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## Education For Thinking

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## EDUCATION FOR THINKING

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HANS G. FURTH, PH.D.

I would like to share with you a few observations from our laboratory that should help you in your difficult work as teachers of deaf children. Our research with deaf children and with deaf adults over the years has led to a considerable amount of new knowledge that is valuable for psychology in general. Moreover, with regard to many of the things which I some time ago advocated for use with deaf children, I would say now, since they are good for deaf children, they may also be good for hearing children. Therefore, this little book, entitled "Piaget for Teachers" which was published a few weeks ago, deals entirely with hearing children and their schools. In fact, our education of hearing children very often lacks many of the things which deaf education lacks; the only difference is that deaf education has much more justification for it, since deafness is a much bigger educational problem.

When you ask a teacher--whether a teacher of deaf children or hearing children--the question, "Do you think that education and school in general should challenge the mind of the child?" there can be only one answer to this: "Of course it should, no question about it." I presented this question to a few elementary teachers of hearing children. And then I continued and said, "Well, tell me an activity in your class that challenges the child's mind." The teacher looks at me, hesitates and hardly knows what to say. Then fortunately she can think of numbers and says, "Well, we've worked with numbers." Apparently she thinks this should be challenging.

I have come to the realization that much of our educational system is really not geared toward challenging the child's mind. There are many reasons for it--maybe unconsciously we do not want

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the schools to challenge the child's mind, we do not want grown up citizens with minds that are alive and thinking. At least, let us be explicit about this. I for one think that we live in rather troubled times; but I am involved in what is going on because I am basically optimistic. I hope that what is happening now will have some constructive outcome, so that our lives will not be entirely dominated by impersonal mechanisms from outside. Take this problem of the war in Vietnam--nobody wants it but somehow we are in it. It is this kind of impersonal, passive taking in of things that are just there which really can make one very passive and pessimistic. There is no easy way out. Nobody can have the correct answers to all these problems, I am the last one to pretend to have them. But I think that as educators we have a terrific challenge in facing these problems, because I do not believe that the human mind is just about the best thing that humanity has; even though we may not have the right answers to every question, the best we can do is develop children who are encouraged to use their minds not only in the narrow area of logic and science, but also in the area of social and human relations, in the area of creative art, in the total area of life. I think this is the challenge that we as teachers in general have, and I am sure you share the same challenge. All of you want deaf children to grow up as thinking human beings, as much as possible, and this is the theme I want to address myself to.

How can we as teachers help to bring up children who will be thinking human beings, who will constructively confront whatever problems they will meet as they become adults? Many of the problems that seem peculiar to deaf children are really not so different from the problems that one finds in ordinary schools across the country. Obviously I limit myself to the United States, but I daresay things are not too different in most parts of the Western world.

I am talking here about the thinking human person, and in particular about the thinking child. I would like to take a few minutes time to explain, as best I can, what I mean by a thinking mind. We realize, of course, that we do not have to be psychologists to have some notions about "thinking." All of us have some notions about what thinking means, what knowledge means, what intelligence means, quite apart from intelligence tests. I am proposing here that thinking, knowing and intelligence, in a general sense, refer to the same thing. Within the framework in which I speak now, intelligence refers to the specific competence of the

human person to behave intelligently; when we employ the word "thinking," we emphasize particularly behaving intelligently, using knowledge intelligently, solving a problem according to intelligent norms.

Let me state first of all that the word "intelligence" very often is taken in much too narrow a sense. We often suppose that intelligence and thinking belong to just a narrow part of physical and logical reality, and then apart from this we have perception, emotions, values, motivation and other things--as if one could neatly partition life into these things. Let me try to impress upon you that intelligence is not something added to behavior; some level of intelligence is present in any kind of human behavior, otherwise it would not be human behavior. Consider then that thinking and intelligence are as broad as life is, and there is not any area in human life to which intelligence cannot be applied. I am not saying that one can apply intelligence in the same way to moral and social areas as one can apply it to the physical area, but I am implying that there is intelligence and an active human mind behind all forms of human behavior, and one should not limit intelligence to just one special area.

What I am proposing to you is a new theory of intelligence. The reason why I expound this theory and impress it upon you is the simple fact that Piaget is the one great psychologist who holds a theory of thinking which makes sense of the fact that deaf children can grow up into thinking human beings even though they do not know much language. In other words, all other theories of thinking put language in such a predominant role, make of language such a determining factor of the developing mind, that if the theory were true it could not happen that a deaf child would grow up into a thinking human being. I refer to a deaf child who has not mastered the language of society. Surely you and I know many hundred deaf youngsters who, we must unfortunately admit, know language very poorly, but who are nevertheless, to all accounts and purposes, adequate thinking intelligent human beings. This is a very important fact; it is there for everybody to see. If you do not see it, it is simply because you do not want to see it. If a theory of intelligence is based on the fact of human language as a major determiner, it would be simply impossible for such "thinking without language" to exist.

When I ask a teacher, "Do you provide activities that challenge the child's thinking," an intelligent answer can only be given to this

if a teacher knows what thinking is--and I would be surprised if in your training of teachers much thought was given to this particular concept. Sure enough, we learned about individual differences and about IQ tests, but IQ tests simply tell you how children differ on a certain dimension, on a certain standardized performance. They do not clarify much about the basic, essential factors of thinking and intelligence.

Observing deaf children grow up into thinking human beings, I was forced to look for a theory that made sense of this fact, and Piaget's is such a theory. The interesting thing is that Piaget himself has never really bothered to point to the existence of deaf children. He came to the conclusion that thinking is not primarily language-based without even considering that there are children on which his theory could be observed in fact. He came to the conclusion that the development of thinking, that is, the development of the thinking child, comes about through activity on the part of the child within the physical and social environment, and that language, far from being the preferred medium of development of the mind, is in itself much too difficult a medium for a young mind. In other words, it requires a developed intelligence to use language intelligently. You can observe this for yourselves. There are many 8-year-old children who have a pretty good idea, let's say, of the concept of probability, the likelihood that something will happen, like 50-50, 80-20, not at all, or definitely yes. Let us call this the concept of probability. An 8-year-old child by and large has a pretty good mastery of this concept. I can show this by playing all kinds of non-verbal games with him, but the child, first of all, cannot express this in verbal terms, nor can you ask him to give you the definition of probability; I could hardly ask you to do this, because it is too difficult. Second; the child would not comprehend a purely verbal lecture on probability--with an 8-year-old child this could just go in one ear and out the other ear. Language is therefore a very difficult tool that can be used once the mind is developed.

The concept of probability is just one example of what I mean by thinking and intelligence. When I use these words, and when Piaget talks about the theory of knowing, he refers to the broad framework within which our thinking takes place, he does not single out particular instances. He refers to the general human competence to behave intelligently; these broad concepts of classes, relations, numbers, probabilities, and other things of this sort, are the framework within which all human thinking takes place,

whether we go to school or not, whether we live now or 500 years earlier, whether we live here or in New Zealand. This is the essential human capacity for intellectual functioning. It is the basis on which any particular skill has to rest if it is to be more than a rote skill. Language is a very difficult skill for thinking, so difficult that most adults have difficulty really assimilating and understanding propositions. So I am proposing the following relation between language and thinking, fully realizing that it is very difficult to change a way of thinking which we have assumed and used for many years.

Language is a principal and preferred medium of thinking for a developed mind, for an adult mind, for a mind that has reached, as Piaget calls it, the formal operatory stage. There is no question about it: what I am transmitting to you now could never be done if I did not have a formalized language and a mind capable of expressing this kind of language, and if your mind were not capable of assimilating this language. You can deal with propositions and you can assimilate them, because you are capable of structural thinking with which you can assimilate the verbal propositions I am communicating to you. But children are not born with these structures. Children first manifest what Piaget calls “instinctive” and “sensorimotor” schemes or structures, and then comes a long period of pre-operatory schemes. When a child is around 6 years old he begins to enter a period called the concrete operatory stage, which means that the child requires his first stable notions of classes, relations, probabilities, time, place and so on, but he can deal with them properly only in context with concrete realities. It is around 12 or 13 that, in general, the human mind develops to the formal operatory stage. At that point the mind is developed and can deal with verbal propositions—the kind of things that I am giving you now. You all know that if a young child were sitting here, he would not get anything out of this talk, unless he was an exceptional genius. Because language is such a tremendously important and useful tool for the developed mind, we fall into the wrong belief that language is the primary food for the developing mind. This is the fallacy which I would like you to guard against. If we want really to develop the mind of a child, to provide opportunities for a child to develop his mind—and I think the school should be a place where we do this—we should realize that language *per se* is in many ways an inappropriate tool. I could give you many examples to show this. Of course, the most telling example is the existence of deaf children

who certainly develop their minds, at least up to concrete operatory thinking. Where deaf persons in general fall short is at the formal operatory level. More precisely what happens is that they barely reach formal operatory thinking, and then they cannot develop their minds much further because they do not have the tool of language.

So let me try to summarize this, and I beg you not to misunderstand the proposition as if I wanted to minimize the ultimate importance of language. But I do suggest to all teachers that the appropriate medium for helping the developing mind is not verbal language. For instance, if we want to help children to attain the concept of probability, we do not call children in and give them definitions of probability in verbal propositions; rather we put the child in a concrete situation where he can observe probability events. Our experiments with both deaf and hearing children have demonstrated that deaf children reach the concrete operatory stage just about the same time as the average hearing child; this finding is really tremendously interesting if you think of its ultimate implication. You know that hearing children from the earliest age are completely surrounded by the linguistic environment. They hear many verbal expressions that have to do with time relations, and yet these hearing children have to wait until they are 6 - 7 years old before they develop a first real understanding of time, as expressed in words like day, week, month, year. Thus, simply being exposed to a word is not enough. Now compare this with deaf children who hardly ever use an expression that has to do with time. When they are 7-year-old children, they too understand these time concepts. Now there are many other observations of this sort. These facts show that the basic development of intellectual competence is largely independent of the linguistic environment. The deaf child learns concepts of time, classifying, relations, numbers, just as well as a hearing child. We should remember this and it should help us to treat deaf children as the intelligent human beings which they are. Moreover, this is equally true of hearing children who may have difficulty with reading or writing or with language skills in a hearing school.

I would like to illustrate how we are testing probability thinking. Imagine the following situation. You have a small bag and marbles of two colors--say, 20 yellow and 20 blue marbles. The child is told to put 10 yellow marbles and 2 blue marbles into the bag. Then you shake the bag and let the child pick out a marble; but before he does this, you say, "Just stop, what color do you think this marble will

be?"--you know from working with deaf children that it is not difficult to indicate to them what you want. Instead of a response, they can point to the color; and if these instructions are still too difficult, one starts with a simpler game. So the children know that there are 10 yellow marbles versus 2 blue marbles. Try this once with 6-year-old children. Even let the children put 10 yellow marbles and 2 blue marbles right in front of them, so that they have in front of them the exact amount of marbles that is in the bag, so that it is not a question of memory, and you ask the child, "What color do you think it will be?" Many 6-year-old children will say "yellow," and if the child is lucky, it will be a yellow marble. Of course it could be a blue marble and then the young child will exclaim: "I was wrong" when actually his guess was quite right. Most 6-year-old children, whether deaf or hearing, after they take out a yellow marble and you continue asking for guesses will say "blue," according to alternating chances. In other words, most 6-year-old children have a very poor concept of probability. They know it is not sure either one way or the other, but they do not understand the proportion, even though they have 9 yellow versus 2 blue marbles right in front of them. This is what I mean about a probability situation. You can continue playing this kind of game, and let the children simply observe. Let the children observe that sometimes even if you have only one blue marble versus 20 yellow marbles, you can still draw out a blue marble the first time. This is the kind of concrete situation that is conducive to the child developing his mind. Whether the child uses words in this game is largely irrelevant, and we could not even teach the child these things if we only used words and did not have the concrete event in front of him. What is true of probability is true of all the other concepts I have mentioned, like classifying things, like understanding relations, space relations, understanding perspective, spatial transformations--what a figure looks like turned in different directions.

These concepts, which Piaget has studied, provide the general framework within which our thinking takes place, I am suggesting here that the school, whether for hearing or for deaf children, should make a conscious effort to provide opportunities for children to show off their developing minds. I am using the words "show off" purposely. I would hate to say, teach intelligence, or teach thinking, because we cannot really teach these things. All we can do is provide opportunity, since Piaget very strongly states that the source of development of the thinking mind is within the child. It is



the child who has to be active, who has to operate on the environment. Many people misunderstand this to mean that the environment is quite unnecessary, that one could simply keep a child alive and then after 12 years would find him a normal operational child. This is, of course, nonsense because the environment is not something added to the organism; the organism and environment are really two parts of the same coin, parts of a larger evolutionary history. Quite obviously the environment can be more or less conducive to development; it provides food and opportunities. You cannot have a healthy plant if you do not feed it properly, and if the plant is basically sick even the best food is not going to make it get well. That is how we should think about the human child.

The human child carries within it the wherewithal to grow and develop, and you do not have to give him candy constantly to motivate him in that direction. Every child wants to develop. Every child has this motivation. As a simple proof of this, take any 5-year-old child and look at him two years later. He is going to be more intelligent now, than he was two years before, and that would not happen if he were not motivated to grow intellectually. The reason why we teachers often worry so much about motivation is because we deal with activities which in themselves are not conducive to the developing mind, activities such as reading, writing and language skills; these things for a 6- to 10-year-old child are quite secondary things, and I would like to put them into the secondary place to which they belong. Unless we develop the healthy mind of a child, just teaching is not going to be of much help. We want to develop children who can use language intelligently, and the primacy here is on the intelligent mind.

I am suggesting, particularly for the elementary school child, that we should introduce activities into the classroom, not as luxuries or as frills, but as primary activities which would tell the child the following message: I like you the way you are. I like you as a human being. I want you to show off your thinking. I want you to show me how clever you are. I want you to enjoy yourself in your thinking activity and try out your thinking in a wide area of activities whether it has to do with visual thinking, motor behavior, drama technique, the arts, or social, moral, logical and physical thinking. Only when this primary message is firmly established in the child and we have the child with us, would I put pressure on language achievement as such. With thinking as the primary emphasis I assure you that you are going to have the child with you.

If you have a child who is intellectually alive and active he will look for ways of symbolizing and communicating.

There is no single child who does not enjoy playing the kind of thinking games I will talk to you about, and some of these thinking games are highly abstract, like symbolic logic. I hardly believed it myself when I attempted symbolic logic with 7-year-old deaf children. They were fascinated by it, and so were the Indian children from reservations, and so were black children from the inner city. It is only 15-year-old children who get bored by it and say it is not relevant. They have gone through a period of frustration and then you have quite a different problem. Unfortunately, it is all too rare that the school provides thinking activities for the students. If a school does give it to them it is mainly because of an imaginative teacher who is intuitively doing the right thing.

Thus I am not saying that these things are never done, but I am saying that if they are done, they are done on the sly, they are done against the school structure rather than with the school structure. Many teachers ask how one could make of the school "a school of thinking." In the book I mentioned above I describe a whole series of suitable activities; some of them I did myself, some of them I observed in different places. It is easy to fill a whole school day meaningfully with activities that are primarily geared to thinking activities. By all means, let us include language and reading as a secondary goal if the child is ready, but let our primary concern be the mind of the child. It is psychologically unsound to force a child into a curriculum when he is not ready and when he is not motivated. Most of the things that we teach in elementary school are relatively simple skills, like reading and numbers. Many of us acquire these skills even before going to school and that is the normal way we should learn these things. To consider these things as primary activities and to judge both the elementary teacher and the pupil at this age level on this criterion means nothing else but to tell the child that he is not here primarily to think, but to do the skills that the adults of the society have deemed necessary for him.

For the past two years we have conducted a small demonstration project in the West Virginia School for the Deaf, where we introduced a lab for thinking for the children. One period every day the children would be in this thinking lab. The project is now finished; it lasted for 1½ years.

The purpose of this lab was to give the children an opportunity to show off their intellectual skills, as best they could, without being

handicapped by their not knowing language well. We focused on tasks that could be given without verbal instructions. Most deaf children, as you very well know, can catch on to the instructions, particularly when they have concrete material in front of them. So we played games like the probability game, games of classifying or visual thinking. We continued these games over several days, dropped them for some weeks, and then brought them back later. Some of these games involved all 8 children in the class, others could be played by 2 or 3 children. Sometimes 2 or 3 children would come in and ask the teacher "Can I play this game with another child?"—so that the children were active themselves. This is an ideal learning situation, as you well know. Every teacher wishes that his pupils would want to be active on their own, and be left alone by the teacher; the teacher has then time to help other children. For visual thinking games we would display certain figures on the blackboard, and the children had to imagine and draw what the figures would look like when they were turned around, up or down, left or right. These are quite difficult tasks for 6 to 8-year-old children, whether hearing or deaf, and these tasks challenge the operatory structures which the children are beginning to develop. For perspective games we would show a certain assembly of objects on a table from various angles. What does the assembly look like from various angles? In all these activities the children were not given verbal instructions; they were given an opportunity to try things out and to look for themselves, to observe what things look like. If the children insisted on some kind of explanation, we would try to encourage another child to tell this child, rather than give a ready-made answer by authority.

For symbol logic games we used logical symbols, some of which you find in a logic book, like conjunction, disjunction, negation, but illustrated by pictures; the children had to use their minds to understand the matching of logical sentences and pictures. For instance, we would use the letter "H" for house and the letter "B" for blue. We would then present the logical expression "not house-and-blue." That is, we want to combine something that is not a house, and at the same time is blue. And then would come an arrow which would indicate "is an instance of"; the child's task was to draw a picture that would satisfy this requirement. Now "not house and blue" can be verified by many different things. It is not just a question of one question and one answer. It is understanding what this formula means: "not house" "and" "blue"; as an illustration a

child could choose to draw a "blue tree" or "blue pencil." Subsequently the task would be indicated by means of a crossed arrow that indicated "is not an instance of" that is, you ask for *wrong* instances. Now I would like to know from you teachers, when did you ever ask a pupil to give you wrong answers? Certainly, intelligence is not exhausted by learning one answer to a certain question. Intelligence is at all times a constructing on our part, one of many ways of looking at things. In all these things that I have described to you, it is not so much having one question and one right answer as it is using a generalized structure applied to potentially varying situations.

I am happy to tell you that this demonstration lab has gone on for nearly two years and has worked very well. There is no doubt in my mind that the deaf children benefitted from this, not merely in thinking but particularly also in language. In other words, those children who had a fixed period of school activity for thinking are in a better position to learn and to use language for the rest of the day than children who were not given this opportunity. We had a control group that was given special language activities during the same time, and the final scores are now being analyzed. I am not saying that the children who went to our thinking lab developed more language than the others; in fact, they were not taking any language in our lab, but I say that linguistically they were in no way behind the control children who spent this period in a special language lab. This is a pretty strong indication that taking a little time out of your day for thinking is not going to harm children. Quite the opposite. If we help our children to feel more like thinking human beings, they will have more to talk about and will be more motivated in the formal learning of the arbitrary and therefore difficult skill of language.

This is a modified version of a talk given during Professional Development Day, May 19, 1970, at the Milton, Ontario School for the Deaf. Reference is made to the author's books "Piaget for Teachers," Prentice-Hall, 1970, and "Thinking without Language: Psychological Implications of Deafness," Free Press, 1966. For information on the Project at the West Virginia School for the Deaf contact Mr. Syd Wolff, Department of Special Education, State University College, GENESEO, N. Y. 14454.