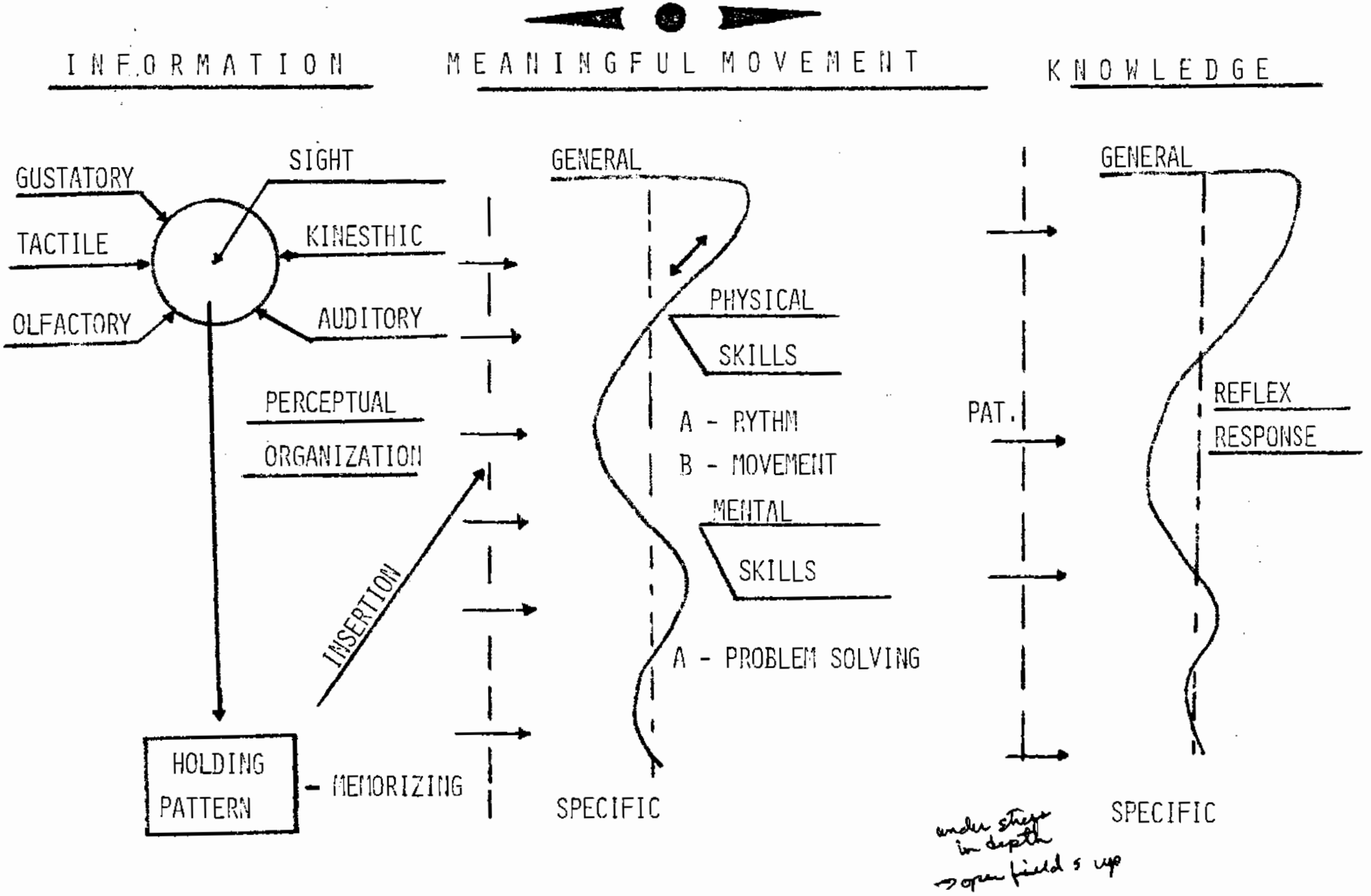
steady

Turn loose of it → is real knowing

catch up – vs. Flow pattern → get stronger as flow go
think shift move

least effort for most meaning

LEARNING PROCESS



PEPPER

CONCENTRATION PROFILE

SCORE SHEET

Name Rob B Date 8-2-74

Skill Tested Size 3 of Parts

Placement

1	1	✓		
2	2	✓	-4	
3	6	✓		
4	6	✓		
5	4		+1	
6	8	✓	-1	Start
7	4		+1	
8	5	✓	-1	
9	8		+1	
10	9	✓	-1	
60 Sec. 11	2		+2	
12	7			
13	6	✓	-1	Slow
14	2		+2	
15	10			
16	4	✓	-1	
17	6		+1	
18	1	✓	-2	
19	9	✓		
20	7			
21	5			
22	9			
120 Sec. 23	3			
24	1		+10	
25	5			
26	8			
27	5			
28	8			
29	1			
155 Sec. 30	6	✓ -1		

Matched Cards
(recorded in sequence of placement)

1	10 3 11
2	6 2 2
3	3
4	4 4 3
5	1 5 5 5
6	4 2 9 6 9
7	7 7
8	10 8 8 8
9	7 6 9
10	10

Time: 2 min 35 sec

Errors: 12

Stress Factors: Standard test instructions

Observations:

The results indicate Rob is a slow starter. Case history confirms this. The slow start section should be evaluated in terms of first 4 placements, The 5 to 10 alternating 1 correct – 1 wrong pattern, and then 11 to 16 – 2 right – wrong pattern. Then a most significant 16 to 19 pattern of 1 wrong 1 right 2 wrong. This final bit of orientation is quite common in its occurrence before things clear up etc. 20–29 pattern.

D. Add a third small fish and start the procedure by changing the direction of one small fish, then two and finally three.

E. Add the fourth small fish and repeat the same procedure.

F. The large fish may be changed to the various meridians and the procedure of A - E repeated.

The following procedures are presented to observe and train the patient's ability to visually identify by direction in a multi-sensory environment.

1. The procedure of #4 is repeated. The clinician introduces an auditory stimulus. The demand is started with low meaning and gradually increased until the demand is just below the frustration level. Record the performance.

2. The procedure of #4 is again repeated while the clinician introduces a tactile stress stimulus. The clinician touches the patient and gradually increases the meaning of the stimulus. Record the performance.

3. The procedure of #4 is repeated under a kinesthetic stress stimulus. This may be done by having the patient perform deep knee bends, swimming strokes or jumping on the trampoline. Record the performance.

4. The procedure of #4 is again repeated while the clinician introduces a sight stress stimulus. This may be done by bringing an object into the patients field of sight. The demand may be changed by:

   A. Changing the object

   B. Factor of object movement

SIZE

The patient identifies objects by size. There are two factors involved in the process of identification of size. First, the patient must be able to perceive an object as being larger than the other. Second, the reverse process in which he perceives one object as being smaller than the other. It is a frequent observation that young children identify size easier in one direction than they do in the other.

1. Equipment: Two flannel boards, a flash card, and two matched sets of different size circles
2. Constant: Color, form, direction, and space
3. Variable: Size
4. Procedure: Use manual flash
   A. The large circle is placed on the clinicians flannel board and is to be used as a circle of reference.
   B. The clinician now places one of the remaining smaller circles next to the larger circle.
   C. The patient is asked to match the position of the smaller circle as the clinician flashes the target manually.
   D. The procedure is repeated for each of the remaining circles.
   E. The smallest circle is now used as the circle of reference and the entire procedure is repeated. Record performance.

FORM

This is a process whereby the patient perceives form as figure against a background of space.

1. Equipment: Two flannel boards, a flash card, and two matched sets of various forms
2. Constant: Color and space
3. Variable: Form, direction, and size are kept to a minimum.
4. Procedure: Use manual Flash
   A. The patient is to match the forms presented by the clinician.
   B. The targets are presented in order of their difference. The target of greatest difference is presented first, then each subsequent target becomes more similar. This follows the principle that the differentiation of differences is easier than similarities. Record the performance.

SPACE

The patient identifies by space.

1. Equipment: One set of circles of different sizes, and a flash card
2. Constant: Size, color, form, and direction
3. Variable: Space
4. Procedure: Use manual flash
   A. Two targets are used, one target of reference. The size of the other target is used as a space unit.
   B. As the space separation is flashed the patient is to report the number of space units present between the two targets.
   C. The procedure is repeated in all meridans. Record the performance.

COLOR

The patient identifies by color.

1. Equipment: Two sets (18 in each set) 2 1/2" colored discs
2. Constant: Size, form, directions, and space
3. Variable: Color
4. Procedure: Use manual flash
   A. The patient matches the colored disc flashed by the clinician.
   B. The procedure is started by using one disc from each color group. The patient matches the group color (differentiation of differences).
   C. The patient is presented with the discs from one color group (differentiation of similarities).
   D. The demand is increased slowly by the clinician as two groups are used, then three groups etc. Until now the patient has been asked to identify the exact color of only one disc at a time. The demand now requires the patient to identify two colored discs at a time, then three at a time etc. The space and direction are kept constant. Record the performance.

TRAMPOLINE PROCEDURES

The function of the visual factor, which is present in all movement patterns of communication, has become more meaningful through the use of the trampoline This piece of equipment has provided the means of developing a basic challenge to achieve in young children. In general, pre-school children relate their ability to achieve in terms of the movement patterns they perform. They become quite aware of the parts and function of their bodies and how they can control their movement patterns to achieve the most desired results.

The trampoline demands a repeated rhythmic pattern of movement which allows the patient to compare each new movement to the last one. He then is able to make corrections as he visually directs new patterns. At first these adjustments are gross, then as he begins to feel the movement pattern the corrections become more refined. The patient should not be allowed to perform movements that would endanger his safety.

TRAMPOLINE TESTING NONSELF-DIRECTED LEVEL

1. Equipment: Trampoline, chalk board, and four imaginary animals
2. Purpose: To determine the gross motor coordination and the patients ability to visually direct large movement patterns while functioning on a nonself-directed level.
3. Procedure: The patient is asked to perform the fundamental bounce.
    A. Start from a standing position and with the head erect and the eyes on the bed.
        1. The arms swing forward and up in a circular motion.
        2. The feet are brought together and the toes are pointed down while in the air.
        3. The feet are kept about fifteen inches apart when landing on the bed.

While the patient is bouncing, the clinician directs him to turn by quarter turns to the right, left, or a multiple thereof.

1. After receiving each command the patient is to bounce once more and then while in the air turn to the direction named. His ability to bounce once more and then turn is one of the fundamental controls.
2. Under stress the ability to turn to the right or left will drop out. Record the performance.

The patient is directed to visualize a different object at each of the four sides of the trampoline.

1. The clinician now directs the patient's turns to the objects. The patient must be able to visualize the change from direction to localization.
2. The demand is increased by having the patient respond first to the command of one object, then second to the command of two objects, etc.

'ING SELF-DIRECTED LEVEL

Same as that used in the nonself-directed level
o determine the patient's ability to visually self-direct
movement patterns while bouncing on the trampoline
The patient says aloud what he is going to do, bounces
more and then performs the movement pattern.
For testing of direction the #3 (B) procedure in
the nonself-directed level testing is repeated.
The procedure of #3 (C) turns by objects, in the
nonself-directed testing is repeated.

. While the patient is performing the turns to objects the clinician introduces the continual math problem.

. The procedures A and B are now repeated under an auditory stress stimulus.

Record the performance.

RAINING NONSELF-DIRECTED LEVEL

t: Trampoline, tachistoscope and slides for digits, phrases, nd color pictures, two flannel boards, two sets of flannel ieces, four imaginary objects and a chalk board.

To enhance the patient's ability to visually process infor- xtion while under the kinesthetic stimulation of bouncing n the trampoline.

e: The patient practices all four phases of the fundamental ounce.

. The patient practices the following phases of the knee drop.

1. While performing the fundamental bounce the patient lands on his knees keeping the back straight and the body erect.

2. He comes back up to the erect jumping position and lands on his feet.

Next, he performs the seat drop from the fundamental bounce.

1. He lands in a flat sitting position
2. Be sure he places his hands on the bed beside his hips
3. He now pushes with his hands as he returns to an erect position.

2. The patient then matches the target by selecting the identical piece and placing it on his board in the same position.

F. Substituting the tachistoscope and targets for the flannel board kit, the procedure of E is repeated. The clinician flashes digits, words, phrases, and 35 mm colored slides, as the patient does seat and knee drops.

G. The word W A S H I N G T O N is presented on the chalk board.

1. The patient says each letter aloud just as he bounces. This is done in perfect rhythm saying the letter and bouncing simultaneously. The demand is increased by having him spell the word backwards. It is increased again by having him perform with his eyes closed (visualization).

2. The word W A S H I N G T O N is again printed on the chalk board. This time three of the letters (S, I, and O) are in different color of chalk. The patient now repeats the spelling and bounces except that when he reaches a different colored letter he does a knee drop instead of saying it aloud. Next, he is directed to repeat the procedure doing a seat drop on each of the colored letters.

H. The word T R A M P O L I N E is now printed on the chalk board. The patient is directed to bounce and say aloud

every other letter. On those letters he does not name he is to insert the correct number. (T 1 A 2 P 3 L 4 N 5). This is done forwards and backwards.

1. The target is covered and the procedure repeated. The patient must now visualize the spacial relationship of the letters and numbers as he bounces and says them aloud. This is done forwards and backwards.

1. The sentence, "The boy is standing in the lake," is written on the chalk board. The patient spells aloud each word as he bounces. This is done forwards and backwards while facing the chalk board.

    1. The procedure is repeated with the chalk board covered. The patient must now visualize the sentence. This is done forwards and backwards.

1. All preceding procedures may be repeated under the auditory stress stimuli.
   Record the performance.

TRAMPOLINE TRAINING SELF-DIRECTED LEVEL

1. Equipment: Trampoline and four imaginary objects
2. Purpose: To enhance the patient's ability to visually self-direct his movement patterns as he performs on the trampoline.
3. Procedure: The patient names aloud the direction he is going to turn (right or left) bounces once more, then does a quarter turn to the direction named.
    A. The previous procedure is repeated with the patient turning to the opposite of the direction he has named.

B. The patient names aloud the name of one of the imaginary objects located on each side of the trampoline and then repeats the movement patterns used in A.

C. The procedure of B is repeated with the patient now turning to the opposite of the object he has named.

D. The patient names aloud the direction he will turn and the movement pattern he will perform (seat drop). He then bounces once more in the direction he is facing, turns, bounces again, and performs a seat drop.

1. The same procedure is repeated using the knee drop.
2. The same procedure is repeated with the patient turning to the object named.
3. The same procedure is repeated with the patient turning to the opposite of the object named.

E. A continual math problem may be combined with all of the preceding procedures.

F. All procedures may be done under auditory stress stimuli.

Record the performance.

WALKING BOARD TESTING PROCEDURES

1. Equipment: Walking board, tachistoscope, tachistoscope slides and chalk board.
2. Purpose: To determine the patient's ability to visually direct his movement patterns as he performs on the walking board.
To determine the patient's ability to visually process information while performing on the walking board.

3. Procedure:

A. Five targets are now placed on the chalk board. One is placed in the center for central fixation. Each of the remaining four is then placed in one of the clock positions of 3, 6, 9, and 12.

B. The walking board is placed directly in front of the chalk board to allow the patient to fixate on the target.

C. The clinician directs the patient to stand erect on the near end of the walking board and direct his eyes to the central target.

D. The patient now walks slowly toward the far end of the walking board. The left foot is placed on the left side of the center line and the right foot is placed on the right side. After reaching the end he returns to the starting position by walking backwards.

Record the performance.

E. The patient walks forwards and backwards using the cross step instead of walking straight.

F. The visual demand is now increased by the clinician naming each target and the patient responds by directing his eyes to the new position named. The performance is recorded for the straight step and the cross over step procedures.

G. The walking board is now placed to allow the patient to observe the tachistoscopic targets flashed on the screen at 1/50th of a second.

H. The patient is to identify digits, words, phrases, and pictures; while performing the straight walk, the cross over step, and while standing still.

Record the performance.

TRAINING PROCEDURES

Walking board, tachistoscope, tachistoscopic slides
a chalk board.

To enhance the patient's ability to visually direct his movement patterns while walking
To enhance the patient's ability to visually process information while walking

The test procedures A through H are also used for training. In each procedure the visual demand is started very low and gradually increased until the maximum performance is reached. This allows the patient to experience the feeling of visual achievement.
Record all performances.

ESTING PROCEDURE

Swinging ball and bat
o determine the eye-hand relationships as the patient
s the movement patterns to hit the ball

The patient holds the bat with both hands. Each hand is placed one third of the distance in from each end. The ball is lowered to a position of chest level and the patient stands 2/3 of his arm length away. The patient is now directed to hit the ball controlling the length of the swing to 12", 16", 20", and 24".

D. Next, the ball is raised 18" and the same procedure is repeated.

E. The ball is lowered 16" and the procedure is repeated. If the eye-hand coordination is good the ball will not jump or turn as it is hit with the bat.

SWINGING BALL TRAINING PROCEDURE

1. Equipment: Swinging ball, bat, chalk board, and balance board

2. Purpose:

A. To enhance the patient's ability to visually direct the hand to specific points in space in a rhythmic manner

B. To enhance the patient's ability to visualize as he performs the movement patterns necessary to hit the ball

3. Procedure:

A. The testing procedures A through F are repeated. Each one is repeated until the maximum performance is observed. The patient should have a short rest period between each procedure.

B. The same procedures are now repeated while the patient balances on a balance board.

C. The patient stands on the floor and faces the chalk board, where several words have been printed. As he hits the ball he spells each word aloud in perfect rhythm. This is done both forwards and backwards, keeping the spelling in perfect rhythm with hitting the ball.

D. The procedure of C is repeated with the words covered (visualization).

Record the performance.

MINATION TESTING PROCEDURE

One box and two matched sets of ten textured units

To determine the ability of the patient to identify texture through the sense of touch
To determine the ability of the patient to utilize sight in the identification of texture by touch

One set of matched units is placed inside the box and the other set is placed in front of the patient. The box is placed before the patient to allow him to reach into the box with one hand and with the other hand touch the units that are visible in front of him.

If the correct identification is made, the unit is removed from the box and placed on top of the visible unit.

The patient again reaches inside of the box and this time makes the selection by sight. He does not touch the visible unit but rather says aloud which one it is. The units are then placed as in B.
Record the performance.

MINATION TRAINING PROCEDURE

One box and two matched sets of 18 textured units

To enhance the ability of the patient to identify texture by utilizing the sense of touch.

B. To enhance the ability of the patient to utilize sight in the identification of texture by touch

3. Procedure:

A. The testing procedures A through C are repeated.
The demand is increased slowly by starting with units that are very different in texture (sandpaper and satin) then gradually adding units that are very similar in texture (flannel and wool).
Record the performance.

B. The procedure of A is repeated under auditory stress stimuli.

1. The induced auditory stimulus should be started with a low demand and gradually increased. This will bring about a better centering on the part of the patient.

FORM BOARD TESTING PROCEDURE

1. Equipment: One 3 piece form board, one 6 piece form board and one 6 piece split form board

2. Purpose:

A. To determine the patient's ability to visually match form

B. To determine the ability of the patient to kinesthetically match form

C. To determine the patient's ability to visually recall the sequence of events in terms of time and space

D. To determine the patient's hand and eye coordination

3. Procedure:

A. The 3 piece form board is placed before the patient and the 3 forms are removed and placed at either side of the board.

B. The patient is directed to place each of the forms in its matching space as quickly as possible.

1. Patient returns forms with the right hand only
2. Patient returns forms with the left hand only
3. Both hands are used together to return the forms
4. Forms are returned using the right and left hands alternately

C. The patient repeats the procedure of placing the forms in the matching spaces. After completion he is asked to say which piece he put in first, which was last, and which one was second.

D. The patient closes his eyes and while his eyes are closed the clinician rotates the board 90°.

E. The patient is directed to use one hand to identify the space and at the same time use the other hand to identify and place the matching form in its proper place.

F. Procedures B through E are repeated using tactile stress.

H. The procedures A through G are repeated using the 6 piece form board.

I. The procedures A through G are repeated using the 6 piece split form board.

The performance is recorded.

FORM BOARD TRAINING PROCEDURE

1. Equipment: One 3 piece form board, one 6 piece form board, and one 6 piece split form board.

2. Purpose:

   A. To enhance the patient's ability to visually match form

   B. To enhance the ability of the patient to kinesthetically match form

   C. To enhance the patient's hand and eye coordination

   D. To enhance the patient's ability to visually recall the sequence of events in terms of time and space

3. Procedure:

   A. The testing procedures A through I are repeated for training.

      1. The demand is started low and then gradually increased until the maximum performance is observed.
      2. Keep the demand below the frustration level.
      3. Observe the figure-ground organization.

      The performance is recorded.

IN SUMMARY

1. This manual has been an attempt to study the visual system as it functions under a multi-sensory environment.
2. The principle of reversal performance as observed in the eye movements, has allowed a more controlled means of observing the effect of stress on vision.
3. The testing procedures have made it more possible to evaluate the patient's visual performance in relation to his own environmental visual demands.
4. The training procedure provides a means whereby the visual performance may be enhanced. Thus, enabling the human being to visually process information while centering on a visual task.
5. The visual system must be evaluated in terms of the individuals own visual demands. The therapy should be designed to bring about an increased ability to visually process information while centered on a visual task.
6. Optometry must concern itself with the visual factor as it exists in the performance of the human being. Stress must be evaluated in terms of its effect on vision. If the area of stress does not lie within the field of optometry an intelligent referral to those concerned should be made.

The ultimate goal of optometry is to increase the individual's ability to visually learn and thereby help him to lead a more successful and happier life.

Percept = real

Weak area dispersal first

Recall relate direct at all depths of involvement
arrange the proper integration of the parts of perception to equal the task
Holding pattern → memory
↓ the more meaningful — the longer it stays
meaningful movement

Physical skills - rhythm
pattern of movement (hitting bouncing etc)

mental skills - the learning process
Knowing what's happening all the time
Problem Solving
when can turn loose w/o losing it — that is knowledge

1. Must identify the weak area

Read the situation correctly
& the reflex takes over - and it comes spontaneously

game plan, theme, schedule

Principals
Communication
Learning
Structure (organization)

positive
- confirm it -
How much right is it -
almost right -
Build from that foundation

develops a readiness

Distraction → survival
result

flip out & retreat at a more generalized level

or recover

that mistake is the best friend you've got
/ see pattern - where you were are will be
w/o getting lost.