

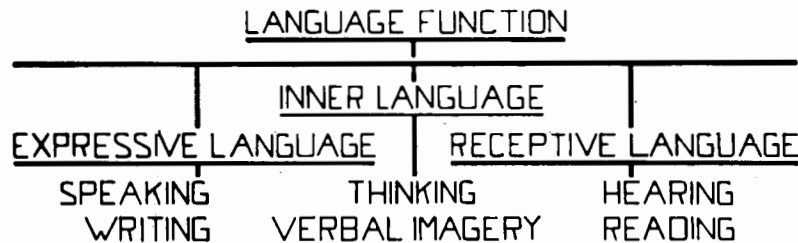
**DIFFERENTIAL DIAGNOSTIC OF HEARING IN LANGUAGE
DISTURBANCE IN CHILDREN**

Sonja Filling

Differential diagnostic of hearing in relation to language disorders in pre-school children — and especially the differentiation between the four main types of auditory disorders causing language and speech retardation — has during the years 1957—61 been one of the main topics of research and of the daily work in the Danish State Hearing Center of Copenhagen highly stimulated by the special interest of the director H. W. Ewertsen, M.D.

A total number of 362 children has been examined according to the audiological-psychological-motorical technique worked out and described by Myklebust 1954. As will be demonstrated later this group of children turned out to be of great variety — the only common trait being speech defects, in most cases accompanied by language defects. The speech defects ranged through alle degrees from the slightest mispronunciation of single sounds to complete lack of speech.

A speech defect is easily discovered by the parents and clinicians, but to the audiologist being responsible for the correct differential diagnosis of the auditory handicap of the child the total language function is of fundamental importance, and as may be demonstrated by fig. 1 quoted from Myklebust (1954) speech is only part of the language function comprising receptive language, inner language, and expressive language.



CLASSIFICATION OF LANGUAGE FUNCTION
MYKLEBUST 1954

Figure 1

In order to attain normal language function it is necessary to live in a linguistically normal environment and to have normal function of the peripheral nervous system. But of special interest is normal functioning of that half part of the information chain comprised in one individual as demonstrated in fig. 2, where each link is of equal and paramount importance.

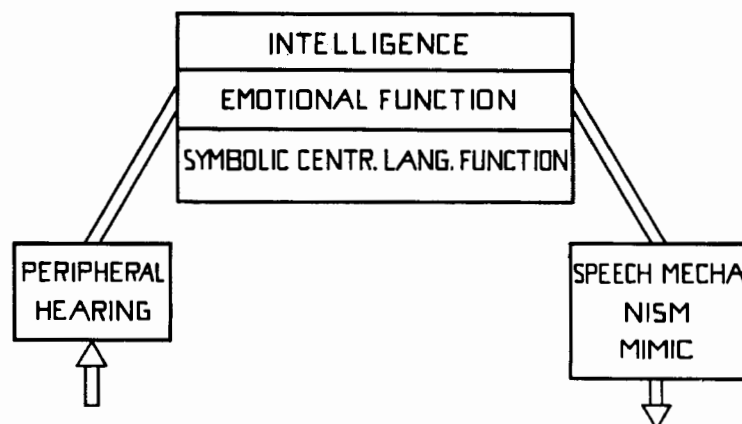


Figure 2

From this schedule the main types of auditory disorders may be derived:

1. **Peripheral hearing loss** caused by defects in the peripheral hearing mechanism comprising outer-, inner-, and middle-ear and pertaining central nervous pathways.

2. **Aphasia** is a language disorder which results from damage to the brain causing decreased ability of understanding, analyzation, formulation, and expression of the spoken language. Cases of aphasia may be subdivided in receptive, expressive, global, and mixed receptive-expressive types.

3. **Mental retardation** causing a defect of language function according to the generalized retardation and especially to the delay of development of intelligence.

4. **Emotional disturbance** caused by diseases of the emotional functioning as for instance infantile schizophrenia and neurosis.

5. In addition to these four rather clean-cut main types of auditory disorders in children we have the **multiple auditory handicap**. In these children two or more of the previously mentioned four main types of auditory disorders are found in the same child and to such a degree that each of them should be able to cause a language disturbance.

Defects in the peripheral speech mechanism are pure dysarthries and should not be mixed up with the auditory disorders and especially not the expressive aphasia.

This differential diagnostic grouping of pre-school children in the audiological clinic is not only of theoretical interest, which was demonstrated by

DISTRIBUTION OF
SEVERE BRAIN-DAMAGE
IN AUDITORY DISORDERS.

MULTIPLE AUDITORY HANDICAP (89 CASES)	--37
APHASIA (37 CASES)	----- 13
PERIPHERAL HEARING-LOSS (176 CASES)	--9
MENTAL RETARDATION (21 CASES)	---4
EMOTIONAL DISTURBANCE (3 CASES)	--1

Table 1

Myklebust 1954, and his results are to a wide extent reproduced in our own material as it is represented in Table 1.

Our material comprises 362 children, most of them were by the first examination 2-6 years old. 227 are boys and 135 girls demonstrating clearly the great overweight of boys seen in almost any pathological material in this field.

As to the etiology it turned out rather surprisingly that in one third of the cases it was impossible to discern the etiological factors. The largest etiological group was the one of prematurity and next came the cases with neonatal asphyxia, rhesus incompatibility, maternal rubella, and meningitis-encephalitis. Hereditary cases were extremely rare in our material.

In table 1 the four upper groups comprise the pure and uncomplicated cases of the four main types of auditory disorders.

Just like Myklebust I found that about half part of the children were suffering from an uncomplicated peripheral hearing loss. The sensory-nerve type of hearing loss was predominant amounting to two thirds of the cases. Only one third of the children had conductive or mixed types of hearing loss. According to the type and degree of the hearing loss the children were treated with hearing aids and referred to the teachers for the deaf or to the otologist for further therapy.

The pure cases of aphasia constitute about 10 per cent of the material and half part of those were of mixed receptive-expressive type.

Mental retardation and emotional disturbance without complication of the other auditory disorders are represented with rather few cases.

But a large and heavy group is the one with a multiple auditory handicap comprising about 25 per cent of the children. The reason for this high occurrence may be our close co-operation with pediatric wards working especially with cerebral palsy, epilepsy and other types of brain lesions. As a component

in these cases aphasia plays a big role so that to the group of 37 pure cases of aphasia must be added further 67 cases of aphasia complicating other forms of auditory disorder. In other words in about one third of the cases aphasia is an important part of the child's auditory problem claiming special therapeutic procedure.

PSYCHOLOGICAL SHIFT

	<u>PERIPH. HEAR. LOSS</u>	<u>APHASIA</u>
PRIM. VISUAL BEHAVIOUR	-- 46 %	-- 0 %
DISTRACTIBILITY	-- 2 %	-- 24 %
PERSEVERATION	-- 0 %	-- 29 %
PERIOD. ABSENT-MINDED	-- 4 %	-- 16 %

Table 2

Table 2 may throw a light upon the special problems of the aphasic children as opposed to the children with peripheral hearing loss. The special behavioural traits in the two groups of children are grouped against each other. It seems like all the advantages of undergoing a psychological shift in attempt to maintain the homeostatic equilibrium are on the side of the peripheral hearing loss. But on the side of the aphasics we find a lot of draw-backs as distractibility, perseveration and periodical absent-mindedness. In our material 70 children have organic damage of the central nervous system revealed by

DIAGNOSTIC DISTRIBUTION

(TOTAL 362 CHILDREN)

PERIPHERAL HEARING-LOSS	-- 176-48,6%
APHASIA	-- 37-10,2%
MENTAL RETARDATION	-- 21- 5,8%
EMOTIONAL DISTURBANCE	-- 3- 0,8%
MULTIPLE AUDITORY HANDICAP	-- 89-24,6%
DYSARTHRIA ~ PURE CNS-DAMAGE	-- 12- 3,3%
NORMAL CHILDREN	-- 21- 5,8%
OBSERVATION	-- 3- 0,9%

Table 3

neurological abnormalities often including abnormal results in electroencephalography and in pneumoencephalography. In 6 of these cases no auditory disorder was found. The distribution of the remaining 64 cases in the different groups of auditory disorders is demonstrated in table 3.

The occurrence of diagnosed organic brain damage is especially high in the groups of multiple auditory handicap and aphasia, which of course should be expected. To this number comes the group of children where the brain damage has been of such localisation that no organic lesions could be demonstrated, the only evidence being of psychological nature as abnormal behaviour and language function.

The high incidence of organic brain damage in our material might implicate a number of cases of central deafness, and already by the first examination a few of our patients have demonstrated auditory behaviour not typical of the known types of disabilities. Some children have good reflexive responsiveness, even at moderate intensities, without being able to profit from auditory stimuli in other respects. But since they have symbolic behaviour and are in normal contact with their environment in other respects they do not seem to fit in the groups of aphasics, emotionally disturbed or mentally retarded.

In our very young children only a few have been able to reliable collaboration in the audiological acoustic testing. Objective testing with impedance measurements and psychogalvanic skin resistance test has been employed, but the interpretation of the results has been rather problematic.

Especially the differential diagnosis between aphasia and multiple auditory handicap on one side and central deafness on the other is intricate.

Central deafness is a deficiency in transmitting auditory impulses to the higher brain centers while aphasia is a deficiency in the interpretation of these impulses after they have been delivered. But since they are both caused by organic damage to the central nervous system even if in different cerebral levels they may give overlapping patterns of behaviour and reactions to environmental stimuli.

Also in the cases of multiple auditory handicap we find atypical and overlapping symptoms as a result of the coincidence of the single components of the disorder.

By our reexaminations carried out periodically in the years to come we will have an opportunity of concentrating especially on this problem.

In conclusion of our present work in differential diagnosis I would like to emphasize the high frequency of organic brain damage in cases of language disturbance. This demonstrates the paramount importance of central auditory disorders in the diagnostic and therapeutic fields of child audiology.

DIAGNOSTIC DIFFERENTIEL DES TROUBLES AUDITIFS DANS LES TROUBLES DU LANGAGE CHEZ L'ENFANT

Dans le diagnostic différentiel des troubles auditifs chez les jeunes enfants il faut appliquer une méthode plus approfondie lors de l'examen conformément au schéma des fonctions du langage présenté à la figure 1.

Chez les enfants âgés de moins de 7 ans, l'immaturation psychique et somatique de l'enfant doit être prise en considération et l'on ne peut donc pas procéder à l'examen auditif de l'enfant sans juger en même temps son état intellectuel et émotif ainsi que son aptitude à la fonction centrale et symbolique du langage.

C'est pourquoi il faut tenir compte des quatre groupes principaux de troubles auditifs tels qu'ils peuvent être déduits de la partie de la chaîne d'informations comprise chez un individu, esquissée à la figure 2: trouble auditif périphérique, aphasie, déficience mentale et trouble émotif.

Dans les années 1957-61, nous avons employé au Centre d'audiologie de l'Etat à Copenhague, le procédé de diagnostic différentiel établi par H. R. Myklebust, consistant en une technique audio-psycho-motrice.

Nous avons examiné 362 cas dont 227 garçons et 135 filles, la plupart âgées de 2-6 ans. Malgré une anamnèse minutieuse, l'étiologie est inconnue dans environ un tiers des cas. Le prématuré, l'asphyxie du nouveau-né, l'incompatibilité des facteurs rhésus et la rubéole de la grossesse jouent un grand rôle dans l'étiologie tandis que des facteurs d'hérédité ne sont constatés que dans très peu de cas.

Le répartition selon le diagnostic ressort du tableau 1 qui montre que la moitié à peine des enfants avait comme affection unique un trouble auditif périphérique sans complications tandis qu'un dixième des enfants était atteint d'aphasie. Le groupe à handicap auditif multiple est étonnamment grand et d'une importance extraordinaire, il constitue un quart environ de tout le matériel. Chez ces enfants apparaissent deux ou plus des quatre types principaux de troubles auditifs à un degré si prononcé que chaque type peut occasionner un trouble du langage.

Au tableau 2 est indiqué le changement psychologique typique chez les enfants à troubles auditifs périphériques et chez les enfants aphasiques composant notre matériel. Ces traits indiquent la nécessité de prendre des mesures thérapeutiques spéciales pour les aphasiques.

Le diagnostic de la surdit  centrale d'enfants aussi jeunes que ceux compris par notre matériel est tr s compliqu . L'aphasie et la surdit  centrale peuvent pr senter chez les enfants des formes de comportement et de r action s'entrem lant, les deux troubles  tant dus   une l sion c r brale organique respectivement sur un niveau cortical du lobe temporal et dans les voies auditives c r brales les plus basses.

Chez pr s d'un cinqui me des enfants examin s, on a constat  une affection c r brale organique. Il ressort du tableau 3 que l'affection c r brale organique est particuli rement fr quente dans le groupe   handicap auditif multiple et dans celui avec aphasie.

Ce qui distingue les groupes   handicap auditif multiple et avec aphasie sont les r actions atypiques au son qui sont diff rentes de celles existant pour les quatre groupes principaux de troubles auditifs. De la m me fa on, la surdit  centrale pourra se manifester par une r action au son fortement atypique et vari e car on peut trouver des r actions auditives r flexes aux seuils d'intensit s normaux alors que le travail pr paratoire central et la r action fait en m me temps d faut. Ceci rapproche fortement les enfants avec surdit  centrale de notre grand groupe avec handicap auditif multiple. Cer-

tains de ces enfants se montreront peut-être aux examens périodiques poursuivis pendant une longue série d'années comme souffrant de surdité centrale.

Pour conclure ce travail de diagnostic différentiel, je tiens à souligner l'existence fréquente de lésion cérébrale organique dans les troubles du langage. Ceci prouve l'importance des troubles auditifs centraux dans le diagnostic et la thérapie de l'audiologie de l'enfant.

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