DETECTION OF DYSLEXIA

AMONG PRE-SCHOOL CHILDREN

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If it is true that the preschool-school years are a time of happiness for the child when he is learning to communicate with the world around him, it is no less true that this communication can be very difficult for some children and a few never manage to achieve it at all. The problems resulting from the child's inability to communicate assume dramatic proportions when he finally starts school. The various problems of adapting become apparent at this period and in particular those normally referred to as dyslexia.

The child follows a path of psycho-sensorial development beginning in utero and continuing until he reaches school age. There are, however, pitfalls along the way which may temporarily adversely effect his progress at school.

By studying child development from a neuro-physio-logical perspective, we examine the different mechanisms causing relational tensions in the growing up process. Such an approach, based upon an examination of the child's listening ability, language usage and bodily gestures, tells us if the transition to school life will be either a happy or a painful experience.

In order to evaluate this transition to the school environment, I shall briefly outline the relationships which can exist among the ear, language and body image. The ear must be perfectly adapted to its role of controlling audio-vocal functions and the body's energy should be well integrated so that the child has a well-structured language for establishing contact with the outside world.

I do not intend to give you a course in neuro-physiology, but I would like to share with you the results of 30 years of experimenting with the human ear as the essential organ of communication. In order to understand the difficulties of some preschool-schoolers, we need to know something about their nervous system. If this psycho-sensorial system has not properly matured, the child lacks the necessary command of his body.

Let us begin our examination of these relationships by outlining certain important notions about the human ear. Too frequently we forget the importance this organ plays in the child's language integration process. The child is expected, with the aid of good hearing, to absorb what his elders tell him. Is he not, like an antenna connected to a special transmitter, required to "obey" (ob-audire - to, towards that which hears) the Word which wants to express himself through this human being?

It is easy to see that we neither concern ourselves with children's audition nor research their listening possibilities. Sometimes examinations and aptitude tests never even psycho-motricity, intelligence, etc...., but we usually forget about the ear. This organ, however, plays a major role in the schooling process, particularly with respect to language, memory, attention, and comprehension. It would be appropriate at this point to briefly explain the different functions of the ear.

I. THE CHARGING FUNCTION

Phylogenetically this is the first to be put in action and constitutes to a large extent the energizing element. The ear can be compared to a dynamo which transforms the stimulations it receives into neurological energy intended to feed the encephalon -the brain. This explains why the apathetic, undynamic child who is not interested in his work is frequently the child whose ears function badly on the level of cortical charge. This function of charging can be re-established by machines especially designed for this purpose.

The human ear provides a large part of the cortical energy. It represents 60% with respect to the other organs. In adding to this the sensory responses of the skin which are phylogenetically allied to the auditory function, and the senso-musculative and senso-articulative responses, which share the same auditory starting point, we have a total of 90% of the total energy of the cochleo-vestibular organ.

In order for the brain to be invigorated and think well, the child needs an ear that energizes it. The ear does this by receiving, analyzing and transforming sounds, particularly those of high frequency. The cortical cells are most numerous in the zone corresponding to the high harmonics. For this reason, I have called these high sounds "charging sounds". By contrast, the bass sounds are de-charging. The latter are distributed along the bass membrane where the cortical cells are the most scarce. The bass sounds, by exciting the vestibular (that is, the utricle, semi-circular canals and the saccule) and generating body movement, consume energy and exhaust the body.

Let me make clear that in taking all of this into account, it is dangerous to let a child listen for long periods to so-called modern music which is principally composed of these low de-charging bass sounds. To make up for the de-charging effect, young people increase the intensity of the music. Such intensity can be dangerous to the

cochleo-vestibular organ and cause neuro-vegetative disorders affecting the nervous system (sympathetic and para-sympathetic) of the ear.

II. THE FUNCTION OF EQUILIBRIUM

This function, better known than the preceeding one, concerns the vesstibular organ (utricule, semi-circular canals and saccule) which is the oldest part of the ear. This ensemble makes the body's mobilisation, its movements and localisation in space, possible. This organ ultimately assures verticality, which we think without a doubt is brought about by language.

Another point to which I should refer is that of the relationship between the vestibular function and motility. In effect, all the interior roots of the marrow are dependent upon the vestibular nerve. There is not one muscle of the body which escapes its control. This explains how every movement and gesture is determined by the same cybernetic circle.

We know if this vestibular organ is not properly functioning by observation the way the child holds himself. Poor carriage and clumsy bodily movements show that his equilibrator needs to be stimulated.

ni. THE LISTENING FUNCTION

The third point of the phylogenetic scheme, the listening function, can be considered as one of the most important human accomplishments. The ear, by focusing on sounds and particularly those of language - using a network of controls along the shortest circuits, a point to which I shall presently return - listens to the external world in order to communicate with it. The auditory organ thus described, more especially the cochlea, must be in perfect working order, that is to say that the child knows how to receive, analyze, select and control the sounds directed at him.

Having recalled the principal functions of the human ear, I would now like to talk about the close relationship between audition and phonation, more precisely listening and speaking. After many clinical experiments, I discovered certain constants which could be therapeutically used. The most significant aspect of this research was in establishing a parallel between a patient's audiogram and his phonogram. In 1953,1 formulated the following law: "The voice contains only the sounds which the ear

hears." These laboratory experiments led me to prove that all impulses given to the ear have an immediate effect upon the speaking or singing functions. In other words, all modifications of the auditory schema included a modification of the vocal articulations. This assertion, far reaching in its consequences, is the basis of our methods of psycho-sensory education. By treating a person's ear to adept the proper listening posture, we also treat his voice and language.

Based upon these findings, I made an embryological study which led to the discovery of the close association between the ear and the phonatory organs. By virtue of sharing the same origin at the level of certain bronchial arches and being located in the same neurological region, the auditory organ and the phonatory ensemble have one an the same complex function. This unity of functions makes language communication possible. The same processes of neurological control work at the same time on the muscles of the middle ear (i.e., the hammer and the stirrup) and also on those of the face, mouth cavity, tongue and stirrup. All articulation is directly connected to the activity of the auditory adaptation which makes up the different elements of the middle ear.

We can say that a person's manner of speaking reveals his manner of hearing and perceiving the world of sound. Thus by studying the voice and language of a child, a teacher can judge the pupil's listening abilities. A grating voice for example will indicate poor analysis of high harmonics. This will prove that the cortex is not energized. Likewise, inability to articulate will show the teacher that the child has hearing distortions at certain frequency levels. He does not perceive sibilants (thus his selectivity is blocked) or he confuses certain phonemes that are close on the phonetic scale: K and G; P and D; T and D; etc.... After discovering the causes of such problems, the teacher should work on correcting them.

The teacher should enter into the psychological world of his pupils. He must ask himself why certain problems occur among some children and not others. Some pupils so completely block communication that they appear to be deaf. Others do not abandon childish lisping at the appropriate stage. The evolution of the ear stimulates the child's growth and structures his nervous system. Emotional difficulties can interrupt tins growing process and introduce damaging fixations.

At birth the child should break away from the liquid sound relationship which has tied him to his mother during his foetal life. His ears must learn to listen in an air

environment. However, if this break with the past has not taken place, the child will need the farniliar cradling voice to set on the proper paths of communicating. The ear's listening diaphragm having been closed since birth can be opened after a series of special exercises. The purpose of these exercises is to re-establish contact with this maternal voice by means of developed linguistic structures.

It is interesting to see the development of language. The listening organ is transformed and body movements become more graceful. The child is neurologically programmed to go from a horizontal position to a vertical one. In this process he naturally passes through the creeping, crawling, and sitting stages before finally standing up. Each of these stages has a corresponding linguistic phase starting with babbling. This simple sound game having no significance at first, quickly becomes colored with meaning as the child grows. This initial primitive language has certain universal characteristics making it truly a mother tongue.

Composed of two syllables, this bilateral babbling will soon differentiate and extend into a laterality or more exactly a cortical hierarchy with specific functions attributed to each hemisphere. The left does the work which the right directs. By neuro-physiological processes, which I cannot explain here for lack of space, laterality is established, taking the shortest route to obtain maximum efficiency. By nature the right circuit assures the greatest amount of control. Many laboratory experiments have proven that only the right ear is capable of controlling the parameters of voice and speech: intensity, frequency, timber, rhythm, flow of sentences, and ordering. This does not mean that the left ear and the left side are useless. Their role, however is distinct from the right side.

Therefore the teacher should know if the child is well lateralized. Does he harmoniously use his cerebral hemisphere? The teacher can determine the child's laterality by observing how he controls his voice. Does the child speak well and distinctly, express himself easily, respond pertinently? The teacher should also note if the voice is clear and well timbered. By watching the child's face one can observe if he speaks from the right side. The right side is the dominant motor if in speaking the child uses the right side of his mouth and the whole right side of his face. The left side is subordinate in the phonatory function.

In order that this relatively new notion doesn't violently shock the idea you may have about laterality, I would like to say a few words concerning the differences

between each side of the body with respect to language. As much on the symbolic level as on the functional one, the right and the left sides have clearly distinct characteristics. The left represents the mother, the past, the voice, the static life, the earth. The right represents the father, growth, language, the dynamic life, the sun. These indices are used in interpreting the listening test. The analysis of the responses of the left and the right ears shows among other things what kind of rapport the person being tested has with his mother and his father and what tensions inhibit his linguistic expression.

That is the symbolic level. On the functional level, I distinguish between the right and the left mouth. Embryologically, it is easy to prove the existence of two such mouths. Likewise there also exist two larynx, each of them being activated by the recurring nerve or the inferior laryngeal nerve connected to the pneumogastric nerve or the tenth cranial pair. At this time it is worth discussing the subject of laterality. The nerve innervation at this point introduces in effect an asymmetry which is opposed to the body's external symmetrical appearance. The asymmetrical phonatory function of the larynx results from two synchronized cerebral impulses each leading from a hemisphere. This so because the recurring left rejoins the larynx after having travelled through the aortic network, or maze. The right moves along a much quicker route by passing under the lower right clavicle. This asymmetry explains the double response of the larynx to the cortical stimulation. The brain quickly discovers this acoustic doublet and structures its own asymmetry particularly in directing language. Right-sidedness or left-sidedness is thus established thereby determining which mouth will control vocal emissions. In actual fact, it is either the right or the left ear that is doing this. As I have just told you, these diverse elements are controlled by the same neurological pattern.

Thus there exist a left and a right voice, and a trained ear can easily detect their characteristics. However, if the observer's listening is faulty, he can always resort to laboratory equipment designed to analyze certain parameters. Nevertheless, nothing surpasses the human ear in doing this. The teacher needs a highly trained ear in order to be able to listen to the voices of his pupils. He ought to know that a right voice contains a rich range of hannonics, is well toned and well modulated. The language expressed by such a voice will be precise, harmonically rhythmic and quick to respond. By contrast, the left voice will be dull, deaf, sometimes grating, and hardly modulated, which indicates a lack of hannonics. As a consequence the language is impoverished and unrhythmic. It is possible that the child, not having opted for either the right or the

left side, haphazardly uses either in speaking. He will therefore be dyslateralized, indifferently using his right or left brain to work in a manner for which it was not intended. This will result in a loss of energy, fatigue and lack of attention. Stuttering or stammering show the beginnings of this asychronous work of the two larynx and the two mouths. In some circumstances such language disorders can be corrected.

To conclude this psycho-sensorial approach, I would like to specify certain neurological points which teachers should not neglect. I shall propose certain exercises for the children in nursery schools and the primary grades. These neuro-physiologically oriented exercises serve as valuable tools in later schooling.

a). The two hemispheres of the cortex have different roles to play. The left part contains the temporal sphere zone for nominal memory. This zone is located at the emergence of the right auditive nerve. The right ear receives the messages which are to be memorized. It is important then that it be in perfect working order and act as the directing ear. This assures a thorough learning of what is to be memorized.

Added to this, the zone of nominal memory is the only one partly isolated from the cortex. This - I'll recall for you - is the complex of multiply combined networks. Only the aforementioned space has an association with the ensemble of flie left hemisphere - therefore the sound messages to be memorized must pass through the right ear. It seems worthwhile to emphasize here that in order for the child to retain what he has been taught, he must control this process himself by his right audio-vocal circuits. He should speak, repeat, and read aloud the lessons to be learned.

Preschool-schoolers will adapt more easily to a musical environment. Thus the early schooling should be geared to this fact. Children's songs, especially nursery rhymes, will help them to memorize and prepare them for future linguistic ordering. In effect the basic elements of language that a child must learn are already contained in the musical rhythms of the nursery jingles. Each ethnic group has its own rhymes so that those in Canada are not like those in France or Spain or Italy, and so on, with respect to their verbal-musical structure.

This sound initiation with the aid of music prepares the child's nervous system to fully receive the language of his social group. Music is the major means of educating the body. With music, the child learns rhythm, and therefore time or beat. It also determines by the action of the vestibular organ, the notions of space through a well-established verticality. Hie teacher must carefully examine the child's posture while singing or speaking. He must observe that the back is straight, and the pelvis is held in. It is preferable that the performer stand for such exercises.

b). If you examine the diverse bodily projections in the area of the ascending frontal bone of the cortex, you will see that the muscles of the face, those for phonation (mouth, tongue, pharynx, larynx) are found near the zone of the right thumb and index finger. A child who has difficulty in learning or in speaking should play at speaking into a microphone. By joining the right index finger and thumb in a circle and holding it 10 cm from the right side of his mouth, he pretends to have a microphone there, When he speaks into this imaginary microphone you can see the change in his voice. The tone lightens, the words flow smoothly and the! language is better organized.

This is an easy exercise to perform. Certain children, however, refuse to do it. They refuse the right which on the symbolic plan represents language, the father, growth. For left-handed children who frequently have affective troubles and stay terribly attached to their mothers, this training is particularly beneficial for audio-vocal control.

c). Let us now consider the role played by the pneumogastric nerve with respect to language and self-receiving sensory-motile representation. Its influence on the child's neuro-vegetative life is of major importance. It is this nerve that innervates the eardrum as well as the phonatory and visceral organs (the lungs, heart, intestines, etc.). By working on the eardrum, that is modifying the listening posture, we can get rid of certain annoying phenomena which appear around the organs controlled by the pneumogastric nerve.

I have stressed these few psycho-physiological facts in order to emphasize some essential points for preschool-school teachers. Before assuming the task of preparing children to enter primary school, the teacher should be aware of these facts. By being

well informed about them, she can get his pupils ready to accept the role of communicating.

A well prepared child will have a solid language foundation. His voice will be properly situated and his audio-vocal circuits functioning effectively so that he directs the articulation of his thoughts. He will have good posture and coordinated movements.

The teacher should be conscious of certain pedagogical questions:

► Does the child have a good voice? Is it right or left: by observing facial movements especially in the area of the mouth, it is easy to determine the dominant or directing side. An analysis of voice quality gibes precise information about this point. The teacher can judge the development of the audio-vocal circuits and whether they are controlled by the right of left side according to the timber, modulation and richness of the voice.

One should pay particular attention to the preschool-school child in studying the development of language. At this age the controlling circuits are established upon which his entire scholastic future depends. These characteristics of the speech pattern will indicate good or bad audio-language control.

► Does the child have coordinated gestures? Does he use his body properly like a perfectly timed instrument when communicating with others? What degree of mastery has he attained in producing sounds? Are they richly inflected, and significantly modulated? Does he express his ideas with a semantically varied and nuanced vocabulary? or is he encumbered by an uncoordinated body which he does not master? Such lack of control reflects dyslaterality.

By referring to an ideal scheme, the teacher will be able to list the deficiencies causing lack of coordination and thus energy loss.

The main concern in teaching at this level is to normalize and harmonize these inabilities. This is a difficult and delicate undertaking. The human body with which he is dealing has a life of its own to be respected: its needs, desires, and problems contribute to an endless range of affecting psychological factors. A well-trained teacher can, however, do this easily.

► Is the child's language will structured and expressive? Does it flow easily? Is his intonation good? Is his speech accompanied by dynamic facial expression? or does he express himself poorly with uneven, unrhythmic language? If the spoken language is badly formed, then the written one will not be easily learned and dyslexia thus develops. The teacher's job is to determine the degree of underdevelopment of the audio-vocal system and find methods of correcting this slowness. Equipment especially designed for re-educating such deficiencies should be available.

If he does not have such material at his disposition, the teacher should use his pedagogic ingenuity in helping the child to gradually overcome these difficulties. The child will be encouraged to rely on his listening by becoming aware of sounds through using his right ear. The teacher's desk should be on a raised platform and his voice directed to the pupils' right ears. (The desk is usually poorly situated in the classroom). He could stimulate facial expression by having the pupils pucker their lips while doing phonatory exercises and at all cost avoiding retracting the comers of their lips. In fact, all grinning corresponds to the weakening of the muscles of the middle ear. A person can no longer be listening when the tension of the tympanic membrane is relaxed.

Besides these phonatory exercises, the teacher could ask his students to speak or read aloud while pretending to hold a microphone as I described earlier. He should make sure that the posture is erect especially around the lumbar vertebrae and occipital region.

Finally the teacher should make the children sing a frequently as possible. Music, as I mentioned before, is of considerable importance in preparing language formation and thus is a valuable teaching aid. The teacher needs to have a beautiful and developed singing voice and to be in control of his entire phonatory system. We have just seen that even since his preschool-natal life the child goes through various auditive stages requiring his acoustic adaption in order to resonantly respond to his milieu. During early childhood the ear is particularly flexible. In listening to the external world the child will adjust his auditive diaphragm to the voice educating him. If the voice is well located, timbered, and controlled by the right circuits, the listener's ear are preserved. On the contrary if the voice is left, raucous, monotonal, the child's ears will be destroyed. He will quickly loose his ability to analyze, to be accurate, pay attention, concentrate. This is a point to insist on because it explains certain obstacles raised in the nursery school class. I would like to recount here an anecdote from

ancient history. It concerns a debate waged in Athens at the time of Plato and Aristotle over the age at which a child should begin school. Plato proposed six years of age, Aristotle said five years and Chrysippe three and a half. Athens, not heeding anyone's advice, decided on seven years of age. Chrysipppe then warned, as a recommendation to all teachers, "Send the children to school at seven years, but see to it that those who care for them before this point have good voices, otherwise they will ruin the children's ears."

What can we take from this lesson? The certitude that the voice is an essential element of communication in the nursery school atmosphere. I find it inconceivable, not to be concerned with choosing the most precious educational material, namely the teacher's voice. Also I suggest instituting audio-vocal training for all teachers as a part of their professional preparation. The knowledge in which a child ought to be steeped in order to enter the adult world is not limited to the contents of transmittable, or measurable, knowledge. The oral, verbal content which reveals the Living Word seems to me also important in educating the child.

I am not ignorant of the difficulties our teachers face today in confronting the more or less contradictory methods advocated in an unstable climate which effects both the school and family environments. Parents should remain very interested in their children's behavior at school and especially in the nursery school. This is the time when the child needs to feel people around him in order to structure his communication with the outside world. Parents as well as teachers need to be educated about the psycho-sensorial effects on children. Ignorance of these facts causes the problems that stifle the learning process.

The father plays an important role at the center of this humanization process which prepares the small child to become a happy and active pupil. It is most disheartening to see a tense relationship between a father and his children. If he doesn't know to talk to them - that does not mean he must be their pal - he will not be able to impart to them all the semantic value of the social language. If his voice is left, badly toned, monotoned or aggressive, the family's ears will be shut off and will only open up on rare occasions. The nursery school experience will be the source of tears and dissatisfaction instead of a happy time of enrichment during which the child takes hold of his linguistic possibilities. It is therefore essential that the father communicates with Jiis children with a tone and voice that encourages dialogue. A father who has time for

his children shows his openness and respect for them. Unfortunately the questions raised on this issue cannot be dealt with in this study.

In bringing this brief survey to a close I would like to express the following wish which is to see new teaching methods researched with respect to sound and listening. It is up to parents and teachers to make sure of the conditions under which communication with the child develops in order that his desire to express his thoughts is realized.

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