The Effect of Imagery on the Verbal Ability of Retarded Children

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Definition of Imagery

Given that imagery is so important in learning, you may then wonder if it is possible for humans to become trained in skillfully producing images. Casual thought would indicate that this could be achieved. Certainly you could try to do this yourself by attempting to visualize mental pictures when reading a text or other materials. For instance, when reading a history text, you could try to visualize mental pictures or images of the significant events involving such things as diplomatic negotiations, important battles, or major cultural achievements. Even in mathematics, mental imagery is important; here you can visualize graphic pictures of equations so that you can "see" how one variable changes as a consequence of another. More generally, when you can conveniently generate mental images of things or events, you should do so as a powerful aid to both learning and memory.

Anyone who has ever had a dream knows what imagery is. In recent years, there has been an active concern with developing theories about imagery and relating these to verbal learning and retention theories (Adams, 1976, p. 185).

In discussing the role of imagery, let me ask this: "How would you go about learning anything, from specific items to numbers and pictures?" Let us suppose that you have

ten items to remember. The following is an extremely good way to go about learning them, in fact, throughout grade school this is one of the ways that we are taught to learn. First, you form the image of a familiar place, like your kitchen, and then imagine each of the ten items and place them in a distinct location in the kitchen image. One in the oven, one under the sink, and so on.... At recall, you imagine each image again, image the item in the oven, the item under the sink, etc...

Cicero recommended that the image be vivid and distinct. But besides being just vivid, he said that the image should be bizarre. Do not just simply place the item under the sink, put it in the mouth of a five-legged dog wearing earrings (Adams, 1976, p. 276). Cicero believed that the more outlandish the example that you use, the more easier it is to recall the item. In other words, the way to recall better is to be able to "see" the object. This visual association is one of the most important foundations for learning through images.

Imagery is one of the more elusive and complex topics in the experimental psychology of learning and retention. How one encodes and decodes the nonverbal products of past sensory experience in relation to the present learning situation is a dark jungle of unknowns. The most perplexing problem in the field of imagery is the separation and control of verbal and imaginal influences on behavior.

Many of the findings on verbal learning and retention that are ascribed to imagery can be equally ascribed to verbal mediators. But of course, a staunch advocate of imagery could contend that verbal mediators are internal sequences that have images associated with them as part of their meaning, and it is these images that are the most fundamental influence for learning and retention (Adams, 1976, p. 280). It should be stressed that the existence of the experience of images cannot be questioned. Imagery is a persuasive form of experience and is clearly of utmost importance to humans (Pylyshyn, 1973).

Zenon Pylyshyn, in regard to just what imagery is and does states,

> Any analysis of the nature and role of imagery is fraught with difficulty. The concept itself proves difficult to pin down. Is a visual image like some concievable picture? If not, then in which ways must it differ? Could it, for example, represent abstract relations or must the relations in the image be of an iconic or geometric variety? Is an entire image available at once-as a spatiacally parallel static picture- or do parts of it come and go? If parts can be added or deleted at will, must such parts be pictoral segments, or can they be more abstract segments? Could one , for example, concieve two images of the identical chessboard with one image containing the relation 'is attacked by' and the other not containing it? If so, then in what sense could such a relation be said to be 'in the image'? Must images in some important sense be specific, as implied by such phrases as visual image, auditory image, etc... And finally, must images always be conscious? Can one, for example, make intelligible the notion of an unconscious visual image? (Pylyshyn, 1973).

As is apparent, questions that are asked about imagery imply disputed views about the role that imagery plays in regard to memory and learning. Depending on the situation, there are theorists who support the role of imagery as being real and as a mediator in learning and, in turn, those who reject it. For even though the existance of imagery cannot be questioned, there are opposing theories concerning the role imagery has in learning and memory.

If you doubt the role of mental imagery in memory, then ask yourself how you know the answer to this question: "How many windows do you have in your house?" Almost certainly, you have made a deliberate count of your windows so a verbal response from previous experience is not available to you in memory. What is available to you are the products of sensory experience with your house, which are memory images with spatial representation. To be able to answer the question posed, you have to, in a manner that is hardly understood at all, stroll through a mental image of your house (Adams, 1976, p. 274).

Similarly, Bahrick and Boucher (1968) argue in favor of an "image retrieval before perception" view. If one is asked to recall the color of a couch in the living room of a friend's home, it is likely that the verbal response occurs at the time of recall and is based upon stored visual information (Pylyshyn, 1973). So this sight or visual aspect of learning is extremely important to the

learning process. If we go back to the already mentioned example of telling the number of windows in the house, this aspect is proven. We need to "see" the house in our mind before any attempt can be made to count the windows.

In a more direct definition, by mental image we mean, "the kind of pictoral representation or arrangement which humans can construct on the basis of their own self-instruction" (Millar, 1968, p. 55). Examples of this are when you visualize sitting down to a juicy steak dinner, or, on the basis of instruction from someone else, conjure up a mental picture of some event or thing.

Traditionally, images have appeared in theories of memory in either of two forms. The first instance involves the wax tablet model in which perceptions and sensory inputs were etched on the mind and were remembered as long as the image percisted. Perceptions are remembered because we would then have a picture of it in our minds.

The other role that imagery has assumed in memory models is that of a mediator. In association memory models imagery has been considered an effective means of connecting items to be remembered, and even though the input and output modes may be verbal, the mediating mechanisms may be non-verbal (Peterson, 1972). In other words, the input to us may be someone, say a teacher, telling us a list of dates or catagories. Obviously, it is given to us in a verbal manner. We hear the list of objects to be

remembered. When it comes time to recall these items, the output can be verbal. We repeat the words back to the teacher or the class. The arguement that imagery is a mediator implies that imagery interacts with the items in between our hearing them and our repitition of them. Imagery becomes the organizer of the items in our memory. This is what is meant by saying that the mediating mechanisms may be non-verbal.

Thus, perceptual or motor events which are functionally equivelent with respect to indicating or leading to functionally similar changes in the organism's enviroment might become represented as unique non-verbal concepts (images). Any perception that we have as a result of our interaction with the enviroment around us becomes part of and is grounded in the structures in our memory called images. As soon as a person has percieved some object or event there immediately is an image associated with the perception and it is this image that is brought forth when the event is to be recalled again. Such a view is in agreement with Newell and Simon's (1972) position which postulates that a single set of internal symbolic structures provides the most parsiminous account for both thought and the deep structure of language. It also receives support from evidence (Macnamara, 1972) that children develope conceptual or semantic structures prior to learning the related linguistic signs (Pylyshyn, 1973).

This is to say, as Newell and Simon state, that any object that we percieve is not just remembered as that object, rather, we associate it with a mental picture which enables us to recall the object with better efficiency and clearness. To go further, this "set of internal symbolic structures" (images), become the basis for thought and for our own language. Any object percieved is represented in our memory by some sort of image or picture. When it is time to recall the object and convey it to others, we have a picture of the object. While speaking, all we have to do is "read off" the image or picture.

So it is apparent that there is a general consensus in psychology that the source of the image is concrete sensory experience, and through this experience, the image becomes part of our memory in some way. Imagery and retention are positively related. The relationship embodies a to-be-remembered verbal item in an image. The image, therefore, has the same requirements as a natural language mediator, if it is to be effective the image must be remembered, as must the method for decoding it (Adams, 1976, p. 282).

History of Thought on Imagery

There has been a general interest in imagery throughout history. Dating back to the early philosophers, the role and the essence of imagery have been questions of interest.

Aristotle, for example, believed that remembering, like dreaming, arises from the affects of sensing that persists after the object is removed. Sensory stimulation "stamps in", as it were, an "impression of the percept." These traces of former movement, as Aristotle suggests, are images which form the basis for remembering. He believed that there is a fainter continuation of original movements through images. Aristotle goes on to say,

> Thought requires sensory experiences with which to work; and sensation leads to its derivitive-imagination; which in turn leads to memory. The materials for thought are supplied by the imagination. In this case, images serve as perception. Thinking depends on the retention of images, which are molded by thought into relations and patterns, so that there is not merely a flux of images but a meaningful organization of them (Watson, 1971, p.65).

I believe that Aristotle's insistance that images are necessary for thought is worth stressing. He leaves no doubt about his position that thinking takes place in

images and never without them. This influence by Aristotle was to have a large effect on the thinking of philosophers and psychologists alike for many years to come. Aristotle set the stage for positive thought on imagery. Philosophers following Aristotle adopted his viewpoint and kept the notion alive that the use of imagery is necessary for any kind of thought. To this day, many theorists now see the "sensory register" as the first step to short and long term memory. This theory has been influenced by Aristotle because of his strong views on imagery. Aristotle said that all perceptions are stamped into our minds and we can recall those objects even when they are not present to us anymore. It is from this sensory register that memory, both short term and long term evolves.

Cicero relates to us the principles of this memory technique using the visual system. He says that the most complete pictures are formed in our minds of the things that have been conveyed to them and have been imprinted on to them by the senses, but the keenest of all our senses is the sense of sight. And that, consequently, perceptions percieved by the ears or by reflection can be most easily retained in the mind if they are also conveyed to the mind by the mediation of the eyes. "The result of this is that the images not seen and not lying in the field of visual discernment are marked by a sort of outline and image and

shape so that we can keep hold of it by an act of sight as it were" (Adams, 1976, p.275). Though it is true that perceptions percieved by the eyes are more easily retained, retention by other sense organs, like the ears, can be possible. It is my arguement though, that retention is easier and more distinct if the perception is mediated by the eyes.

Further along in the history of thought on imagery, Empedocles had supposed that objects give off effluences that act upon the senses to furnish knowledge. Following this lead, Democritus described their projection as faint images. Sensation and perception involve the contact of non-bodily atoms with those of the body. The impression that their interaction produces spreads or reverberates throughout the body. An external thing is percieved because the atoms from the object pass through the organs of the body to the mind (Watson, 1971, p. 6).

Contemporary thought on this position can be found in Atwood (1971) who states that the most elementary question which can be asked about image visualization is "does the mnemonic image actually involve the visual system?" Using a method of selective interference, he gathers evidence which leads him to conclude that to a large extent it does. He writes, "Verbal material may be recoded into a visual image and encoded into memory as a

primarily visual schema. During recall, the schema is decoded once again into verbal symbols" (Pylyshyn, 1973).

Interpretations and opinions as to just what imagery actually was continued through history. But it was not until 1882 and Galton that modern interest in imagery really developed.

Galton became interested in the problem of visual mental imagery because he thought that demonstrations of its presence in varing degrees might help to establish an essential difference in the mental operations of different men. Galton devised a questionnaire which contained various situations for which his subjects were to try to form images. His subjects were to say whether the image that they had was dim or clear, the objects ill or well defined, and the like. From the results of this study, Galton found distinct imagery types. He stressed that there was a graduation of clarity of imagery from distinct to faint. Future work by Galton showed that imagery falls not into types, but it is more or less distributed in the population with the great majority having some, but not much capacity for it (Watson, 1971, p. 217).

As you may expect, the supporters of imagery did have their opposition. One such group, in Germany, became known as the Wurzburg School. Closely identified with the

Wurzburg School is the conception of what came to be called "imageless thought." This school of thought dealt with knowledge as the representation od meanings in thinking that did not seem to be carried out by specific images (Watson, 1971, p. 300). The influence of this attitude led to a general disinterest about the use of imagery.

Another area of thought that has been devastating to the theory of imagery began in the early Twentieth Century. This "new psychology" developed by John Watson was behaviorism. The main emphasis of behaviorism, as Watson stated is as follows:

> Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness (Watson, 1971, p. 417).

Watson was trying to re-direct the entire focus of psychology. It was his opinion that psychology had failed in its previous fifty years to establish itself as an experimental sort of science. Watson insisted that for psychology to become an experimental science it must discard consciousness. He further said, "The time seems

to have come when psychology must discard all references to consciousness; when it need no longer delude itself into thinking that the object of observation is mental states" (Watson, 1971, p. 418).

This viewpoint was damaging to the field of imagery. Watson was beginning to convince people that anything concerning the mind was outside the rational world, dwelling instead in the dark with ghosts and goblins. He argued that the whole issue of introspection should and could be ignored by focusing on behavior to the exclusion of all else.

Watson's view quickly dominated psychology shaping a new interest which was to eventually to become stronger than any other especially in the United States. This mass spread of behaviorism caused thought on imagery to be put aside for over thirty years. For it is only in the past few years that a renewed interest in imagery has come about.

Contemporary Thought On Imagery

Another man in disagreement with the need for images to be present in thinking was Baylor. Opposing imagery Baylor (1972) said, "For one thing, visual mental imagery is just another representational system, even though it is used because it is convenient to use" (Pylyshyn, 1973). In other words, the image has lost all its picture-like qualities and has become a data structure. In fact, it can be put into a one-to-one correspondance with a finite list of propositions. Thus it becomes more like a description than a picture. Also, "seeing the image" has been replaced by a set of common elementary mechanical operations. Pylyshyn (1973) answers back against Baylor's arguement by pointing out that Baylor eliminated all reference to the perceptual process. But virtually all the informal definitions mentioned earlier stated that perception is involved with imagery. Consequently, Pylyshyn has to conclude that Baylor's representation has little to do with what is meant by the term "image" (Pylyshyn, 1973).

As argued before, perception and sensation are very influential in the use of imagery. For example, in

discussing the use of the "one-bun" rhymning mnemonic used by his subjects, Bulgeski(1968) stated,

> The most convincing evidence regarding imagery comes from the reports of the many subjects who expressed the beliefs that they didn't know some or any of the words when either the original learning or the recall tests began. They would then mumble the numeral, state the rhyme word, and then report, "Oh yes, hen-ski". They asserted that the little hen on the skis had to appear before they could report "ski" (Pylyshyn, 1973).

Images can be extremely vivid and therefore helpful in recalling objects as was shown in the study by Bulgelski (1968). It is the degree of vividness which determines the rate of learning and recall when imagery is used as a mnemonic.

There were a number of investigations in the 1930's which focused on "eidetic" imagery. Images are said to be eidetic when they are so vivid that the person is able to "read off" unfamiliar items from a picture shown just previously. The clarity is so real that the subject can point to small details located in specific directions as if the picture was still present (Millar, 1968, p. 146).

Images can be spatially related to each other and to the individual. They can be so vivid that a child can even reach for candy that he has seen being put into a cabinet and will run straight into the room to it when

the door is opened. Also, people can see the broken vase still standing on the table if they try.

In line with this, the thrust of Bulgelski's (1968) study is to show the inadequacy of theories of learning and memory which rely exclusively on postulating associations among words. From this aspect, he adopts another position: that all learning and memory takes place exclusively through the mediation of either images or of images that have words as their method of output. In fact, it appears that most psychologists working on imagery today believe in the assumption that there are no other forms of mental representation other than these two means.

Bulgelski relates this concept to deaf students by saying that if they truely have no speech or verbal capacity, and can learn certain kinds of materials, the conclusion that imagery was being used seems logical. It is logical only if we accept that images and words exhaust the available forms of mental representation (Pylyshyn, 1973).

The issue that words and images are the only forms of mental representation, or, the dual encoding hypothesis (Pavio, 1971), tends to be the basis of all arguements supporting imagery. This system proposes that objects, pictures, and to a lesser extent concrete words, can be encoded in two different ways; one involving a

non-verbal code, the image, and the other involving a verbal code. While the dual code may exist (Pavio and Csapo, 1973), it is entirely possible that the advantage for items so encoded stems not from the availability of both codes, but instead from the operation of one- the imaginal code (Hashler, Reibman and Wren, 1973). So even though there are two forms of mental representation, images and words, the code that is the most efficient and useful is the code which uses imagery as its mediator.

Begg (1973), in particular, has argued that the imaginal code has a dual advantage over the verbal coding system. First, an image is more flexible in that it can easily integrate new memvers into the unit; and secondly, each component of the image is a more effective cue for redintigrating the remaining components (Hashler, Reibman and Wren, 1973).

In an image, it is easier to use one part of the image as a cue or "stimulus" for remembering other parts.

If you remember one part of the mental picture, the other components of it will fall into place more easily. In the verbal coding system "one part of the picture" would be a word. If you were to remember this sentence, "The boy on the red bicycle drove through the yard in front of the yellow house with black shutters", the cue

or stimulus would be something like "house" or "bicycle". These cues, more than likely, would not bring about recollection of the entire sentence. Whereas an image of the sentence or the same would give you a picture of the entire event.

There are several things to notice about the conception of an image. First, it is objective in principle because it derives from experience. Second, it does not necessarily imply that consciousness and images are the same; there is no reason why one cannot have an unconscious image. Third, an image is not necessarily a clear photograph in the head. It does not have to be a clear cut representation (Adams, 1976, p. 185).

To summarize, we have argued that functional mental representation is not to be identified with the input to a perceptual stage. In other words, mental representation or imagery, is not just a way in which we "pick up" sensations or perceptions and then send it to our memory. Imagery accomplishes much more than that. Imagery, as I said, is also identified with the output to a perceptual stage. Once we have retained a perception, it is imagery which brings it into consciousness again. Imagery also lets us combine several perceptions into an organized whole which we can convey at any particular moment. "If we could think of functional images in this sense we would

have removed the disturbing duality of 'image', at the same time, we would have answered some of the questions referred to earlier: An image in our sense can certainly be selective, generic, abstract, and even unconscious" (Pylyshyn, 1973).

The image can be all of these. While this may be the case, we still have to remember that imagery is a way of conveying perceptions. It is the input into what I believe is language. Verbal ability or linguistic ability obviously is the basis for communication. By verbal ability I mean the process in which a person communicates to others. Not just in memorizing words and objects, but the way that a person can look at a scene or an object and then be able to describe it. I am not talking about language in the sense of semantics or the modes of communication. Rather, I am speaking of something deeper and more basic than the ability to attach a specific word to an object. Actually, imagery is the "deep structure" of language (Pylyshyn, 1973). Here is where imagery comes into play.

As I already discussed, imagery is a positive influence on memory. It has facillitating powers when used to aid memory and recall. But I believe that imagery is also related to verbal ability. For example: there is no way that humans would be able to communicate by speech

without the use of imagery. If man could not recall the language symbols of specific objects in his enviroment, it would not mean much even if he had the ability to make audible sounds. We need the memory available to us to associate specific words with the objects that we have in our enviroment.

It is my contention that since imagery facillitates memory, it can also have the same effect on the verbal ability process of humans.

If a person has the ability to use imagery to a high level, then my contention is that the person's verbal ability will be high. This is assuming that there are no physical handicaps which would limit the level of verbal ability in a person.

When a person talks or tries to explain a certain event or object, it is beneficial to "see" a picture of the event in the mind when doing so. An event or object is much easier to discuss and is discussed more coherently if the event is "described" in an image than if the person had to ramble on without any image guide.

Before a person can talk about an object or event in a specific language, he first must have the ability to arrange his concepts or ideas in his mind to give them some order or clarity. Imagery, I believe, is the mediator for this process. If a person can image in his mind, this

would create a more ordered pattern of events for him and thus would allow him to be more fluent in conveying them to others. Therefore, if a person has been trained to use imagery, and he is relatively good at it, I believe his verbal ability will be higher and more efficient than others who do not have the ability to use imagery.

Much of the modern revival of interest in imagery is due to Allen Pavio. Pavio's theory is based on the dual coding hypothesis, which has both images and verbal processes as codes, with the degree that these two codes operate depending on the type of material.

Pavio (1969) pits his defense of mental imagery against the word association approach. He says, "One can respond verbally to pictures as well as to words and so, by anology, one's verbal response could just as logically be mediated by mental representations. Thus we can add images to the list of mental representations" (Pylyshyn, 1973).

Since Pavio's revived interest into this area, the use and effectiveness of imagery has risen. The same could be said about the role of imagery in other cognitive tasks including the learning of paired associates.

It is at this point that I wish to apply the use of imagery specifically to my study. It has already been documented that the use of imagery facillitates learning.

We have seen this in past research. But what about of retarded children? Can the use of imagery increase the amount of linguistic ability that the retarded child can achieve? Can imagery become the mediator to allow a retarded child to improve in verbal ability? I believe that it can. Bulgelski (1969) Bugelski, Kidd and Segman (1968) and Pavio (1968) have shown that retarded subjects taught a rhyme and instructed to use imagery are superior in recall to those not learning the rhyme and receiving only standard paired-associate instructions (Lebrate and Ellis, 1974, p. 704).

Perhaps the most important aspect of results in this area is the fact that imagery-mnemonic pre-training substantially facillitates the learning and/or memory of retarded persons. Without such training the retarded persons perform quite poorly. It seems that the use of imagery can facillitate the learning of retarded persons.

A second important finding is that retarded persons apparently are unable to follow verbal instructions to image and to use these images to mediate their learning with visual aids. With just verbal instructions, the retarded subject usually performs poorly. But when given actual pictures, the memory of which may provide an image, their performance is greatly facillitated, presumably as a result of imagery mediation (Lebrate and Ellis, 1974).

These results clearly show that the visual imagery mnemonic can be taught to mentally retarded persons. However, it is apparently necessary to use "imagery crutches" in teaching the use of this process to the retarded subject. The presentation of these pictures would provide memory images which could be used in the mediation of subsequent learning and that this would further prime the imaging behavior of the retarded student.

Two studied tend to bear this opinion out. Taylor, Josberger and Knowlton (1972) and Yarmey and Bowen (1972) have found that retarded subjects are also able to utilize non-verbal imagery as a mediator to facillitate learning. Taylor, Josberger and Knowlton (1972), compared the effects of imagery elaboration, verbal elaboration, and repitition on the paired-associate learning of educable mentally retarded (EMR) children and found a significant superiority of the elaboration groups over the repitition control groups.

Yarmey and Bowen (1972) demonstrated the equal improvement in the paired-associate performance of retarded subjects given intentional and incidental imagery instructions relative to that of control (no imagery) subjects. In addition, the performance of the retarded subjects improved with practice and the continued use of imagery (Lebrate and Ellis, 1974, p. 704-713).

In support of the preceeding theories, we know that all men have a brain. Though there may be a difference in degree-sometimes vast-there is not a difference in kind among men concerning the brain. A retarded child, obviously, differs in degree from non-retarded children in terms of brain capacity and performance. But to some degree they do posess a functioning brain which can and does perform like any other brain. Along with the brain, no matter to what degree, man posesses certain other qualities. Among them are long and short term memory, imagination, conceptualization, and problem solving devices.

A retarded child has the potential to develope all these qualities. They may not be able to develope them to the same performance level as other men, but they do have the possibility and the right to be able to develope to their own capacities and potential. It is my contention that if a retarded child is taught to use any of these qualities, his performance and quality of work will improve.

In this instance, I am concerned with imagery. Everyone has the potential to use imagery whether the person actually uses it or not. The same is true with the retarded child. It is my arguement that a retarded child can learn to use imagery and can practice the use of it to develope and improve other areas.

I have already stated that imagery and verbal ability are somehow linked. Whether they work together or act upon each other is debatable. But there is a relationship.

If it is assumed that the two are related, then there is a logical conclusion if this statement is drawn out: If by some means you can teach a retarded child to use imagery-by use of pictures, objects, drawings etc.-then once it is learned, the use of this quality can be improved with practice (The more you practice, the better you get at it; Practice makes perfect).

So, consider the relationship between imagery and verbal ability. If the use of imagery is improved, then the verbal ability of the child, theoretically, should improve. Maybe not drastically, but any improvement in verbal ability and techniques is positive. If this correlation is found to be true, the practical implications of such a finding would be innumerous. The benefits of applying it to our educational system or even for younger children not in school would be large.

With the evidence already stated that the use and practice of imagery can facillitate learning-both verbal and non-verbal-in retarded students, I am prepared to attempt it in a study. My hypothesis is that if it is possible to work with retarded children in the use of imagery, and if this use of imagery improves, then this

improvement will cause an increase in their verbal ability also.

Method

Subjects. Subjects are four male and six female retarded students from Tenth Street Grade School in Jasper, Indiana. The ages of the students range from six to twelve years. All subjects are in the Educable Mentally Retarded (EMR) class and their I.Q.'s range from 53 to 84.

The subjects were selected to be in the study because of my familiarity with the class. The ten students are the entire class at the school, so therefore, they were not randomly selected.

Material. The initial material used in this study was the Parsons Language Sample (PLS), authored by Joseph E. Spradlin. The purpose of this test is to assess the speech and language development of retarded children between the ages of six and fifteen.

"The behavioral system used in developing the PLS was drawn primarily from B.F. Skinner. The author selected the Skinnerian model primarily because of its emphasis on the environmental conditions inder which language behavior occurs" (Spradlin, 1963).

The development of the PLS was an attempt to devise

subsets and test items which sample language behavior. All of the subsets used in the original test are not being used in this study. The subsets which are used in this study are: Tact, Echoic, Intraverbal, and Intraverbal Gesture (See Appendix A for PLS).

One reason why this test was chosen to be used was because the majority of tests which could be given to the students require a psychometrist to administer the test and therefore were unavailable to me.

A second reason for choosing this test was because the PLS is composed so that it is specifically for retarded children from the ages six to fifteen.

Thirdly, an initial examination of the reliability of the several PLS subsets was made in terms of split half coefficients computed from data obtained from the PLS administration to the 275 subjects in the initial test (See Table 1.4 on page 19, Journal of Speech and Hearing Disorders, 1963).

"The low split half coefficients were obtained for the two Mand subsets, correlations of .25 for the vocal scoring and .17 for the non-vocal scoring. The coefficients were all above .90 for the three subsets of the vocal section of the PLS. The correlations for the three subsets of the non-vocal sections are all above .84. When the Spearman-

Brown correlation formula for double test length was applied, the reliability coefficients for the three vocal subsets were all above .95. The Spearman-Brown coefficients for the three non-vocal subsets were all above .91.

Additionally, the correlational data (shown in Table 1.6 on page 22, Journal of Speech and Hearing Disorders, 1963) once again indicate that the measures of the PLS have generally high retest stability even on a restricted sample. Subtest test-retest correlations range from .82 to .96 for the vocal subsets and from .59 to .89 for the non-vocal subsets. The reliability coefficients for the composite vocal, composite non-vocal, and total PLS are .93, .92, and .93 respectively.

The following is a review of each subset of the PLS used in this study.

Tact Subset. The tact subset consists of 28 objects or pictures which are named by the children. "Seven items involve real objects, seven involve miniature objects, seven involve colored pictures and seven involve non-colored pictures. The examiner shows the child each object or picture individually. Upon presenting each item the examiner says, 'What is it?' or 'What do you call it?'. If the child does not respond the examiner repeats the question. The examiner accepts any response given by the child. After the child has responded, the examiner says, 'good' or

indicates approval to the child and hands the child the object for inspection. As soon as possible, the examiner retrieves the object and proceeds to the next item. If the subject does not respond to any of the first five items the examiner proceeds to the next subset" (Spradlin, 1963).

Echoic Subset. "The Echoic subset consists of 22 items. The first ten items consist of words and sentences of varying degrees of complexity which the child is requested to repeat. Each word or sentence is introduced by the command 'say'. The following twelve items consist of a series of difits which the child is requested to repeat. The items range in difficulty from one to six digits. The examiner presents the words, sentences and digits only once. The child's response is classified as appropriate if the words, sentences and numbers are repeated as the stimulus is given. Provided that the child's speech is intelligible, errors in articulation are allowed" (Spradlin, 1963). If the subject gives three incorrect answers in a row, the examiner goes on to the next section of the subset.

Intraverbal Subset. "The intraverbal subset is composed of 29 items which sample the child's vocal response to vocal stimuli. For the first seven items, the examiner asks the child simple questions such as, 'What do we do when we are hungry?'. The next sixteen items present the child with an incomplete sentence such as, 'The flag is

red, white and _____.'. The final six items are questions concerning similarity such as, 'In what way are a dog and a cat alike?' If the child does not respond the question is repeated." (Spradlin, 1963). If the subject gives no correct responses to the first five items, the examiner moves on to the next section of the subset. If one or more of the first five items are answered correctly, all of the remaining items are asked by the examiner.

Intraverbal Gesture. "The Intraverbal Gesture subset consists of 24 questions which can be answered with either a verbal or gestural response. Some questions are: 'Where is your ear?' or 'What do you do with a handkerchief?'. If the subject gives no response to the first five items, the experimenter stops giving items in this subset." (Spradlin, 1963).

Imagery Tasks. A second type of material used was a set of tasks involving imagery. Basically, they were precise practice sessions for the students in the use of imagery. They were used as drills for the students. During the drills for imagery, data was collected on the performance of the subject in terms of how many items are correctly determined when using imagery. This enabled the experimenter to determine if any improvement was made by the subject in terms of improvement in the

use of imagery. The imagery tasks used are:

(1) Have eight objects (toys, games, pencils, etc.) in front of the subject. Remove one object and have the subject tell the examiner which one is missing.

(2) Have the subject study a group of sixteen objects for thirty seconds. Cover up the objects and have the subject recall as many as possible.

(3) Have the subject recall five objects that are in their own home and describe each one.

Procedure. A matched group design was used. Matching was accomplished according to the subject's I.Q. which had been tested by the Special Education teacher at Tenth Street School. The experimenter gave all of the subjects, both in the control group and the experimental group, the Parsons Language Sample testing for initial speech and language ability levels for the children. Then, for a period of four weeks (twice a week), there was a training period for the experimental group. This training consisted of bi-weekly meetings which lasted for twenty minutes with each subject, in which all three imagery tasks were practiced as many times as the time period allowed. The control group did not recieve the

imagery training sessions. The other children in the class (both in the control group and the experimental group) continued the same daily schedule as usual during the imagery training which consisted of interaction with the teacher and the other students.

At the end of the training sessions, the Parsons Language Sample was given to the subjects in both groups again. The reason for test repitition was to see if any improvement was made by the subjects after the training period with imagery was completed.

Expected Results. There are a variety of results that I expect from this study. First of all, I think this study will show that you can improve the use of imagery through practice.

Secondly, I think that imagery can facillitate the improvement of verbal ability among retarded students. I would expect the results from the Parsons Language Sample to show that there was a significant improvement by the experimental group after they went through the imagery training sessions.

In conclusion, it has alraedy been shown that imagery can facillitate memory. But imagery can also be a link to verbal ability. A person who is capable of using imagery effectively should do well on a verbal ability test which in this study is the Parsons Language Sample.

Also, any improvement in the use of imagery and recall shoud correspond to an improvement in verbal ability in the retarded subjects.

Results

A one way analysis of variance (Hays, 1963, p. 371) was used to analyze the average responses per day by the experimental group on Imagery Task Two. These responses are shown in Table 1. Imagery Task Two consisted of

Insert Table 1 about here

the subjects viewing sixteen items set before them for a period of thirty seconds. When the specified time passed, the objects were covered by the experimenter. Subjects were then asked to recall as many objects from the group as possible. The correct number of responses per day were collected by the experimenter. The raw scores for Imagery Task Two are shown in Figures 1 through 5. The figures show the responses by the five subjects in the experimental group for the period of four training days.

For Imagery Task Two, the results of the one way analysis of variance did not show a significant difference among the experimental group's tendency to improve in the use of imagery over the period of training days, $F(3,12)=2.72$, $p>.05$. However, it was found that there was a significant subject effect in the training of imagery ability, $F(4,12)=10.89$, $p<.001$. (See Appendix B for Summary Table for Analysis of Variance). The significant

Table 1

Average Scores on Imagery Task Two

Day of Imagery Training Sessions

Subjects in Experimental Group	1	2	3	4
S_1	7.5	11.0	12.0	10.25
S_2	7.3	11.0	10.0	12.6
S_3	6.0	5.0	4.0	6.0
S_4	5.5	8.0	10.16	7.6
S_5	3.0	7.5	4.5	3.3
Mean	5.86	8.5	8.13	7.95

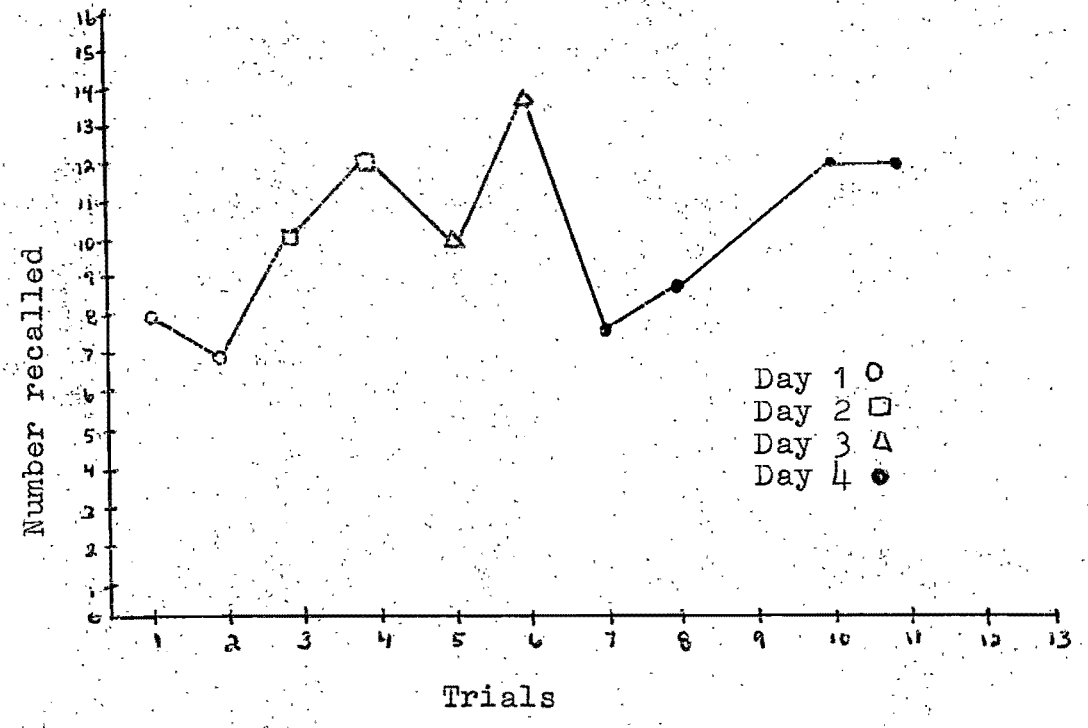

Figure 1. Raw scores for imagery task two by subject 1.

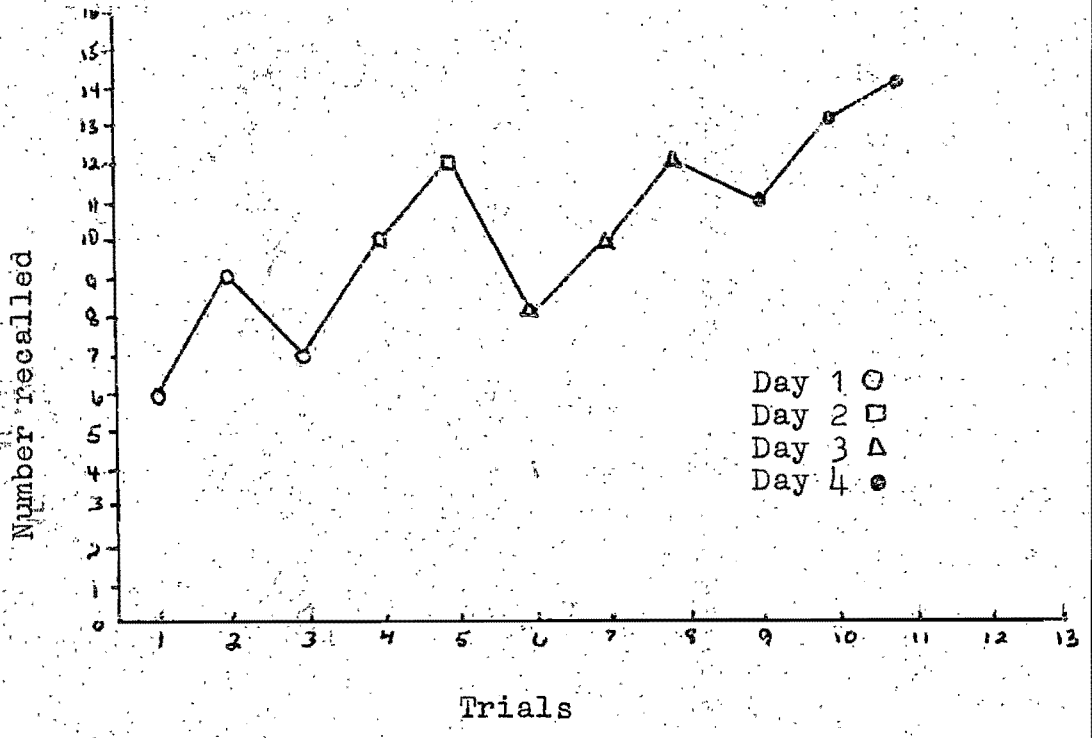

Figure 2. Raw scores for imagery task two by subject 2.

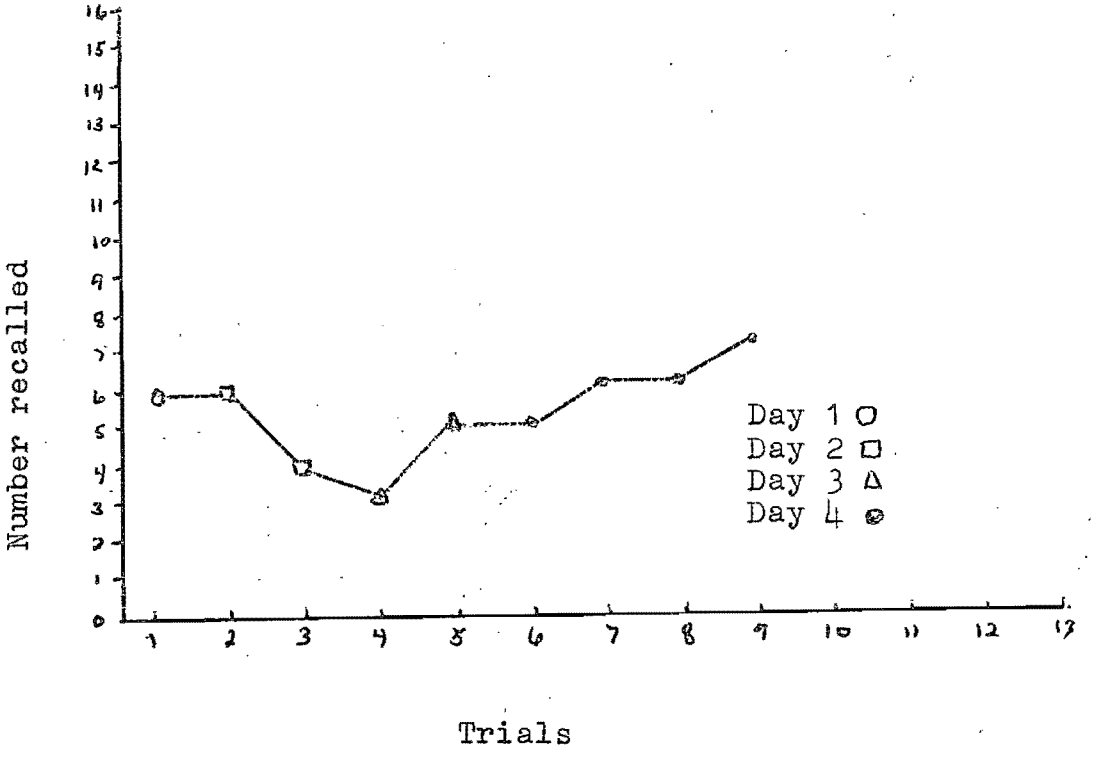

Figure 3. Raw scores for imagery task two by subject 3.

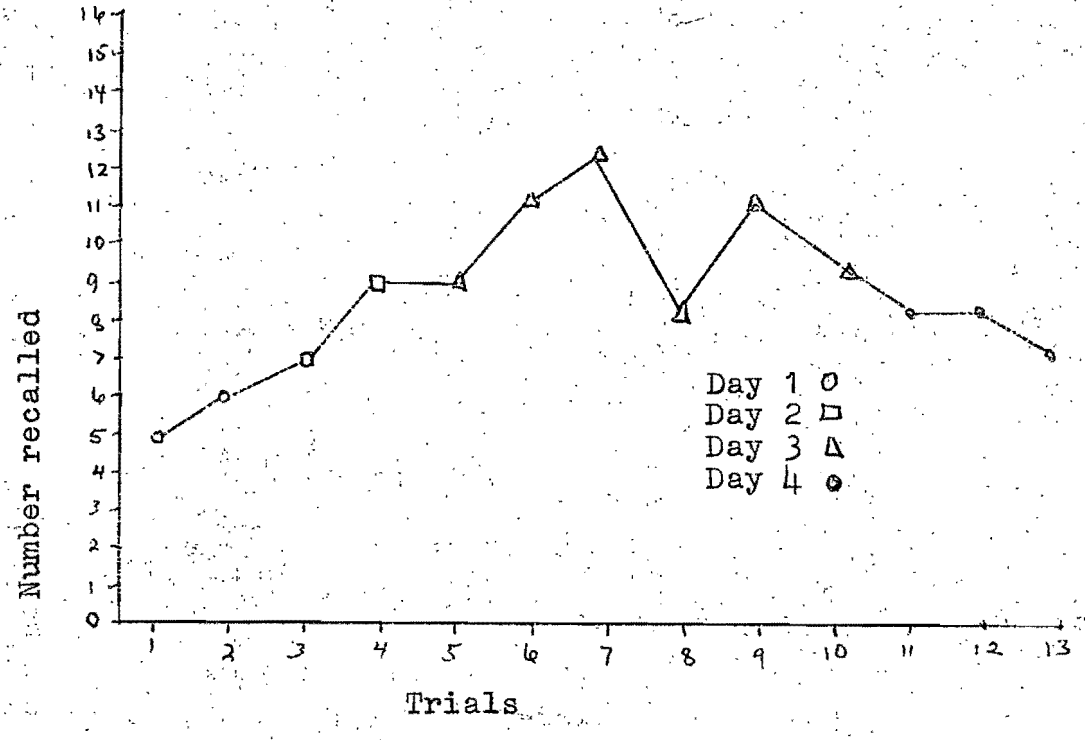

Figure 4. Raw scores for imagery task two by subject 4.

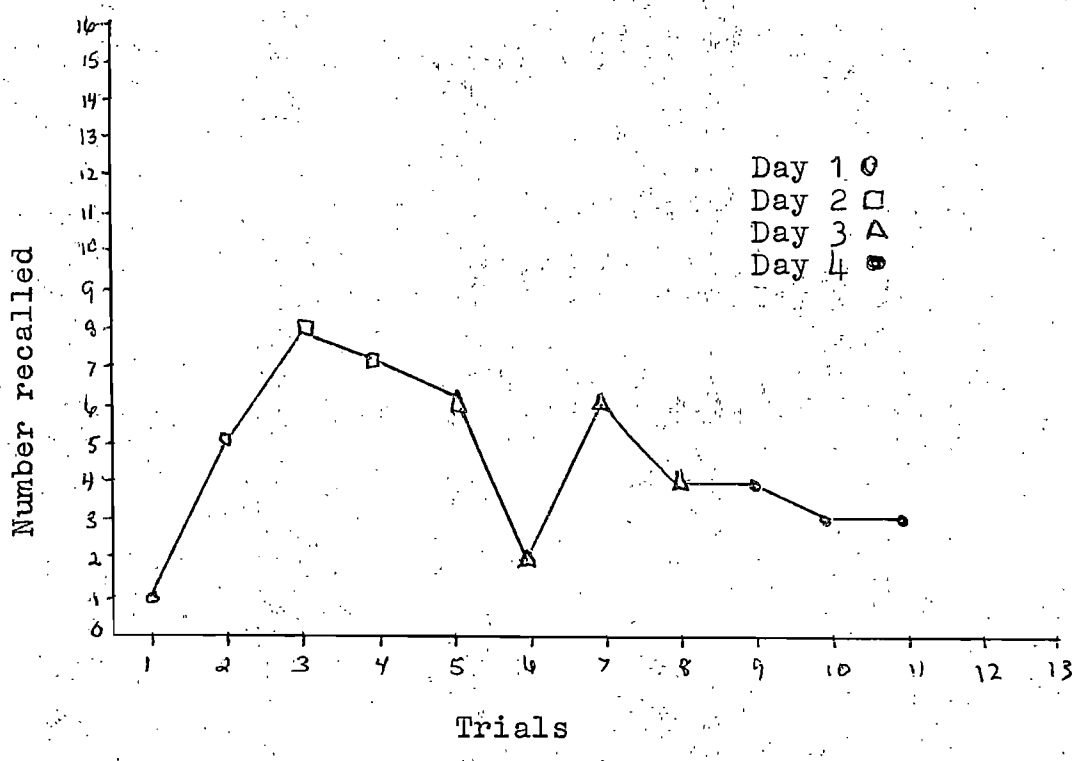

Figure 5. Raw scores for imagery task two by subject 5.

subject affect shows that some of the subjects did in fact improve in imagery throughout the training session. However, because the other subjects did poorly, the results for the experimental group as a whole showed no significant improvement in imagery ability.

Two other Imagery Tasks were used in this study and given to the experimental group along with Imagery Task Two during the training sessions. The raw scores for Imagery Task One are shown in Figures 6 through 10. The figures show the responses by the subjects in the experimental group over a period of four training session days. The raw scores for Imagery Task Three are shown in Figures 11 through 15. The scores are the responses by the experimental group over a period of four imagery training sessions.

The results of Imagery Tasks One and Three show that, although each task could have had an affect, neither Task added variability to the subject's performance. Because of the minimal variability between the subjects, one cannot infer that their scores had any affect on the outcome of the test. In Imagery Task 1, the subjects began the task on the first day by incorrectly responding a few times, but by the fourth day, all subjects were responding correctly. From those results, all that can be said is that all the subjects improved equally with no variability. In the same way, the results of Imagery

Task Three showed little or no subject variability. When asked to recall and describe five objects from their homes, each subject began with recalling five objects the first day and continued that trend throughout the next four days, with similar or equal results. No inference can be made that this task affected the subject's final scores. On each of the two tasks, after the initial improvement, all subjects neither improved nor got worse with trials and no variation was observed within the results.

The design used to compare the post test scores of the experimental and the control group was a one way analysis of co-variance (Keppel, 1973, p.485). The between groups variable being measured was whether or not the Imagery training sessions with the experimental group had an affect on the post test scores on the PLS. The results were scored on the performance of both the control group and the experimental group on the Parsons Language Sample. The covariate in this case were the post test scores on the PLS. The dependent variable was the affect that the imagery training had on the scores from the second testing of the PLS. The results show that there is no significant difference between post test scores on the PLS when comparing the experimental (imagery trained) and the control group

(no imagery training), $F(1,7)=.8713$, $p > .05$. (See Appendix B for Summary Table for Analysis of Co-Variance.)

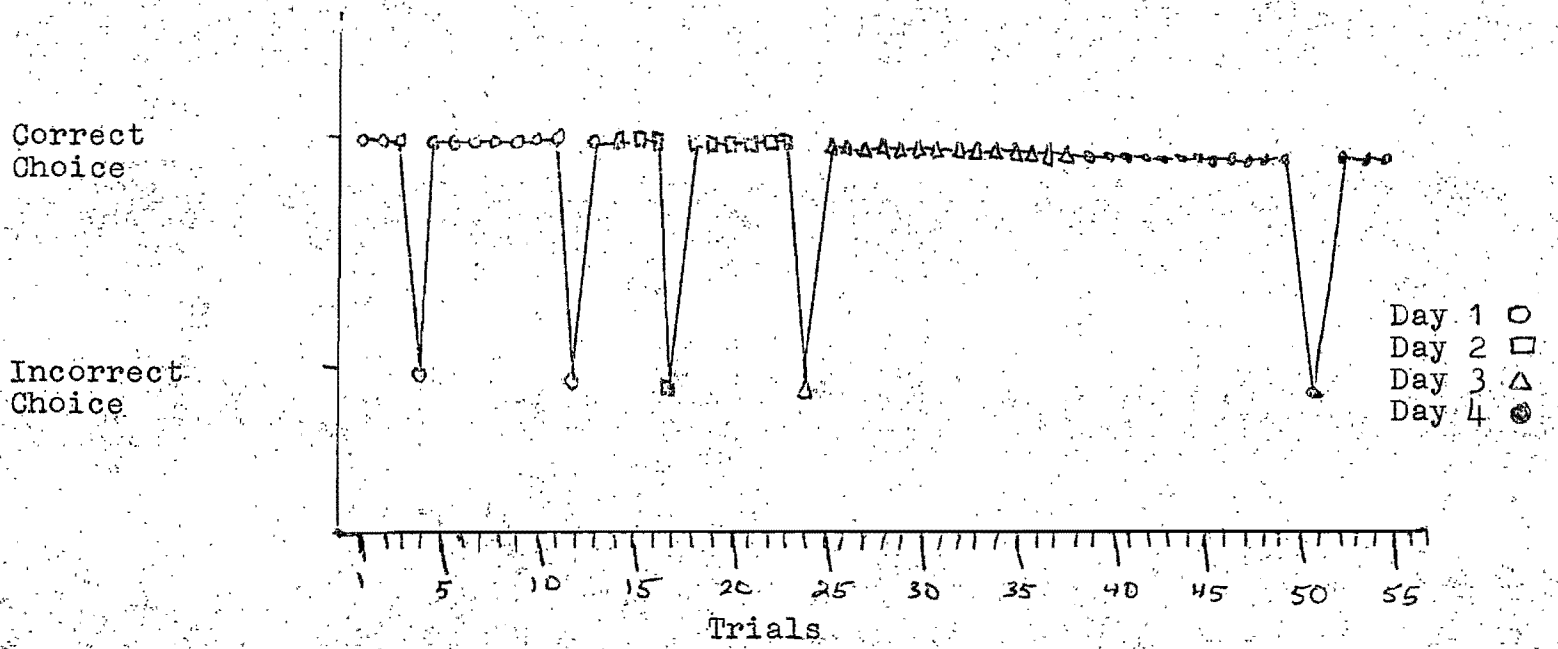

Figure 6. Raw scores for imagery task one by subject 1.

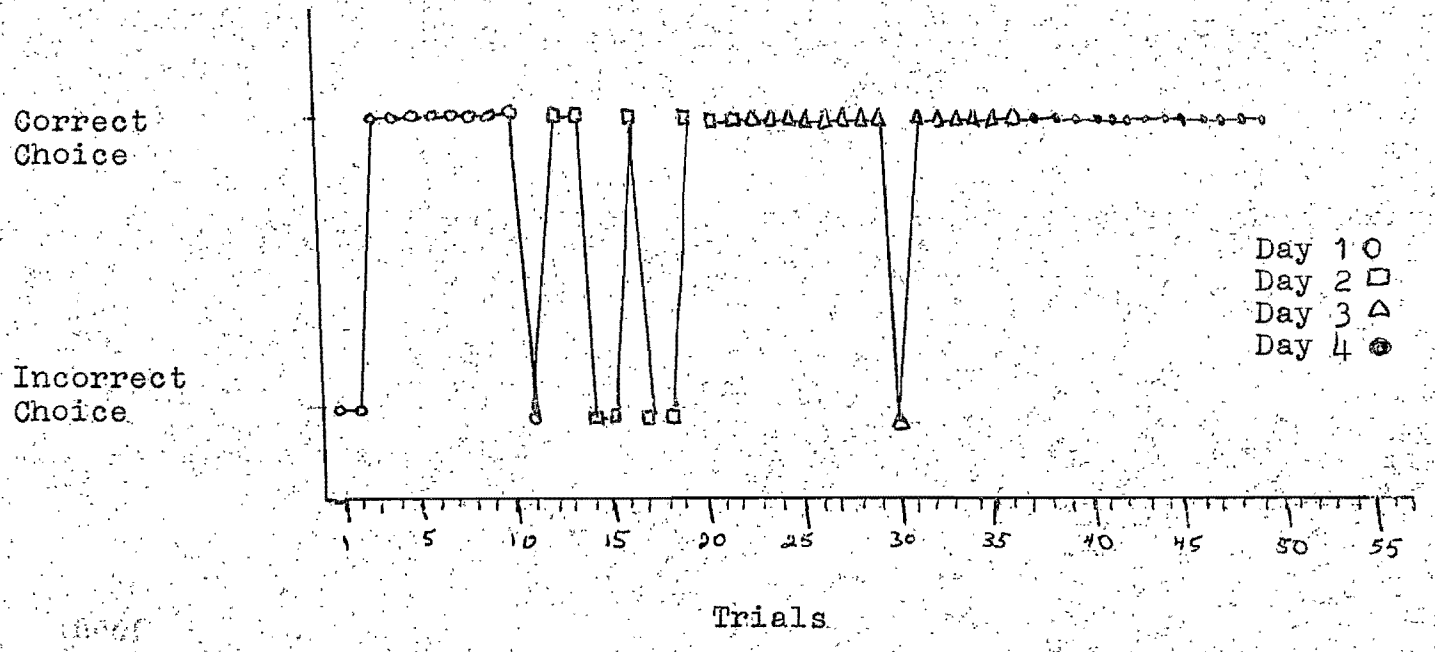

Figure 7. Raw scores for imagery task one by subject 2.

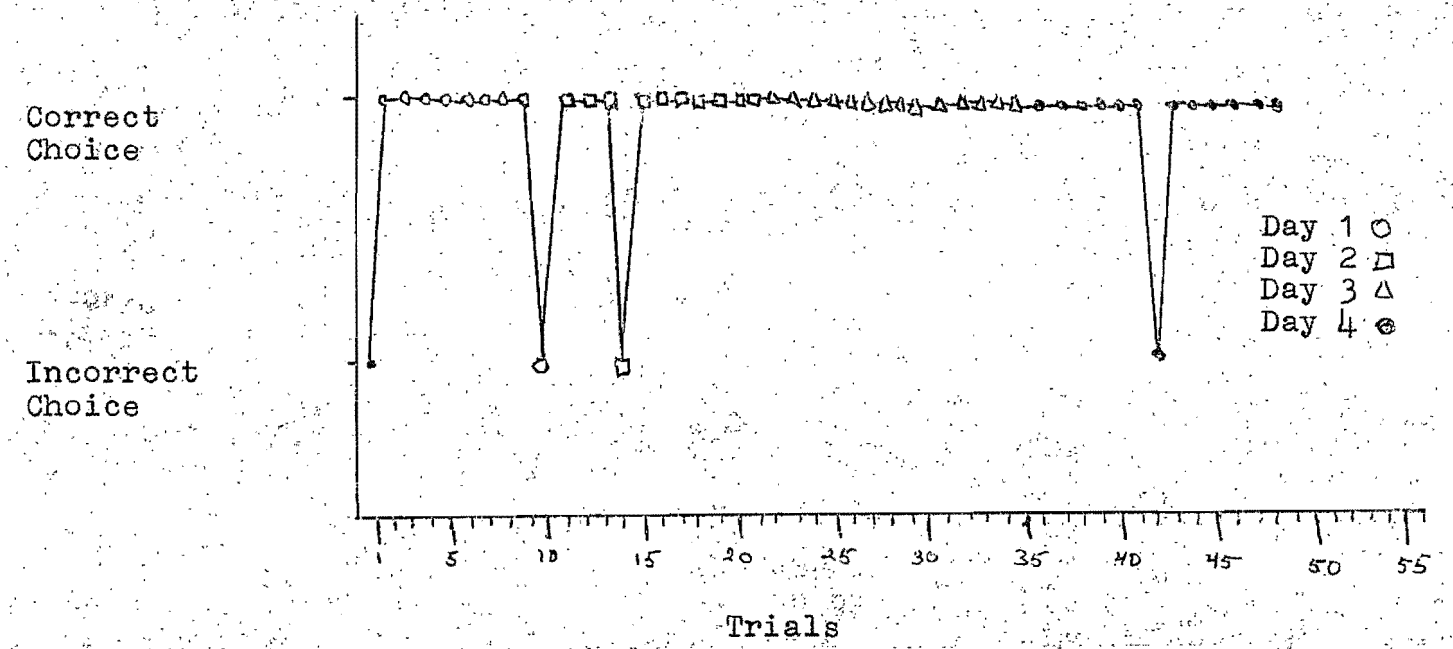

Figure 8. Raw scores for imagery task one by subject 3.

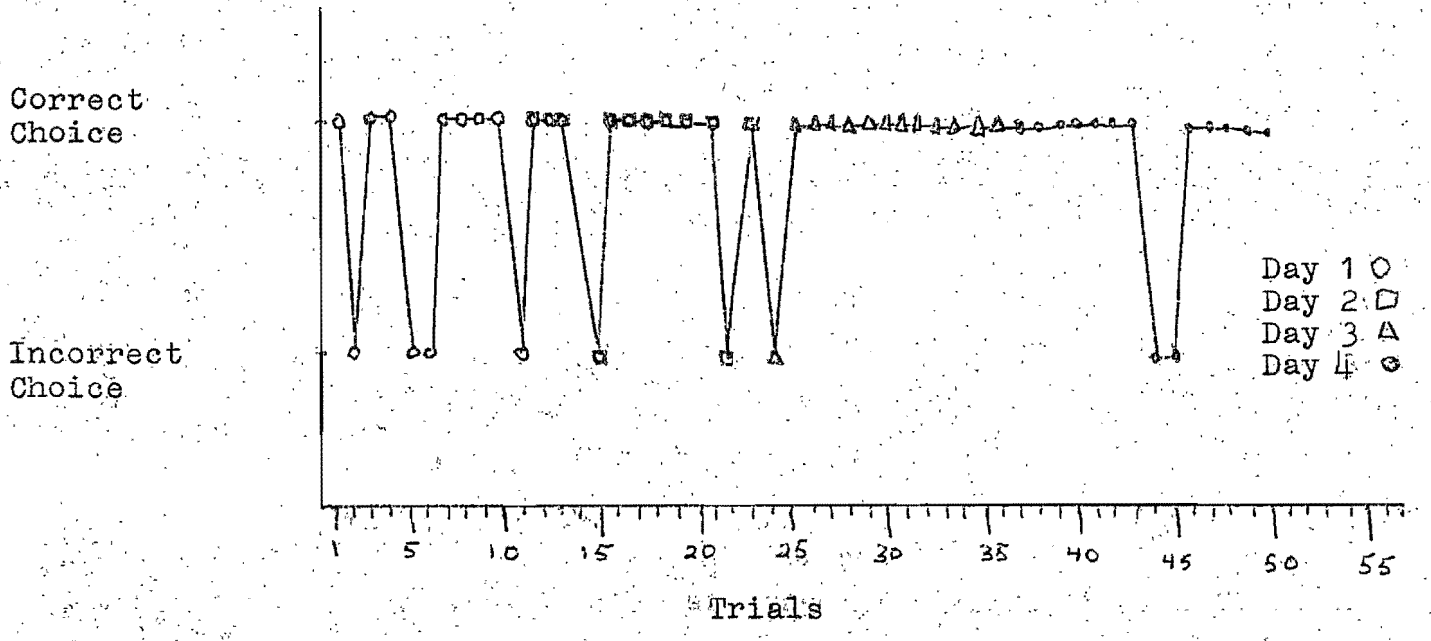

Figure 9. Raw scores for imagery task one by subject 4.

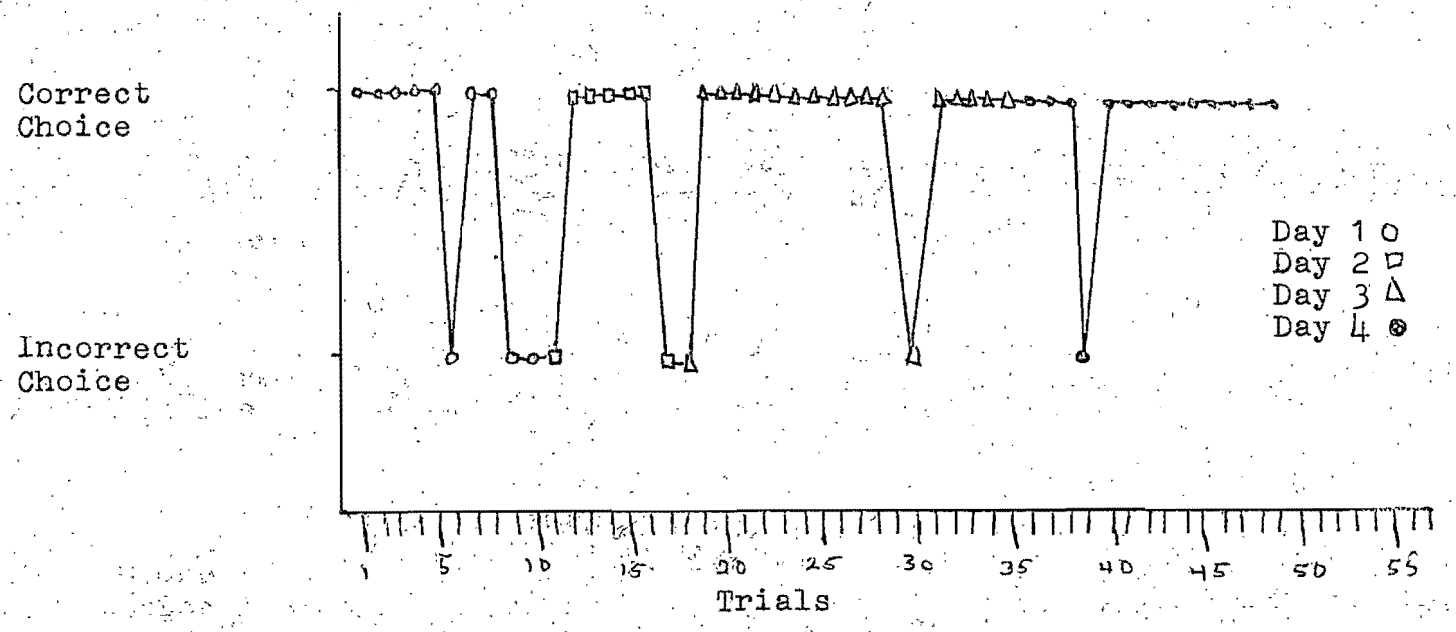

Figure 10. Raw scores for imagery task one by subject 5.

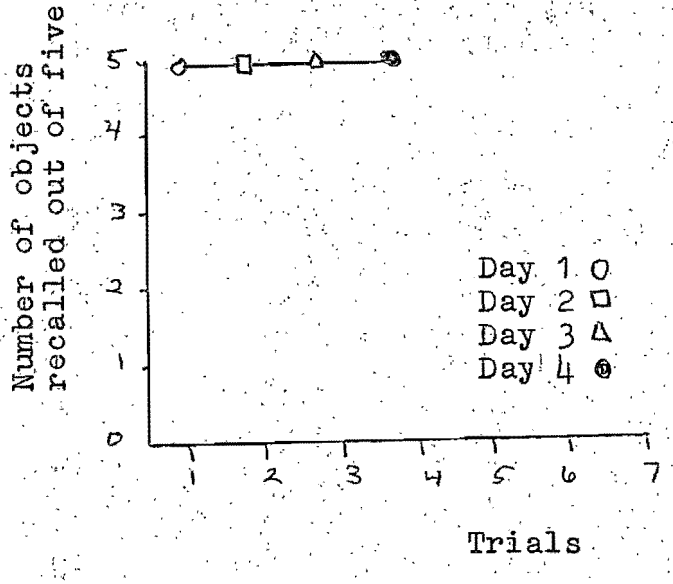

Figure 11. Raw scores for imagery task three by subject 1.

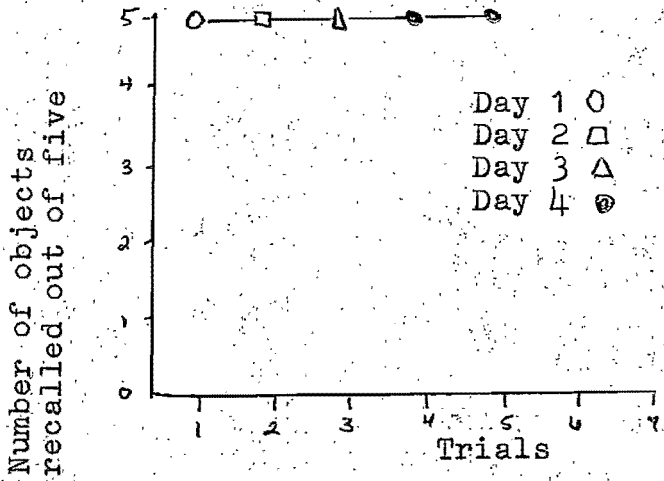

Figure 12. Raw scores for imagery task three by subject 2.

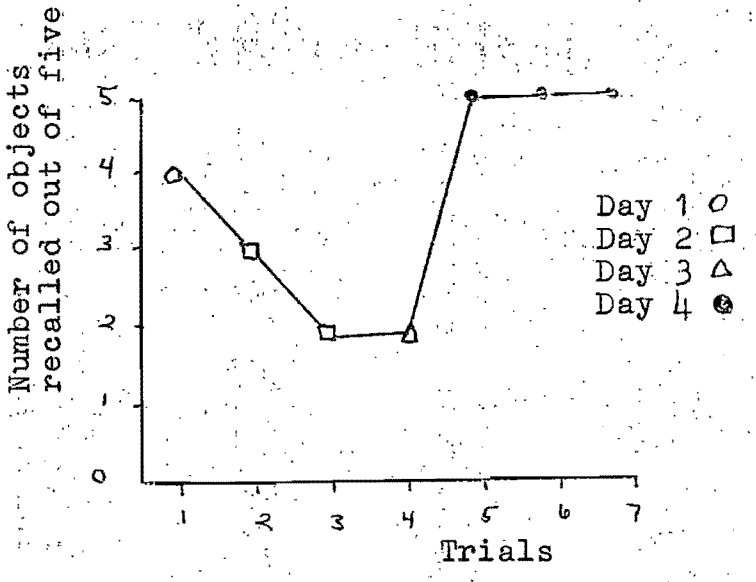

Figure 13. Raw scores for imagery task three by subject 3.

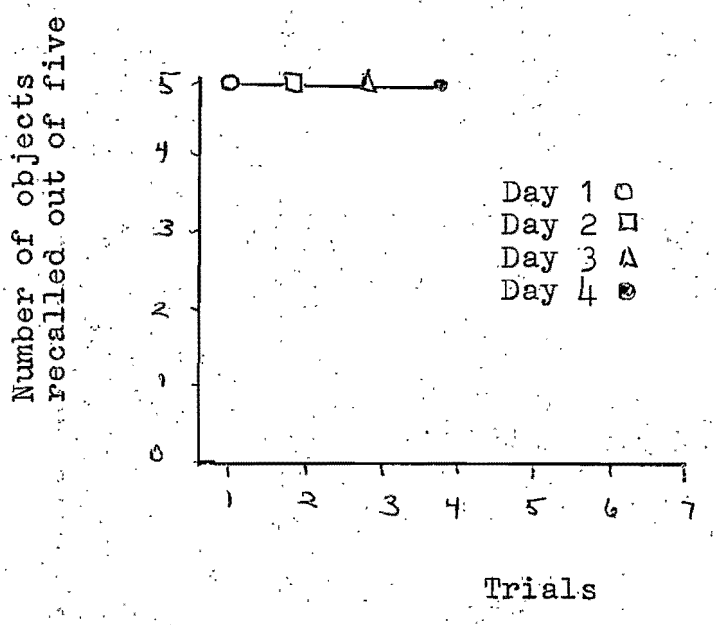

Figure 14. Raw scores for imagery task three by subject 4.

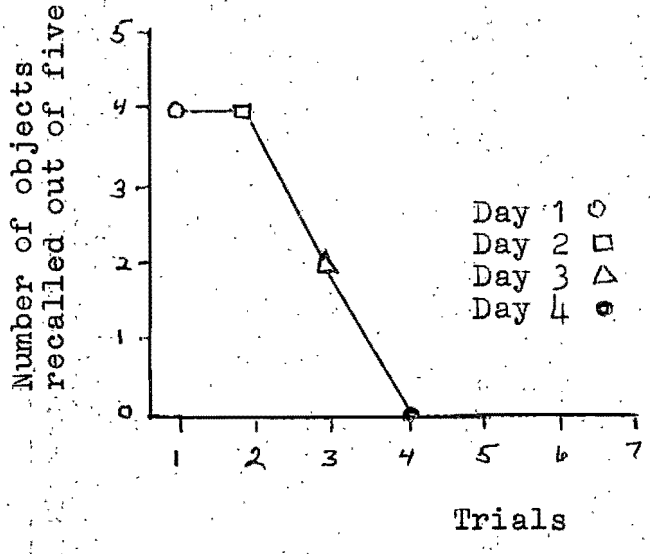

Figure 15. Raw scores for imagery task three by subject 5.

Discussion

The hypothesis tested in this study was two-fold. First, it was expected that a retarded subject's ability to use imagery could be improved over a period of time through the use of specific imagery training tasks. Secondly, and more importantly, it was expected that if a retarded subject could be taught to use imagery more efficiently, then, at the same time, his or her verbal ability would also increase.

The first hypothesis, simply stated, was through imagery training sessions, a retarded person's ability to use imagery could be improved. However, as was already shown, the group as a whole did not significantly improve in their ability to use imagery. On two of the three tasks (Task one and three) the subjects started out at maximun performance and on the third task no significant improvement was found. However, if the individual results of the experimental group of Imagery Task Two are consulted (See table 1) one can see that three of the five subjects did in fact improve in their imagery performance. Subjects 1, 2, and 4 all showed a marked improvement in correct responses on Imagery Task Two. However, this improvement was not significant for the experimental group as a whole. Subjects 3 and 5 showed

very little improvement, if any at all, which could have caused the group mean to be lowered and therefore make the analysis of the Imagery Takss be non-significant. The difference among these subjects caused the significant subject affect in the one way analysis of variance for Imagery Task Two.

One conclusion drawn from the results of this experiment is that ability in the use of imagery can be improved by the practice of imagery tasks for some retarded children but not for all retarded children. But evidence leads us to believe that this improvement occurs only in some retarded children and cannot be applied to all retarded children. It could be possible, through finding or inventing new Imagery Tasks, that imagery ability could be improved in retarded children through practice.

There are a variety of reason as to why no improvement was shown in Imagery Task Two in the experimental group. It cannot be positively stated that any of these factors caused failure of improvement, but anyone of them could have.

First, the imagery training sessions only lasted for four weeks. This period was the maximum possible due to vacations and school closings which did not allow for a more extended amount of training. If more training sessions could have been provided, the added training

could have had an affect on the ability of the students to use imagery. Perhaps subjects 3 and 5 would have showed an increase in imaging ability if extended training could have been provided.

Secondly, the amount of time per day that the experimenter spent with each subject on the specific imagery tasks was only twenty minutes. It would be reasonable to say that a longer amount of time for interaction between the experimenter and the subjects may have produced other results because of more practice.

Thirdly, distractions could have affected the results. There were three major types of distractions. First, the attention span of each child is different, and the length of the attention span differs each day. Finding a way to equalize this variation would be difficult, but it is still a factor to acknowledge. A second distraction which affected the performance of at least two of the subjects on one day was a fire drill held at the school while training was in progress. Moving from the cite during testing was a definite factor on scores for that day.

The third distraction factor, and perhaps the most significant, was the fact that the training was done in a classroom while other students were there and class was going on. Classroom noise, sporadic visitors, and student curiosity were especially detrimental to the subject's

attention to the experimenter's questions. I propose that if a replication is ever attempted, that the test cite be in a private room with no one present but the experimenter and the subject. In this way, the subject can give maximum attention to the instructions given by the experimenter.

A fourth reason for the failure of the experimental group to improve on the imagery tasks apparently could be the tasks themselves. As already stated, Imagery Tasks 1 and 3 show little or no subject variability. So it is apparent that either both tasks were so simple that all the subjects mastered them with relative ease, or that each task required very little use of imagery to achieve a correct response. In Task Two there was a significant subject variability but no practice affect. In conclusion, any one or all of the "imperfections" stated could have caused the final outcome of results which rejected the first hypothesis.

The second hypothesis was that if a retarded child could be "taught" to use imagery more efficiently then, at the same time, verbal ability would also increase. As the results showed, any difference between post-test scores on the Parsons Language Sample between the Imagery and the Non-Imagery trained groups was not due to the imagery training that was recieved by the experimental

group. Both the control group and the experimental group improved a minimal amount, more than likely due to the fact that they had taken the PLS previously. But the improvement was not due to the affect that the imagery training had on the experimental group. One reason why the second hypothesis was not verified could have been the fact that the first hypothesis was not supported. It seems logical that if the experimental group did not improve in the use of imagery ability there would be no reason to expect their verbal ability to increase. If the first hypothesis would have been supported, then there would be reason to believe that there should be a significant improvement by the experimental group on the verbal ability test.

Another reason why the second hypothesis was not verified could have been because of the test itself. The Parsons Language Sample turned out to be more like an I.Q. test rather than just a Verbal Ability test. But due to the fact that this was the only test available, due to an inability to get permission to use other tests, I had to use the PLS. Many other tests have to be given by a licensed administrator and therefore were unavailable to me. Two tests which I would have preferred to use instead of the PLS were the Objective Language Scale (Johnson and Bommarito, 1971, p. 67) and the Illinois

Test of Psycholinguistic Abilities (Robinson and Robinson, 1965, p. 439).

In conclusion, the results of the Analysis of Co-variance was not significant and according to my data I would have to reject my hypothesis and say: An increase in a retarded child's ability to use imagery has no affect on his or her verbal ability. However, because of the significant subject affect on Imagery Task Two, I believe that the hypothesis could still be proven valid if the changes in the experiment were to be made along the lines already stated before. The results show that subjects 1, 2 and 4 improved greatly in their ability to use imagery on Task Two. If the above changes were to be made perhaps subjects 3 and 5 could have made the same improvements, and therefore the first hypothesis could have been supported. And if the first hypothesis were to be supported, which would mean that the subjects in the experimental group would have improved in imagery ability, there could have been a change in results in the analysis of the second hypothesis. Therefore, I propose that if the changes already stated be made, I believe that I would find a relationship between the ability to use imagery by a retarded person and his or her verbal ability.

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Appendix A

Tact Subset:

	Objects	Correct Response
(Real objects)	1. ball	ball
	2. cup	cup
	3. telephone	phone or telephone
	4. spoon	spoon
	5. pencil	pencil
	6. wrench	wrench
	7. C clamp	clamp or C clamp
(Miniature objects)	8. duck	duck
	9. car	auto, car, etc.
	10. chair	chair
	11. table	table
	12. screwdriver	screwdriver
	13. pliers	pliers
	14. hammer	hammer
(colored pictures)	15. motherly type woman	mother, lady, woman
	16. kitten	cat, kitty, kitten
	17. apple	apple
	18. drum	drum
	19. leaf	leaf, trees
	20. cigarettes	cigarettes
	21. monkey	monkey
(non-colored pictures)	22. fatherly type man	man, daddy, father
	23. puppy	puppy, dog, doggie
	24. baseball bat	bat, baseball bat
	25. watch	watch
	26. airplane	airplane, plane, jet
	27. boats	boat, ship
	28. house	house, home

Echoic Subset:

	Vocal Rating
Section A	
1. Say 'ball'	
2. Say 'skate'	
3. Say 'cowboy'	
4. Say 'playhouse'	
5. Say 'Give me one'	
6. Say 'The cat is black'	
7. Say 'Bob made a box for his cat'	
8. Say 'My sister wants Daddy to buy her a big doll'	
9. Say 'At night we went to see a movie at the theater'	
10. Say 'In the summertime the little children like to eat black walnut ice cream.'	
Section B	
1. Say '2'	
2. Say '1'	
3. Say '3-9'	
4. Say '1-4'	
5. Say '4-9-3'	
6. Say '4-6-3'	
7. Say '9-7-6-8'	
8. Say '2-8-1-3'	
9. Say '5-4-8-7-1'	
10. Say '3-9-6-7-1'	
11. Say '1-7-9-3-2-5'	
12. Say '1-5-8-9-3-7'	

Intraverbal Subset:

Question	Correct Response
1. What do we do when we are hungry?	eat, supper, dinner
2. Why do we have houses?	live in, shelter,
3. Why do we have stoves?	keep warm, cook on
4. Why do we have books?	to read
5. Why do we have clothes?	to wear, keep warm
6. Why do we have beds?	sleep
7. Before we go outside we put on our coats and ____.	Any article of cloth- except coat.
8. The flag is red, white and ____.	blue
9. The color of an apple is ____.	red
10. We go to church on ____.	Sunday or the bus
11. Santa Claus comes on ____.	Sled, Christmas
12. We wear our shoes and our socks on our ____.	feet
13. We smoke ____.	cigarettes, cigars
14. Sister is a girl, brother is a ____.	boy
15. A lemon is sour, sugar is ____.	sweet
16. A car goes on the ground, an airplane goes in the ____.	air, sky
17. A mile is long, an inch is ____.	short, small
18. A chair is made of wood, a window is made of ____.	glass
19. Snow is ____.	white, cold, wet
20. You kick with your foot, you throw with your ____.	arm, hand
21. We smile when we are happy, and cry when we are ____.	sad, unhappy
22. My Daddy's sister is my ____.	aunt
23. My Daddy's brother is my ____.	uncle
24. In what way are a dog and a cat alike?	'Both have...'
25. In what way are a boat and a car alike?	'Both have...'
26. In what way are paper and wood alike?	'Both have...'
27. In what way are a tree and a lion alike?	'Both have....'
28. In what way are cigarettes and cigars alike?	'Both have....'

Intraverbal Gesture:

1. Where is the light?
2. Where is your ear?
3. Can a bird fly?
4. Can a dog fly?
5. Can a rabbit eat?
6. How do you fasten a button?
7. What do you do with a cup?
8. Can a boy outrun a horse?
9. What do you do with a key?
10. What do you do with a spoon?
11. What do you do with a scissors?
12. What do you do with a crayon?
13. What do you do when you are hungry?
14. What does an airplane do?
15. What does a wheel do?
16. What does a swing do?
17. What do you do with a saw?
18. What do you do with a cigarette?
19. What is a ceiling?
20. What do you do with a drum?
21. What do you do with a ballon?
22. What do you do with a comb?
23. What is a floor?
24. What do you do with a handkerchief?

Summary Table for
Analysis of Variance

Source	SS	df	MS	F
A	21.22	3	7.07	2.72
S	113.22	4	28.31	10.89
AxS	31.134	12	2.60	

Summary Table for
Analysis of Co-Variance

Source	SSadj	df	MSadj	F
A	5051895154	1(a-1)	505189515.4	$\frac{505189515.4}{579825514.7} = .8713$
S/A	4058778603	7 a(s-1)-1	579825514.7	