

THE PROCESS CURRICULUM

Volitional Competence
Attention

by Patrick C. Conway

with the assistance of:
Daniel C. Jordan
Richard C. Hastings

ANISA PUBLICATIONS

Box R
Escondido, Calif.
92025

CONTENTS

DEFINITION.....	1
DESCRIPTION.....	1
THEORETICAL JUSTIFICATION: ANISA.....	6
Attention and Volition.....	7
Attention and Cognition.....	8
The Role of Attention in the Exercise of Values: Its Significance for Moral and Spiritual Development.....	9
DEVELOPMENTAL CONSIDERATIONS.....	10
EDUCATIONAL OBJECTIVES.....	10
IMPLICATIONS FOR PEDAGOGICAL EXPERIENCES.....	11
PROTOTYPICAL LEARNING EXPERIENCES.....	16
REFERENCES.....	28

DEFINITION

Attention is the process by which one purposively selects (differentiates) and organizes (integrates) feelings, sensory information, memories and ideas into a single focus of conscious experience.

DESCRIPTION

William James wrote:

Everyone knows what attention is. It is the taking possession of the mind in clear and vivid form of one out of what seem several simultaneously possible objects or trains of thought. Focalization concentration of consciousness are its essence. It implies withdrawal from some things in order to deal effectively with others and is a condition which is a real opposite in the confused scatter-brained state which is called distraction (James, 1980, I, p. 100).

He goes on to explain that the "abolition" of this confused ambient state of mind is the awakening of attention.

One principle object comes then into the focus of consciousness. Others are temporarily suppressed by reason of a stimulus from without, or in consequence of some unknown inner alteration and the changes it brings with it amounts to a concentration upon a single object with exclusion of aught besides, or to a condition anywhere between this and the completely dispersed state (James did not elaborate as to the nature of this inner alteration although there are indications elsewhere that he is referring to the causal effects of purpose and intentionality upon the awareness) (Ibid., 101).

James points out that the effects of attention are to make one perceive, conceive, distinguish and remember things better. He emphasized that attention is an active process the function of which is to select information from the environment.

James' interest in the selective aspect of attention led quite naturally to the problem of how many things or ideas a person could attend to at once. The question is quite important, because it leads us to consider the nature of the processes which are responsible for the limitation of attention. James' answer was that the number of things to

which one can attend is altogether indefinite depending upon (1) one's intellectual powers, (2) the complexity of what one is doing, and (3) what the "things" are. He goes on to point out that when apprehended conceptually as a connected integrated system, the number of things may be quite large.

But where the object before us breaks into parts disconnected with each other, and forming each as it were, a separate object or system not conceivable in union with the rest, it becomes harder to apprehend all these parts at once and the mind tends to let go of one whilst it attends to the other. (Ibid.)

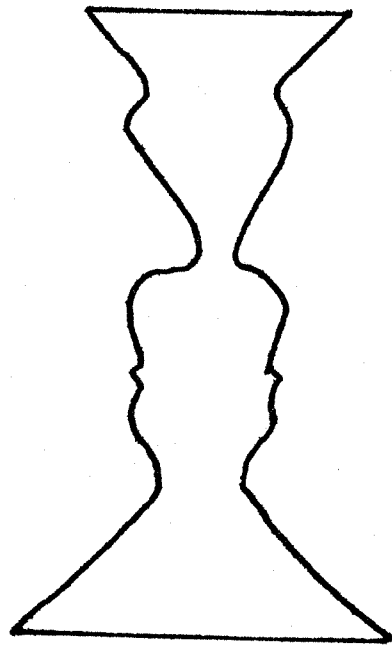
For example, when driving a car, most of us find no difficulty in guiding the steering wheel, maintaining the proper speed, chewing a stick of gum and carrying on a conversation with the passenger next to us all at the same time. Most of these activities we carry out without directly being aware of them. On the other hand, it is almost impossible to listen to two conversations at once or to do more than one arithmetic problem simultaneously. How can we account for this plasticity in the number of things to which we can attend?

It is conceivable that there are various levels of conscious activity which can be described as hierarchically organized systems of processes. At the top level is the center of focal awareness wherein we experience the seemingly one-channel capacity of conscious activity illustrated in the fact that we can listen to and interpret only one conversation at any given instant or solve only one arithmetic problem at a time. This focal awareness is the product of an integration sustained by a number of lower order subsidiary processes. Examples of these lower order processes are the habitual operations which underlie routine activities like walking or recognition of individual words when listening to a speech. In either of these cases an immense amount of information is being handled and processed by the nervous system in any given moment. Walking involves the flexible coordination of thousands of neuro-muscular operations at once, and reading 300 words a minute involves accounting for and interpreting 30 to 40 letters, per second, but both walking and comprehending language are normal activities for a human being.

Take the situation of listening to speech. Normally, we focus out attention upon the semantic content or meaning of the sounds which we hear. This act of attending entails an extraordinarily rapid integration of pitch, duration, consonant characters (all of which are attended to proximally) into units which convey symbolic meaning. However, if instead we concentrate our attention upon the sub-units of speech, noting in detail the movement of the speaker's lips as he articulates various morphemes, noting the prosody and intonation of his voice, we would be

focally aware of these elements of speech as terminal objects and hence lose grasp of their higher order meaning as parts of a symbolic message.

Thus, we see that attention consists of many different levels of awareness which culminates in a single focus. This unified structural property of attention in part provides a clue as to why attention must be selective. Some things cannot be integrated, i.e., they do not go together. For example, two like-charged poles of a magnet do not coalesce—they repel one another. Likewise, a human being cannot see both configurations of a figure-ground pattern simultaneously. He can attend to only one at any given instant. The figure below may be seen either as a vase or as two opposing facial profiles, but not both at the same time.



With regard to attention, then, it is possible to attend to a number of elements at once, insofar as they can be mentally integrated into a single whole. If sensory information and ideas cannot be integrated into a single object of attention, some of the elements must be rejected. The selection of some possibilities necessitates the exclusion of others.

One means by which diverse fragments of information can be integrated and resolved into a single object of attention is through the power of conceptual abstraction. Abstraction allows one to focus on a particular

quality inhering in the situation apart from any concrete exemplification of the quality.

A necessary consequence of such abstraction, however, is that the rich diversity and subtle uniqueness must, to some degree, be sacrificed. Conscious understanding, knowledge, indeed survival, depend upon continual interchange between the general and specific, between the abstract and the concrete. Consequently, the bulk of our experience is built upon various degrees of abstraction. As we move away from the abstract toward the concrete, we become aware of the subtleties and differences among things and accordingly encounter aspects of incompatibility. For example, we may see an array of cone-shaped objects. Insofar as our attention is directed towards "coneness" we may not be immediately aware as to whether the objects are blue, red, or yellow. Color is irrelevant in determining the focus of attention. Thus, on the basis of shape (our abstract principle) we are able to attend to an entire set of diverse objects as "one object" of attention. If we descend the ladder another step so that we take the color of the objects into account, we suddenly introduce disjunctive elements into the perceptual occasion. The formerly single object of attention, (i.e., cone-shape) perishes, creating new and independent potential foci, i.e., "red cones", "blue cones", "yellow cones". In this condition each focus constitutes a potential object of attention and a new criterion or ceiling for the inclusion and exclusion of data. To entertain one focus requires the momentary suppression or exclusion of other possible foci. For example, to perceive an object as a red cone demands reciprocally that one perceive it as "not blue" or not yellow. Thus, when attention is more abstract, the range of elements one can attend to expands; when attention moves toward a more concrete mode, the range of elements narrows.

One position we have taken throughout the discussion, so far, is that attention is an active process by which the organism selects and structures his conscious experience. This means that, when we perceive something such as a car, we are, in part, creating the image of the car in our minds as we receive the visual sensation. This image consists of past references, memories, references to aims and aspirations which are all brought to bear on the incoming sensations. As James wrote; "The image in the mind is the attention". "It is half the perception of the looked-for thing". This explains why two different people can "see" different things when looking at the same object. For example, a young child's attention towards an automobile will tend to be undifferentiated. If asked to draw what he sees, he is likely to omit the door handles, chrome trimming, window vents and other details whereas a car designer is apt to "see" such detail since he brings to the situation a highly differentiated and integrated image (set of references) allowing him to perceive the car in far greater complexity.

One advantage in regarding attention as an act of constructive synthesis is that it easily accommodates the role of intention and purpose in the process of selection and integration. If a person perceives reality by constructing it, then what he selects and the manner in which he integrates it, is something which he determines according to his purposes. This explanation is consistent not only with experimental research but also with our direct experience. For example, we are all familiar with how a person's expectations about a situation heavily influences his actual perception. If one is led to expect that he will see a particular shape or object, he often sees what he expected to appear, rather than what was actually presented. A well-known illustration of this phenomenon is the proof-reader's illusion, the case in which a reader does not detect misspelled versions of familiar words. He, in effect, "fills in" the missing or wrong letter himself without any conscious effort of doing so.

No discussion of attention would be complete without a remark about the role of interest. William James said, "To feel interested in something is to feel attracted to it, to feel inclined to give attention to it." (*Ibid.*, 430). Here, the element of feeling and affect is encountered. As such, interest might be regarded as the feeling or loving component which underlies attention. Because it is essentially a quality of feeling, interest must be aroused. A person can voluntarily attend to something for which he has no interest, but only for a very short time unless there is something which strikes him as new and exciting. When this happens, one develops interest and attention is easily sustained.

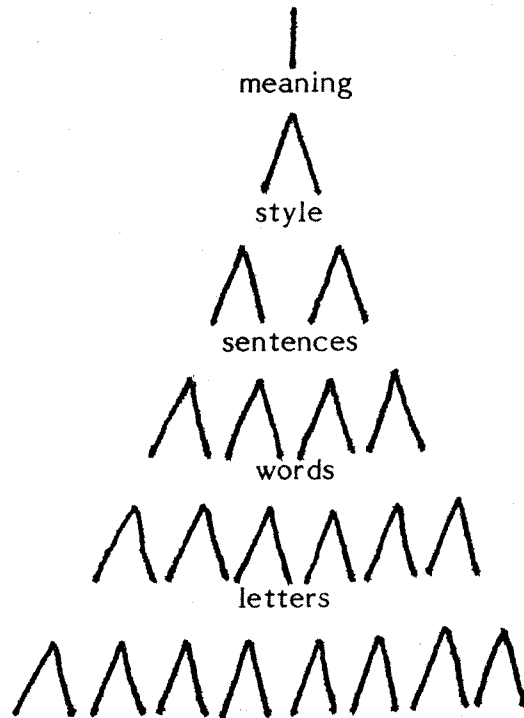
Thus, although attention and interest are not to be equated with each other (since one may be interested in many things but only attend to one at any given moment), one's interest in a situation or object will determine his capacity to attend to it.

Conclusion

In summary, the process of attention is comprised basically of two interrelated operations: a) selection (differentiation); and b) structuration (integration). This interdependence operates in two directions: 1) the elements selected in a situation will determine what is integrated, and 2) the limits of the integration determine what must be excluded, i.e., if the structure cannot accommodate the elements into a unified whole, those which are incompatible must be rejected.

Both of these operations are influenced by purpose. In addition, the structure of attention includes many levels of awareness which are hierarchically organized. As an illustration, let us again consider reading. The letters are integrated into words, the words are structured

into sequences. From many sentences one infers style and from the style and text one extracts meaning.



THEORETICAL JUSTIFICATION: ANISA

If there is one point over which educators find no dispute, it would be that attention is a fundamental prerequisite to effective learning. Inasmuch as we have defined attention in terms of selection (differentiation) and construction (integration) of experiential data, one might naturally expect that attention is at the very core of the learning process itself. In fact, it would seem accurate to regard attention as a process that underlies and constitutes a phrase of learning.

As James once pointed out, the effect of attention is to make us perceive, conceive, distinguish and remember things better. This was so, he maintained, because attention is one process which helps determine which things get into primary (long-term) memory. William McDougall (1908) maintained that the effect of thought is not only to select and stabilize a particular focus of thought but to allow for a more detailed

analysis and therefore a more subtle control of actions with respect to that focus.

Regarding its differentiative function, attention enhances the subtleties and detail of our immediate perception of things. It also mediates the storage and retrieval of information (what we attend to, we remember better). Unless we are able to differentiate between two situations we have no basis upon which to develop different kinds of action towards them.

These propositions receive a good deal of empirical documentation from the research concerned with intentional versus incidental learning. In the laboratory studies of human learning, it has been demonstrated again and again that the presence of an intention or "task" to learn can have a very powerful effect upon learning. The explanation which most adequately accounts for the experimental results is that attention is intensified or redirected by the task and the material is more organized or perceived differently.

So far, we have treated the relation between attention and learning competence in very general terms. The remainder of this section will concentrate on the importance of attention to several specific aspects of learning competence.

Attention and Volition

According to James, "Attention is the first and fundamental thing in volition. The essential achievement of the will, in short--when it is most voluntary, is to attend to a difficult object and hold it fast before the mind" (James, 1890, II p. 528). In fact, it would appear that attention in its rudimentary form is the genesis from which these other processes evolve. Take, for example, the process of formulating intentions or goal-setting. Implicit within any such consciously held goal or intention is some measure of attention toward the object or situation which the goal reflects. The ability to turn one's attention toward some yet unrealized possibility in the future is essential if one is to have a degree of control and self-determination over one's destiny.

The differentiation of complex goals and intentions into component sub-plans and intermediary steps also requires the capacity to attend focally and analyse the conditions and contingencies with which one is faced in constructing a coherent plan of action. This includes the ability to project and imagine the consequences of a given alternative.

Attention also serves an important function in the translation of intentions into actuality (the process of willing). It is James, again,

who provides us with a description, this time through one of his charming anecdotes:

We know what it is to get out of bed on a freezing morning in a room without a fire, and how the very vital principle within us protests against the ordeal (remember, James lived in New England before the advent of central heating). Probably most persons have lain on certain mornings for an hour at a time unable to brace themselves to the resolve. We think how late we shall be how the duties of the day will suffer; we say, "I must get up, this is ignominious," and so on. But still the warm couch feels too delicious and the cold outside too cruel, and resolution faints away and postpones itself again and again just as it seemed on the verge of the decisive act. Now how do we ever get up under such circumstances? If I may generalize from my own experience we more often than not get up without any struggle or decision at all. We suddenly find that we have gotten up. A fortunate lapse of consciousness occurs, we forget both the warmth and the cold; we fall into some reverie connected with the day's life, in the course of which the idea flashes across us, "Hello! I must lie here no longer" - an idea which at that lucky instant awakens no contradicting or paralysing suggestions, and consequently produces immediately its appropriate motor effects.

And then he adds,

It was our acute consciousness of both the warmth and the cold during the period of struggle which paralysed our activity.

The "reverie connected with the day's life" or fantasy is, in essence, a form of attention in which the object is some future possibility instead of a stimulus in the present.

Attention and Cognition

For Piaget, attention is a fundamental prerequisite for all stages in the development of thought. In fact, Piaget regards the concentration of attention on one idea as precisely nothing else but the centering of thought (Piaget, 1966, p. 131). He points out how, in pre-operational intuitive thought, the child is able to focus his attention on one dimension of comparison between two different sized and shaped objects.

For example, take the case of the child who estimates that there are more beads in jar B than in jar A because the level has been raised. He centers his attention on the relation between the heights of "B" and "A" and ignores the widths. But if we transfer the beads from "B" into another glass "C" which is even thinner and taller the child is apt to reply that there are fewer beads because "C" is too narrow. This represents a shift of attention from height to width. On the other hand, the child who judges the quantity in "B" to be less than that in "A" on account of thinness is likely to favor the increased length of "C" in favor of height and ignore the decrease of width.

He remarks:

Now the transition from a single centering to two successive centering heralds the beginnings of the operation; once he reasons with respect to both relations at the same time the child will in fact deduce conservation (Ibid, p. 96).

Thus, the operational stages of thought are characterized by an increasing ability to coordinate and focus one's attention upon the various aspects of incoming sensory data so as to yield a more complex and versatile integration of the referent experience.

Many studies underscore the key role of attention in the formation and utilization of concepts. Effective conceptual thinking depends upon the ability to respond to a situation very selectively in terms of one or several of its attributes. If a child is unable to focus his attention upon the relevant attributes of an embedded instance while ignoring the irrelevant qualities, his capacity to order and classify experience and thus manage its otherwise overwhelming complexity, will be severely handicapped.

The Role of Attention in the Exercise of Values: Its Significance for Moral and Spiritual Development

Inasmuch as the application of moral and spiritual principles to one's daily life involves the translation of ideals into action, volitional competence is centrally implicated in the moral and spiritual aspects of human growth. Let us consider a specific illustration. Assume that individual "A" holds as his highest value the organic oneness of the human race. Let us also assume that A sees the primary means of realizing this ideal in his personal life as the establishment of harmony with others. Now one of A's frequent contacts is "B", a cantankerous, ill-wishing individual, seemingly devoid of a real interest in the feelings of others. Thus, whenever A meets B, A's capacity to respond to B in a manner

congruent with his values is often overtaxed. However, A discovers that he is much more successful in actualizing this value if he actively focuses his attention upon the positive qualities which B displays (however sporadically) and ignores the irritable aspects of the latter's character. The effect of this strategy then begins to exert a transforming effect upon B's actions.

DEVELOPMENTAL CONSIDERATIONS

The development of attention can be seen in terms of three distinct but interrelated modes of progression.

1. From outward to inward control. According to Piaget, as the child matures, what he assimilates in the course of experience becomes more and more the product of the operations which the youngster enacts upon his environment. Thus the nature of the child's experience, his representation of reality and his immediate perception of the world around him becomes less a direct registration of sensory input and more a function of his self-directed interactions and transformations upon the world around him. Attention shifts from being extrinsically (outwardly) determined to intrinsically determined.
2. As the child advances further in age and experience, his attention accommodates more complex and novel situations.
3. Another developmental trend involves the progressive internalization of perceptual and motor processes. The child depends less on overt physical manipulation of objects and is less reliant on concrete sensori-motor experiences to direct and control thought and attention. Instead, he can conceptually manipulate ideas, concepts and abstractions, which become in themselves a new and increasingly important source of data for the child. Thus, the third major trend in the development of attention is the progression from a level in which attention is divided exclusively to concrete physical information to one in which attention can accommodate abstractions and conceptual possibilities yet unrealized in the immediate present.

EDUCATIONAL OBJECTIVES

To purposively select (differentiate) and organize (integrate) feelings, sensory information, memories and ideas, into a single focus of conscious experience and reject that information incompatible with, or irrelevant to one's purpose.

It seems appropriate that the more specific objects be derived from the developmental progression outlined in the previous section.

1. To bring the operation of attention more under self-control so that it becomes less dependent upon activity in the environment and originates increasingly from the child.
2. To subsume under focal attention increasingly complex and novel information. This includes the ability to attend to abstract and conceptual data.
3. To turn one's attention toward the realm of potentiality, i.e., to fantasize or imagine an unrealized future possibility.

IMPLICATIONS FOR PEDAGOGICAL PRACTICE

The purpose of the present section is to delineate those qualities of experience which serve to facilitate the development of attention. Many of these principles are implicit in the previous discussions but at this time a more explicit treatment will serve as a useful prelude to understanding the subsequent prototypical experiences.

In our treatment of some of the developmental issues surrounding attention, we mentioned the critical role of early environment. In accordance with the stages of development outlined earlier we propose the following suggestions:

A) That the child's environment should be rich and varied in stimulation. Since the infant begins to respond differentially to patterns within the first few days after birth, this exposure should commence immediately. Following the fifth or sixth week it becomes increasingly important for the child to begin to have not only a diversified environment but also a responsive one. There should be ample opportunity for the infant to manipulate and experiment with the things around him. Active participation in the environment is a critical stage in the development of attention. It is through manipulation that the child begins to acquire a schema of operations which form the basis of internalized perceptual-cognitive processes. Recall that these internalized operations are what enable attention and perception to be internally directed. A popular example of this sort of provision is the mobile which is fastened to the child's crib. By moving, the infant causes the mobile to move. His own actions then become instrumental in the perceptual experience. A variant of this set up is to tie either a string, yarn, or ribbon between the mobile and the child's hand. Here again, the effect is the same but in this case, the child can produce motion by a more refined, differentiated

movement whereas in the former case, gross bodily movement is necessary. As a result, the infant has more control over the kind of effects he can produce. The experience can be further enriched by tying several ribbons or lengths of yarn, each of a different color, to various sections of the mobile so that by pulling a different ribbon he can produce a distinctly different experience.

It is not enough that the physical environment alone be responsive to the child's actions. Even more important is that his interpersonal contacts especially with parents or other primary adults be frequent, warm, and nurturant. Lack of such regular contact amounts to a form of emotional as well as perceptual-intellectual deprivation. Thus, a parent's interaction with the child might include little games wherein the parent shows recognition and actively responds to the infant's sounds and bodily movements.

During the period from four to nine months when the child's innate interest tends toward recognitive familiarity, the format of parents' responses should place heavy emphasis upon repeating patterns of behavior or speech on subsequent occasions. This, of course, should not preclude introducing new incidents into the interchange.

After nine months, the substance of parent-child interaction should shift toward a greater inclusion of new patterns and elements. Thus, instead of merely repeating vocal or motor patterns, the parent should produce novel variations in response to the child's. For example, if the child babbles "ma ma" the mother might respond not just with "ma ma" but perhaps with "mi mi" or "moo moo" and encourage the child to imitate. Or if the parent and child have been clapping hands together the parent might initiate a departure from the original game by patting her hands on her head or cheeks. Of course the variations on such a theme are innumerable and need not be explicitly spelled out here. The main guidelines are all a parent or teacher requires to generate his own individually tailored learning experience.

B) The role of feedback - It is fairly well known that if an individual is provided with a knowledge of the results of his efforts to direct and maintain the focus of his attention upon a particular object, his performance improves. Moreover, the results indicate that the completeness of such feedback correlates positively with improved performance.

The main value of knowledge of results is to let the subject know when his attention is wandering or lapsing and hence provide a corrective cue for him to refocus his energies upon the task. Insofar as the individual is knowledgeable of his behavior and the subjective feeling with which this behavior is associated, he has a measure of control over it. This

principle might be implemented in a number of ways on different levels. For example, students who are working together in a cooperative task which requires constant attention towards the activity of each other can incorporate a vigilance game within the main task in the following way.

Suppose the main task involved a shadowing exercise, the object of which is to mirror the movements of one's partner through one's own movements. The vigilance game could consist of an unanticipated signal given by the leading partner which would signify that the following partner should immediately reverse the direction of his movements so that instead of mirroring the leader's movements, he opposes them. Thus, if the leader were to extend his left arm, the follower who would be facing the leader would be required to raise his left arm instead of his right and therefore oppose the leader's pattern. The signaling cue could be any inconspicuous action or common word, a particular movement, wrinkling one's nose, etc., but both leader and follower should have agreed on what the signal will be ahead of time. When the signal is repeated, this would indicate a reversion to the original mirroring exercise.

In these circumstances, a lapse of attention would yield immediate overt consequences enabling the leading child to give prompt feedback to his partner. Presumably the follower would then have the advantage of knowing when his attention wandered and would be able to better identify the onset of lapses in future occasions and redirect his energies and efforts to avoid them.

Another situation which would yield valuable feedback employs the type of selective listening task used by Broadbent (1958) and Treisman (1963) in their studies. The task requires a subject to separate two simultaneously spoken messages and verbally "shadow" one message while ignoring all others. The exercise demands high levels of concentration and any shift in attention results in an immediate breakdown of the subject's activity.

This design can be modified or complicated to provide various levels of difficulty. For instance, a younger child at first may be incapable of differentiating two sources of speech in which case simply shadowing without this interference would be a sufficiently challenging task. More advanced students might be challenged by using three instead of two simultaneously spoken messages. In addition, the physical intensity or clarity of the shadowed message could be varied with respect to the intensity and clarity of the unwanted messages. Blindfolds may or may not be used depending upon whether the child requires or can dispense with visual cues in differentiating the messages. Another variation would be to have the speaking voices constantly in motion, criss-crossing one another in space, making the use of spatial cues more difficult and intriguing.

These experiences require no special equipment and can be implemented easily. Students can work together in groups, each one serving a vital role in the experiment.

C) On a very fundamental level these experiences can be viewed as exercises which require one to differentiate figure-ground relations. Since this is one way to characterize the process of attention, we would like to suggest a couple of practical applications derived from this conception.

The first instance involves the use of simple figures and images embedded in a variety of increasingly complex backgrounds. This sort of exercise is commonly used as a device for assessing a child's level of perceptual development and serves to determine whether or not the child suffers from any psycho-neurological handicap. There is no reason why this technique could not be modified and developed into a learning aid.

The second instance utilizes the same principle but in the auditory mode. In this case, music is the medium and the task becomes one of identifying themes or motifs in various rhythmic and harmonic contexts, within various keys, tempi, etc. Again the level of difficulty should be gained according to the child's capacities, beginning with simple exercises and gradually moving toward more complex tasks.

D) Equally, if not more important than being able to attend to selected sources of information in one's immediate environment, is the ability to entertain as the object of one's attention some ideal or unrealized possibility--the capacity for imagination and fantasy. Many children show a natural inclination for fantasy, but often teachers either ignore or suppress fantasy because they feel it has no practical value. This could hardly be further from the truth. Fantasy is one of the primary means by which an individual transcends the present and gains control of his destiny. Specifically, fantasy is extremely important in formulating goals, initiating and maintaining goal-directed activity.

The teacher should thus be willing to entertain and encourage fantasy in his interaction with children, as well as among the children themselves. For example, the teacher might develop a game based on the question, "What would you do if...?" The game could be conducted in various ways, depending upon the children's level of development and what other objectives are being served by the content of the learning experience. The following illustration merely suggests a direction.

Each student writes (or if he cannot write, the teacher or an older child can write for him) on a small piece of paper the question, "What would you do if...?" and then adds on the conditions such as, "What would you do if you had 100 rolls of toilet paper?" All the papers are then

scrambled up in a box after which each child draws a question and spends a few minutes fantasizing what he would do under those circumstances presented to him. Once everyone had written down or recorded in some way his particular fantasy, each would share his own with the others.

A variation on this procedure would be to use actual materials such as blocks, paints, balls, sticks, dolls, etc., allowing the child to touch and see materials about which he is speculating and then to actually demonstrate his speculation.

To conclude, we would like to raise some general considerations about the structure of learning environment and the role of the teacher in fostering the development of attention.

One point which consistently emerged above all others in the description of attention was its nature as an active process of differentiating and integrating experience. As such, we cannot expect a child to attend for any length of time to something with which he cannot interact--to develop his capacity for attention without allowing him to actively interrelate with the things in his environment. Although the nature of the interaction may evolve to be highly internalized and conceptual, it must begin with overt concrete forms of process and then progress to more covert and abstract levels.

Attention depends upon the continual penetration and transformation of the world, the advance of consciousness into novel realms. Research clearly demonstrates that if this process stalls, if the interaction between subject and data subsides into stasis, attention will disintegrate. Thus, it is unrealistic to expect a child to attend for any length of time to something with which he cannot interact; yet, we often subject children to passive, inert conditions, reducing both their capacity to attend and the receptiveness to learning.

It has been noted that children in Montessori schools generally display extraordinary attentional capacities. One explanation for this seems to be that Montessori children are allowed extensive periods of uninterrupted time to explore and manipulate objects on their own. These sessions involve a minimal amount of passive taking-in and are filled with activity which the child himself autonomously generates. Another is that the child is provided by the teacher with a "set" of operations to perform upon the object. The teacher demonstrates several, though not all the ways in which an object may be used, after which the child attempts to replicate these operations on his own. A child who has acquired such a structure or "set" now has the means for governing an ordered, integrated series of transformations in relation to his environment. The more knowledge a child has about a class of events, the longer he can work at assimilating a new event and the more prolonged his attention. There is a close parallel

between performing operations in concrete action and the internal processes associated with focal attention. In fact, as we suggested previously, there is good reason to believe that one is the developmental precursor of the other.

Evaluation

Kagan (1972) has recommended using the quality of short-term memory, fixation time, eye tracking patterns, and quality of performance on continuous vigilance tasks. The quality of performance on continuous vigilance tasks might be assessed in the following way.

The child is asked to show by some response, verbal and non-verbal, that he understands what is said by the examiner. The examiner's questions and directions are designed on four levels of age appropriateness: 18 months, 24 months, 30 months, and 36 months. Examples of items:

- a) Ask child to point to objects and to objects in pictures.
- b) Using a single imperative with a variety of verbs: e.g., show/give me the ball; find it, etc.
- c) Ask child to pick out objects by size, shape.
- d) Ask child to respond to two or more parts of a series of instruction.
- e) Show pictures of objects in pairs, ask child to point to pictures; e.g., "Show me the boy and the dog: the dog playing with the ball, etc."
- f) Ask child to respond to imperatives in which two parts are simultaneously varied; e.g., "Give me the pictures of a variety of situations, ask the child to point to the dog running, the boy sitting down, the girl playing ball, etc."

The quality of short-term memory can be assessed by asking the child to repeat short sequences of numbers, letters and words, e.g., 1 - 2 - 3; 1 - 7 - 8 - 2; a - o - f; dog house; the car is red.

PROTOTYPICAL LEARNING EXPERIENCES

Several of the following experiences are multi-faceted--that is, they implicate other processes and potentialities besides attention. Experience No. 1, for example, involves processes of color discrimination and simple

seriation. Successful discrimination and seriation presupposes attention to the materials and operation. However, adequate attention does not necessarily guarantee success at these other tasks. Thus, inasmuch as the objective of these experiences is to strengthen the child's attention, whether or not the materials are finally seriated correctly is more or less incidental in the present context. The important matter is that the child is able to focally attend to the activity at hand. Of course, in another context, the objective behind the experience might be seriation or color discrimination and then correct seriation, etc., would be a central concern of the experience. In such cases, the format of the experience would also be modified (see seriation specification).

The experiences are ordered in terms of their relative level of difficulty, the easiest appearing first.

General guidance for planning prototypical experiences

1. Decide on the process underlying learning competence to be strengthened and the experience (guided interaction with the environment) required for that strengthening.
2. Plan arrangement of environment:
 - a. Decide the number of children at any one time to be presented with experience.
 - b. Decide on physical space and conditions needed for experience (mats on floor, tabel facing wall, chairs in semi-circle, dim lighting).
 - c. Decide on amount of time experience may take.
 - d. Plan other activities which might take place at the same time to enable teacher to devote full attention to prototypical experience presentation (decisions a., b. and c. are needed for all activities).
3. Plan guided interaction:
 - a. Prepare and assemble materials for prototypical experience.
 - b. Prepare demonstration Scenario
 - 1) work with materials
 - 2) decide on layout, sequence and end point of experience
 - 3) rehearse hand movement, eye contact, etc.

- c. Prepare language scenario (decide amount and form of language to be used).
4. Rehearse Presentation

Go through complete experience, step by step, with team members and teacher aids alternating roles as child and teacher.
5. "Go through" real experience with children.
6. Critique presentation, discussing all preparatory steps in light of actual child response.

Plans for prototypical learning experiences

EXPERIENCE I: Learning Active Silence

Arrangement of Environment

- A. Presentation to 5 children, ages 3 to 6 (while others are out of room (?))
- B. On the carpeted space, large enough for children to sit cross-legged in circles and not touch each other.
- C. Presentation takes about five minutes.
- D. Other activities which children can do with minimal supervision (with decisions on A, B, C on each of these)

Guided Interaction

1. Call the children by going to them, one at a time and invite them to the circle to sit down cross-legged, with hands on knees, not touching each other; "Sit cross-legged on floor;" "Put your hands on your knees."
2. Dim the lights in the area where the children are sitting.
3. Sit down with them cross-legged, with hands on your knees, and say, "Let's be as quiet as we can." "Shut our eyes and listen to ourselves breath."
4. Gradually, group gets very quiet.

5. Teacher gets up from her place, goes quietly to a far spot in the room and stands still.
6. One by one she whispers each child's name.
7. As he hears his name, each child gets up as quietly as he can, tip toes over to teacher and stands next to her, remaining absolutely quiet physically.
8. Finally, when the last child has joined the group, the teacher moves to the light source, and brightens the room. This is a signal for the quiet to be over, and the children start to talk quietly.

Rehearsal

Experience

Critique

EXPERIENCE II: Gradation of hues, using series of Montessori color tablets.

Arrangement of Environment

- A. Presentation to one child at a time, aged three to four years.
- B. On a small (4' X 6') rug or carpeted floor, free of furniture, out of traffic, facing a blank wall.
- C. Presentation to take about 7 - 10 minutes. Child's use of material to take from 15 - 30 minutes.
- D. Other activities which children can do with little supervision: Collage, blocks, housekeeping activities (with decisions on A, B, C on each of these).

Guided Interaction

1. A wooden box with eight sections, each containing seven graduated hues of red, blue, yellow, green, orange, violet, brown, maroon and black.
2. Demonstrate scenario
 - a. Invite the child to do the exercise, showing him the box on the shelf where you have placed it.

- b. Carry the box with two hands, thumbs on lid and fingers underneath, from the shelf to the rug (carpet).
- c. Take out one set of seven tablets, one at a time, holding the plastic edges of each tablet between thumb and the second finger. Place the tablets randomly on the rug, with no tablet touching any other tablet.
- d. Replace the lid on the box and move it to the extreme left.
- e. Pick up the darkest and the lightest and show them to the child.
- f. Place the darkest tablet beside the box at the top of the rug.
- g. Indicate to the child that you are looking for the next darkest tablet, by picking up tablets, one at a time and comparing them to the darkest tablet and to the other tablets.
- h. If the child appears to want to finish the grading, let him. If not, continue grading to the lightest color.
- i. Indicate the gradation by moving your right index finger lightly down the column of tablets from darkest to lightest.
- j. Mix the tablets, and ask the child to grade them.
- k. If the child does not succeed, this indicates that he does not perceive the differences among the gradations. For the next presentation, use only four of the tablets, dropping the "in-between" hues, to have sharper contrasts.
- l. After the child has successfully graded two or three sets of colors, ask to see if he can grade all of the sets, by himself.
- m. When replacing the tablets in the box, do so in mixed order.
- n. Put the lid on the box, returning box carrying it as in b., to the shelf.

3. Language Scenario

The names of all the colors in the box and words dark, lighter, lightest, used very sparingly but with emphasis. "blue". "lighter blue", "lightest blue".

Rehearsal

Experience

Critique

EXPERIENCE III: Blind Box; Curvilinear forms

Arrangement of Environment

- A. Presentation to one child, aged 3 to 7 years.
- B. On a small rug, carpet or table, facing a blank wall.
- C. Presentation to take about 5 minutes; child's using the material to take about 5 - 10 minutes.
- D. Other activities which children can do with minimal supervision (with decisions on A, B, and C on each of these).

Guided Interaction

1. a. A triangular prism box with holes at each end, large enough to admit a child's hand
- b. Three solid geometric shapes: a sphere, an ovoid, an ellipsoid.

Presentation I

1. Invite the child to see the presentation.
2. Carry the blind box with the entire surface, holding it in both hands.
3. Pick up the sphere and feel the entire surface, holding it in both hands.
4. Say "This is a sphere." "Would you like to feel this sphere?"
5. Let the child hold the sphere, feel it and say "sphere".
6. When the child has finished, put sphere down on table.

Attention 22

7. Pick up the second solid, the ellipsoid, feel it in both hands and say "This is an ellipsoid."
8. Let the child feel it with both hands and say its name.
9. When the child has finished, put ellipsoid down.
10. Pick up the ovoid and feel its entire surface, holding it in both hands.
11. Say "This is an ovoid. Would you like to feel it?"
12. Let the child feel it with both hands and say its name.
13. When the child has finished, put ovoid down on table, next to ellipsoid.

Presentation II

1. Set blind box on table in front of child and into it, place in order, sphere, ellipsoid and ovoid.
2. As you place each solid in the box, say its name, "sphere", "ellipsoid", "ovoid".
3. Standing behind the child, put your arms around his. Place your hands in the blind box and rearrange the solids. Remove your hands.
4. Ask the child "Please give me the ellipsoid" or "Please take out the ellipsoid".
5. Child puts both hands in blind box, feels each of the three solids, with both hands and draws out what he believes to be the ellipsoid. (If he is correct, move on to the same strategy with "ovoid" and "sphere". If he is not correct, name correctly the solid which he has drawn out.)
6. Ask successively for each of the three solids in a random order. Set each solid down next to the box.
7. Return box and basket with solids to workplace.

Rehearsal

Experience

Critique

EXPERIENCE IV: Making Triangles

Arrangement of Environment

- A. Presentation to one child, aged 3 - 5 years.
- B. On a small rug, carpet or table, facing a blank wall.
- C. Presentation to take about 5 minutes: child's use of the material to take about 5 - 10 minutes.
- D. Other activities which children can do with minimal supervision (with decisions on A, B, and C on each of these).

Guided Interaction

1. A triangular box of plywood triangle containing:
 - a. 1 equilateral triangle painted grey.
 - b. 2 green scalene triangles, which have a black line on the longer of the two sides which inscribe the right angle. When these black lines are mapped, the triangles form an equilateral triangle equal to the grey triangle.
 - c. 3 isosceles obtuse triangles painted yellow and having black lines on the two equal sides which inscribe the obtuse angle. When these black lines are mapped, the three triangles form an equilateral triangle equal to the grey triangle.
 - d. 4 red equilateral triangles, one of which has black lines on all three sides and three which have black lines on one side. When these black lines are mapped, the four triangles form an equilateral triangle equal to the grey triangle.

Presentation

1. Invite the child to workplace. Show him triangular box.
2. Open box and place the lid underneath it.
3. Take out grey triangle and place it to the upper left.

4. Take out green triangles, place them on the rug randomly and with your index finger, trace from top to bottom, the black line on each.
5. Slide the triangles together, mapping the black lines to form an equilateral triangle.
6. Show that the triangle thus formed is equal to the grey one. Do this either by placing the grey triangle on the green one or by building the green triangle on the grey one.
7. Take out the three yellow triangles and join them to form an equilateral triangle using the procedure outlined above.
8. Compare the yellow equilateral triangle with the grey triangle as indicated in number 6.
9. Take out the four red triangles and follow the same procedure to form an equilateral triangle equal to the grey one. Compare as in number 6.
10. After all the triangular fixtures are lined up on the rug, mix them and allow the child to join them as you have demonstrated. This may be done by mixing one or two sets first, and then all three, depending on the child.
11. After the child has had the opportunity to join the sets of triangles, show him the comparison with the grey triangle, by placing it first on the green triangle, then on the yellow and red triangles.
12. Form a large equilateral triangle using all 4 triangles, grey on top, then left to right, green, yellow and red.
13. When replacing triangles in box, use this order: red, yellow, green and grey.

Rehearsal

Experience

Critique

EXPERIENCE V: Blind box, Matching Prism Bases

Arrangement of Environment

- A. Presentation to one child, aged 2 1/2 to 4 years.
- B. On a small rug, carpet or table, facing a blank wall.
- C. Presentation to take about 3 - 5 minutes; child's use of the material to take about 5 - 10 minutes.
- D. Other activities which children can do with minimal supervision (with decisions on A, B, C on each of these).

Guided Interaction

- 1. a. A triangular prism box with holes at each end, large enough to admit a child's hand.
- b. Three solid geometric shapes: a cylinder, a rectangular prism, a triangular prism.
- c. Three wooden shapes forming the base of the solids: a circle, a square and a triangle.

Presentation

- 1. Invite the child to see the presentation.
- 2. Carry the blind box and the basket containing the three solids and three shapes (in two trips) to workplace.
- 3. Pick up the rectangular prism and feel all sides of it, holding it in both hands. Set it down.
- 4. Pick up the triangular prism and feel all sides of it, holding it in both hands. Set it down.
- 5. Pick up the cylinder, feel all surfaces, holding it in both hands. Set it down.
- 6. Take out of the basket the triangle shape, feel carefully its edges; set it down.
- 7. Take out of the basket the square. Proceed as above.
- 8. Take out of the basket the circle shape. Proceed as above.
- 9. Put 3 prisms in the blind box; mix them up.

Attention 26

10. Ask the child to find the block that "goes with this," pointing to the triangle.
11. Child finds triangular prism in the box; removes it from the box, and places it on the triangle.
12. Same for rectangular prism.
13. Same for cylinder.
14. After exercise is completed, materials are put away by the children.

Rehearsal

Experience

Critique

EXPERIENCE V: What would you do if...game

Objective: To develop attention toward unrealized possibilities through fantasy and imagination.

Arrangement of Environment

- A. Presentation to 5 children, aged 5 - 7.
- B. On carpeted floor, space in quiet corner (8 ft. X 8 ft.) isolated from other activity.
- C. Duration of experience 15 - 20 minutes.
- D. Plan activities to occupy other children while experience is taking place.

Guided Interaction

1. Materials: blind box, 15 small pieces of paper or 3 X 5 cards.. Prepare one question on each card in form of "What would you do if...?", each card with a different condition.
2. Presentation
 - a. Insert cards (folded in half) in blind box; have child scramble cards.

- b. Allow each child, one at a time, to draw from box.
- c. Invite child to make an answer to his chosen question.
- d. Allow 1 minute of quiet contemplation (more or less depending upon assessment of attention span).
- e. Have each child, in turn, share his fantasy or plan with others.
- f. Other children and teacher may elicit details and extend imagination asking questions about the fantasy.
- g. Collect papers after all children are finished.
- h. Ask each child to make a question based upon the same format; teacher records question on paper, inserts card in box.
- i. Scramble cards.
- j. Each child draws card; repeats scenario.

Rehearsal

Experience

Critique

REFERENCES

- Blum, A. and Adcock, C. Attention in early learning: A selected review, Journal of Education, 1968, 3, 150.
- Broadbent, D. E. Perception and communication. London: Pergamon Press, 1958.
- Deutsch, J. A. and Deutsch, D. Attention: some theoretical considerations. Psychol. Rev. 1963, 70, 80-90.
- Eisendrath, C. The unifying moment: The psychological philosophy of William James and Alfred North Whitehead. Harvard Univ. Pres. Cambridge, 1971.
- Gilmore, J. V. The factor of attention in under-achievement. J. of Educ., 1968, 3, 150.
- Hunt, J. McV. Intrinsic motivation and its role in psychological development. Nebraska Symposium on Motivation, (ed.), D. Levine, Lincoln: Univ. of Nebraska Press, 1965.
- Gibson, E. J. Principles of perceptual learning, New York: Appelton Century Crofts, 1969.
- James, W. The principles of psychology. New York: Henry Holt and Co., 1980, 6., Vol. 1 and 2.
- Kagan, J., Finley, G. and Cayne, O. Development of young children's attention to normal and distorted figures: Stimuli a cross-cultural study. Developmental Psychology, 1972, 6, 288-92.
- May, R. Love and will. New York: W. W. Norton & Co., 1964.
- McDougall, W. Introduction to social psychology. London: Methuen, 1908.
- Mostofsky, D. The concept of attention in education. J. of Educ., 1963, 3, 3-91.
- Neisser, U. Cognitive psychology. New York: Appelton-Century-Crofts, 1967.

- Piaget, J. Psychology of intelligence. Littlefield, Adams and Co., 1966.
- Polanyi, M. The structure of consciousness. Knowing and Being: Essays of Michael Polanyi. ed. M. Green: London: Routledge, Kagan, Paul, 1968.
- Ryan, T. A. Intentional behavior: An approach to human motivation. New York: Ronald Press, 1970.
- Treisman, A. M. Verbal cues, language and meaning in selective attention. Amer. J. Psych., 1964, 77, 215-16.
- Whitehead, A. N. Modes of thought, Toronto: Collier-MacMillan. 1938.