CHAPTER III

EXCEPTIONAL CHILDREN: THE PHYSICALLY HANDICAPPED

INTRODUCTION

Children are called exceptional who have special abilities, an unusual limitations and who are in need of special methods and programmes for their training and education. One writer has defined the term 'exceptional' in these words: "The exceptional are those who differ from the average to such degree in physical or psychological characteristics that school programme designed for the majority of the children do not afford them the opportunity for all round adjustment and optimum progress and who, therefore need either special instruction or in some cases special ancilliary services or both to achieve a level commensurate with respective abilities."¹ One writer has given 12 types of exceptional children (1) Gifted (2) Educable mentally retarded (3) the trainable retarded (4) the socially maladjusted (5) emotionally disturbed (6) speech impaired (7) deaf or hard of hearing (8) partially deaf (9) crippled (10) the chronic health cases.²

²Ibid., p. 10.
The exceptional children can also be categorised as follows: Gifted, physically handicapped, mentally handicapped, emotionally handicapped, socially handicapped.

3.1 The Intellectually Exceptional Children

It includes two groups each of which presents significant challenges to educators and each of which has essentially different characteristics. The two groups are categorised according to the degree of their mental ability.

(a) The Gifted

The children of high mental ability may be called superior, gifted and extremely gifted whose I.Q. is always above 125. Such children may have outstanding intellectual qualities in academic fields as some of them are noted to be talented in certain activities connected with advanced concepts and generalisations; others may be gifted in special areas as in technical skills, music, art, dancing, writing poems etc. A definition of giftedness has been given by two other authors namely, Eleigher and Bish who have said, "The term gifted encompasses those children who possess a superior intellectual potentiality and functional ability to achieve academically in the top 15 to 20 percent of the school population and or talent of a high order in such special areas as mathematics,
mechanics, science, expressive arts, creative writing, music or social leadership and unique creative ability to deal with their environment. 3

The society should bear the responsibility of developing the special abilities and talents of the gifted child by arranging special programmes of education for him. The teachers and the administrators must plan a realistic programme geared to meet the special needs of the gifted pupils and at the same time ensure that society will benefit to the maximum from the unusual abilities and leadership qualities which the children and youth with high mental ability, possess.

Some advanced countries attempt to provide special education for the gifted and talented students. In India, because of economic and political problems, educational provisions for the masses are not adequate and the gifted are sadly ignored. Though there are some public schools for the meritorious students but there are no systematic attempts to identify the gifted and no proper education suited to their abilities has been arranged. 4


4Shankar, Uday- Exceptional children; Sterling Publishers Private Limited, p. 147.
In the new education policy, there is mention of pace-setting schools (Navodaya Vidyalaya) for the talented students. But care must be taken to identify the gifted properly and to arrange proper education for them.

(b) Mentally Retarded:

(i) Definitions and Classifications:

It is a condition of arrested or incomplete development of the mind which is characterised by subnormality of intelligence. In accordance with a child's mental level as expressed in various grades in terms of I.Q., children have been classified under different categories by various investigators. In the revised standford edition of the Terman-Merril test, the following grades of intelligence are recognised. According to one view mental deficiency or retardation refers to sub-average general intellectual functioning which originates during the developmental period and is associated with impairment in adaptive behaviour. The degree of retardation is commonly measured in terms of I.Q., borderline (I.Q. 68-85), mild (50-70), moderate (35-49), severe (20-34), profound, below 20.

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Table 3.1

Terman-Nerril's Classification of Intelligence Quotient

<table>
<thead>
<tr>
<th>Classification</th>
<th>I. Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental defectives</td>
<td>Below 70</td>
</tr>
<tr>
<td>Border line or feeble minded</td>
<td>70 - 75</td>
</tr>
<tr>
<td>Dull and backward</td>
<td>75 - 90</td>
</tr>
<tr>
<td>Low Average</td>
<td>90 - 95</td>
</tr>
<tr>
<td>Average</td>
<td>95 - 105</td>
</tr>
<tr>
<td>Superior</td>
<td>105 - 128</td>
</tr>
<tr>
<td>Very superior</td>
<td>125 - 140</td>
</tr>
<tr>
<td>Genius</td>
<td>140 and onwards</td>
</tr>
</tbody>
</table>

Borderline and mildly retarded children are educable, who can learn the usual school subjects by means of special methods of teaching. They can be made to be independent both economically and socially by giving training in semi skilled jobs like printing, handicrafts, cottage industry, simpler electrical appliances etc. Moderately and severely retarded children are trainable, who require special skills such as better speech, toilet training, dressing and other activities of daily life. They can be trained in manual repetitive types.
of work so that they can earn their living as unskilled workers in sheltered workshops. Profoundly retarded children are known as uneducable and they need whole day care in all activities and a large percentage of these children require institutional care.

For educational purposes, there are at least three distinct groups of mentally retarded children. Each of which has its unique characteristics and problems requiring a distinct educational programme. These groups are the trainable mentally retarded, the educable mentally retarded, the slow learners. A fourth group is there which is not fit for educational purposes. They are intellectually so deficient that they require constant care and supervision, because they are incapable of learning even to meet their personal needs such as eating, dressing and using the toilet.

(ii) Causes of Mental Retardation

Mental retardation has been traced to many causative factors which may work singly or in groups. According to Tredgold, mental retardation is caused firstly by primary amentia or by secondary amentia. There are other causes of mental retardation.

1. Defect inherent in the Germplasm
2. Defect resulting from the fertilisation of the egg.
3. Defect arising from birth injury

4. Defect arising from infancy and late childhood

Aetiology of Mental Retardation:

In the last 15 years there have been important developments in understanding the aetiology of mental subnormality. One of the possible ways of classifying causative factors may be presented as follows.

(i) Factors acting before conception: Genetic: (a) Single gene (b) multifactorial (c) chromosomal.

(ii) Other factors

Prenatal (while in mother's womb)

Infections - viral parasites
chemical influences
Nutritional factors
Physical factors
Immunological factors
(blood - group Incompatibility)
Endocrinological disorders in the mother
Intra-uterine hypoxia
other pre-natal factors.

(iii) Perinatal (during birth)
Asphyxia
Birth injury
Pre-maturity

(iv) Post natal (in early infancy)
Infections
Injuries
Chemical factors
Nutritional factors
Deprivation factors (e.g. sensory, parental, social)
Other post natal factors.

(v) Unknown causes

The causative factors may be summarised in the following ways.

1. High blood pressure, syphilis and severe nutritional deficiency in the mother during pregnancy.

2. The Incompatible Rh. factor in the parents.

3. Unusually prolonged labour and abnormal conditions of delivery.

4. Unscrupulous and dangerous abortive measures.

5. Pre-mature separation of the placenta.

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'Mandi, Dhirendra - Article - 'Mental Disability'
'Mono Samiksha' - December, 1982, p. 14.'
6. Brain injury or injury to the cortex of the child as a result of fall or asphyxias.

7. Hydrocephalic conditions.

8. Glandular disturbances in the child.

9. After effects of such diseases as encephalitis, severe typhoid.

10. Emotional starvation of the child as a result of his long isolation in early infancy from human contact or repressive and inhibitory treatment of the child in his first few months.

11. Other hereditary factors, such as defects in the chromosomes.

There are severe infectious diseases which are also known to cause brain damage. Diseases like whooping cough, scarlet fever, measles, syphilis, T.B., meningitis or inflammation of the brain caused by brain fever in early childhood, have been found to destroy cortical cells causing some degree of mental retardation. Food deficiencies due to lack of vitamin in the first year of life is also found to contribute to mental retardation as is often found in the case of rickety children.  

(iii) Education of the Mentally Retarded:

All children in a social democracy are entitled, as a birth right, to be educated according to their ability, no matter how limited this may be. In the mentally retarded, we have groups of children who differ from ordinary children mainly in respect of impaired or defective mental functioning as a result of which they are unable and never will be able to benefit from the kind of education which is provided in the ordinary school. If they are to be aided and encouraged to develop the limited intellectual potential which they possess, then they will require some form of special educational facility. So they are to be provided with proper education according to their needs and abilities.

For educational purposes two fairly distinct groupings may be distinguished within the broad category of mentally retarded.

(a) The Educable Mentally Retarded

(b) The Trainable Mentally Retarded

(a) The Educable Mentally Retarded:

The educable group comprises those children who live at the upper end of the mentally retarded category. Since their intelligence measure tends to fall in the I.Q. range of 50-35 to
70-78, their degree of mental retardation may be regarded as minimal. The educable retarded should be re-educated so as to make the greatest use of their abilities to satisfy their own needs as well as that of the society in which they are living. The aim of education is the same i.e. to teach them the art of living and to enrich their minds by utilisation of potential capacities so that they might also become useful citizens in their own way.

The three specific objectives of a program for the educable retarded children consists of

(1) Personnel adequacy
(2) Social adjustment
(3) Occupational adequacy

The first objective of personnel adequacy is to train them to look after their own physical needs, personnel hygiene and cleanliness. They should learn to dress themselves properly and to adjust themselves in society in a more or less acceptable manner. They must be able to control their emotions.

Social adequacy as an educational aim, means helping the child to behave and conduct himself generally in ways that make him acceptable to his fellow men both in work and leisure.

The mentally retarded should be given vocational training
for some period of time, in trades like carpentry, leather work, tailoring, simple art or drawing or pattern designing, gardening etc., in the case of boys and needle work, cooking, laundering etc., in the case of girls, so that they have some opportunity in producing something more real and useful. The large majority of the educable-retarded capable of employment and consequent economic independence will earn their living in unskilled and semiskilled jobs requiring little in the ways of specific training.

If all the three objectives can be fulfilled in the education of the mentally retarded, then they would be able to live as useful citizens in the society.

(b) The Trainable Mentally Retarded:

Approximately .3 percent of the handicapped population fall in this trainable mentally retarded range of intelligence. The intelligence quotient of this group falls below 55 or 60. The majority of the trainable mentally retarded are retarded due to pathological causes, brain injury, metabolic disorders, genetic aberration, and so forth. To formulate the educational

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9 Ibid., p. 204.
objective for the trainable mentally retarded, the group's very limited intellectual ability must be taken into account. Goals are much more limited in scope. The objectives of educating these children are (1) to help them to become useful persons in the society as far as possible and to help them to make whatever small contributions may be possible for them within the confines of the protected environment in which they must always live. Our aim should be to make them as self-sufficient, socially adjusted and economically useful as their limited resources will allow. With these broad objectives in mind, the curriculum should tend to cover the following main areas.

(1) **Self Care**

A programme of a simple habit training enables these children to develop skills of self-help in respect of their daily practical needs such as eating, dressing, washing, using the toilet etc. These abilities relieve the burden on parents and make the child more acceptable in the home.

(2) **Social Training**

Different types of group activities like games and other co-curricular activities and social services are to be organised so that they will learn social behaviour of good members, love for the society etc.
Craft Work:

The students should be taught simple crafts such as weaving, basket making, rug making etc. Some of these skills may enable them to achieve some degree of economic self-sufficiency in future.

Academic Skills:

They should be given training in language development and in academic skills in simple reading and counting. The educational programme for the trainable mentally retarded emphasises physical and social, rather than intellectual skills.

Both the two types of mentally retarded should be given education according to their needs and abilities so that they can adjust in the society and become useful citizens. These aims and purposes can only be realised if we have small classes, specially trained teachers, adequate teaching materials and co-operating parents and an understanding public.

The Emotionally Handicapped Children

The whole group of exceptional children may also include those who are emotionally disturbed and socially
mal-adjusted. Within this large group of children are those who because of a broken family, a developmental disturbance, or economic, social, religious or ethnic conflict, may fail to mature socially or emotionally within the limits which the society imposes on them. Children who are emotionally handicapped, generally become backward in their studies and are known as educationally retarded children.

The causes of emotional disturbance as social mal-adjustment are, unhappy homes and social life, generally all sorts of emotional insecurity, overcrowding in homes and schools, lack of individual attention, absence of individualised instruction, defective discipline and age deflating methods of teaching. Special care and attention must be paid to such children for proper emotional growth and mental hygiene. There should be arrangements of child-guidance clinic and specialists to look after such children.

3.3 The Socially Handicapped Children

The socially handicapped children usually include those who are spoken as truants, incorrigibles, behaviour-problem cases, pre-delinquents and pre-truants. These children are handicapped also on account of some social factors particularly social attitudes. Otherwise they are normal in every other
respect. Children belonging to certain classes of society do not enjoy normal attitudes of the society towards them e.g. illegitimate children and children of prostitutes are handicapped only on such account inspite of the fact that they may otherwise even be intellectually gifted. In some cases children may be handicapped on account of their parent's profession, caste, race, religion or even colour.

The society is responsible for such type of handicap in the children and suffering from those types of handicap they develop delinquent behaviours. In our society, due to different social factors, many students go in the wrong ways and many talents are lost. There are many environmental causes of delinquency i.e. poverty, vicious home life, bad influence of environment, unhealthy emotional atmosphere etc.

So, proper practical steps should be taken to remove these environmental defects and thereby occurrences of delinquency would be checked and at the same time proper educational measures should be taken for the socially handicapped students.
3.4 The Physically Handicapped Children

Introduction:

The physically handicapped are those who cannot reasonably lead a reasonable normal life due to the defects in some organs of his body. There are children with impaired vision, children with impaired hearing, children with speech handicap, children with orthopaedic and neurological impairments. The physically handicapped may be classified into three groups. (a) The visually handicapped or blind (b) The deaf and dumb (c) The orthopaedically handicapped. All these physically handicapped children cannot take full advantage of general physical education curriculum or who need specialised attention in addition to the regular programme.

(a) The Visually Handicapped:

(i) Definitions and Classification:

The Report on Blindness in India submitted by a Joint Committee of the Central Advisory Board of Education and Health, defines that "A person is a blind who cannot count fingers of the out-stretched hand held at a yard's distance".10

Generally speaking, the blind includes those persons whose vision is of no practical value to them for the purpose of education or in general business of living. The blind are those who suffer from either of the following maladies.

(a) Total absence of sight

(b) Visual acuity not exceeding \( \frac{4}{60} \) or \( \frac{20}{200} \) (snellen) in the better eye with correcting lenses.

(c) Limitation of the field of vision subtending an angle of 20 degrees or worse.

Therefore, the blind could be considered as those who have no vision or those who have central visual acuity of \( \frac{20}{200} \) or less in the better eye with corrective glasses. A visual acuity of \( \frac{20}{200} \) means that the child reads from a distance of 20 feet a line or words which a child with normal vision can read from a distance of 200 feet or the widest diameter of his visual field subtends an angle not greater than 20 degrees even though his visual acuity in that narrow field may be better than \( \frac{20}{200} \). This definition is sometimes referred to as legal blindness or economic blindness.\(^{11}\)

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partially blind can be considered as those who have visual acuity between \( \frac{20}{200} \) and \( \frac{20}{70} \) or so in the better eye with corrective means.

From the educational point of view the blind are those who can learn to read large print or regular print when magnified under special conditions or with the help of a magnifying glass. But some children with tactual and visual disabilities or problems learn neither in Braille nor seeing large or magnified print but only through listening.

Classification:

The following functional classifications have been proposed and may be useful to the educators.

(1) The Functionally Blind or Non-functionally Sighted:

A person shall be considered to be functionally blind or non-functionally sighted if he is visually impaired, and is unable even with the aid of optical or image enhancement devices, to read and write as the literate-sighted do, or fails to visually identify familiar objects as the illiterate-sighted do and, also is unable to maneuver safely in an unfamiliar environment without the aid of a dog or a cane, as a sighted person or a functionally sighted person who has unaided mobility can do.
(II.) **Functionally Sighted with Neither Sighted Literacy Nor Sighted Illiteracy**:  

A person shall be considered to be functionally sighted with neither sighted literacy nor sighted illiteracy, if he is visually impaired and is unable even with the aid of optical or image enhancement devices, to read and write as the literate sighted do or fails to visually identify familiar objects as the illiterate sighted do, but is unable to maneuver safely in an unfamiliar environment without the aid of a dog, or a cane, as a sighted person or a functionally sighted person who has unaided mobility can do.

(III.) **Functionally Sighted with Aided Mobility**:  

A person shall be considered to be functionally sighted with aided mobility if he is visually impaired, yet is able, with or without the aid of optical or image, enhancement devices to read and write as the literate-sighted do and is able to visually identify familiar objects as the illiterate-sighted do, but is unable to maneuver safely in an unfamiliar environment without the aid of a dog, or a cane, as a sighted person or a functionally sighted person who has unaided mobility, can do.

(IV.) **The Functionally Sighted**:  

A person shall be considered to be functionally sighted
if he is visually impaired, yet is able, with or without the aid of optical or image enhancement devices, to read and write as the literate-sighted do and is able to visually identify familiar objects as the illiterate-sighted do and is also able to maneuver safely in an unfamiliar environment without the aid of a dog, or a cane, as a sighted person or a functionally sighted person who has unaided mobility can do.12

The children under category I may get educated primarily through the auditory and tactile modes and would require formal instruction in orientation and mobility. The children under category II are to be re-educated primarily through auditory and tactile modes because their near vision is not sufficient to enable them to read printed matter even with magnification. Those in category III would receive their education primarily through the visual sense but deficient distance vision would require them to have formal training in orientation and mobility. Those in category IV would use vision primarily both in educational process and for mobility.

Simarily a child is defined to be visually impaired if he cannot profit from the regular school programmes unless specific provisions are made for him. The teacher of the visually impaired may have three groups of children in the classroom, those whose vision is so defective that they must learn through auditory and tactile methods, those whose vision is defective but who can learn primarily through visual sense and the middle group who may need to be instructed through all three sensory modes.

(ii) Identification:

The child with a visual impairment should be identified as early as possible in his childhood. Of course, the child with severe visual impairment is usually identified early in his pre-school years. But the child with mild or moderate impairment is identified during elementary school years when visual ability becomes essential in the performance of his school tests. The teacher is mainly responsible for identification of these children.

The following is the list\textsuperscript{13} of the signs of eye trouble in children.

\textsuperscript{13}Teaching about vision ; New York ; National society for the prevention of blindness, Inc., 1972, p. 19.
Behaviours:

(1) Rubs eyes excessively.

(2) Shuts or covers one eye, tilts head or thrusts head forward.

(3) Has difficulty in reading or in other work requiring close use of eyes.

(4) Blinks more than usual or is irritable when doing close work.

(5) Holds books close to the eyes.

(6) Is unable to see distant things clearly.

(7) Squints eyelids together or frowns.

Appearance:

(1) Crossed eyes.

(2) Red-rimmed, encrusted or swollen eye-lids.

(3) Inflamed or watery eyes.

(4) Recurring styes.

Complaints:

(1) Eyes itch, burn or feel scratchy.

(2) Cannot see well.

(3) Dizziness, headaches, or nausea following close eye work.
(4) Blurred or double vision.

Children in whom any of these signs are detected should be referred to an eye-specialist for intensive examination.

Keeping in view the importance of early identification and remedy of all physical defects, the schools should conduct physical examinations, including vision screening at the time of entry into pre-primary schools. The Massachusetts vision Test and the Snellen Test for distance visual acuity are recommended by the National Society for the Prevention of Blindness, New York.\[14\]

(iii) The Structure of the Eye and the Vision:

Different Parts of the Eye:

The eye is an optical instrument which helps us to see things. It is like a ball or globe and is an outgrowth of the brain. There are four fundamental parts of the eye. If any part of the eye or system is damaged due to any influence or effect (which may be inborn or may be due to some use of drugs or to some disease, poisoning or injury), complete or partial disability may occur. The eye has the following four systems or

\[14\] Ibid., pp. 18-25.
parts (a) Protective part (b) Refractive part (c) Directive part (d) Receptive part (Fig. 1).

The eyes are placed in the orbits of the bony cavities of the skull. Each is like a ball and the optic nerve holds the eye ball.

In front, the eye-ball is protected by the eye lids which are movable rods of skin and muscles. Their inner surface is covered by a thin mucous membrane called the conjunctive. This membrane is reflected on the front of the eye ball. The edges of the eyelids can close and open the eye by the contraction of the muscles.

There is a small almond-shaped Lacrimal or tear gland situated in the upper and outer part of each orbit. It continuously secretes a saltish fluid which keeps the conjunctive moist and is slowly evaporated from the surface of the eyeball.

The second part is the refractive part of the visual system which is designed to focus the light on the retina in which there are the cornea, the crystalline lens, the aqueous humour and the vitreous humour.

Structure of the Eye Ball:

The eye ball is globular in shape. It is embedded in
A sketch of the human eye showing the various parts to understand the defects of vision.

**Figure 1**
fat in the cavity of the orbit. It is about an inch in
diameter from side to side. The walls of the hollow ball
are made up of three coats.

(1) The Sclerotic and Cornea
(2) The Choroid and the Iris
(3) The Retina

**The Sclerotic:**

It is a tough white opaque coat which forms the five-
sixths of the posterior outer covering of the eyeball. It is
pierced behind by the Optic Nerve and is supplied with blood
vessels. To it are attached various muscles that move the
eye ball.

**The Cornea:**

In front the Sclerotic is continued into a transparent
circular plate called the Cornea. It forms the anterior one-
sixth of the eye ball. There are no blood-vessels in it and
it is nourished by the lymph.

**Functions:**

(1) The sclerotic protects the delicate structures lying
under it.
(2) The cornea forms a kind of window for the light to pass inside.

The Choroid:

It is the middle coat of the eye ball (Fig. 2). It lies the immediate inside of the sclerotic and is much more delicate in structure. It contains pigmented connective tissue cells designed to darken the chamber of the eye and to prevent reflection of light by absorbing the surplus rays. Like the Sclerotic, it is pierced by the Optic Nerve at the back.

The Iris:

The front part of the Choroid which lies behind the cornea is called the Iris. It is a coloured circular curtain which gives colour to the eyes. It is movable and is made up of two kinds of voluntary muscular fibres:

(1) The Radiating fibres which radiate from the centre.

(2) The circular fibres, which are arranged in the form of a ring. The Iris has a central hole called the Pupil, which contracts or dilates so as to allow suitable amount of light to pass into the eye. In dim light the radiating fibres contract causing the pupil to dilate and in bright light or sunshine
FRONT SECTION OF THE EYEBALL
the circular fibres cause the pupil to contract, thus
shutting off a major portion of the bright light.

**Functions of the Choroid and the Iris:**

1. The Choroid darkens the chamber of the eye
2. It prevents reflection of light
3. It absorbs rays of light when the light is very strong
4. The Iris regulates the quantity of light that passes into the eye.

**The Muscles of the Eye:**

The various movements of the eye are affected by six muscles (Fig. 3).

1. The superior Rectus
2. The Inferior Rectus
3. The Internal Rectus
4. The External Rectus
5. The Superior Oblique
6. The Inferior Oblique.

1. The superior Rectus is attached on the upper side of the eye-ball. It is controlled by the Third Cranial Nerve. It
MUSCLES OF THE RIGHT EYE BALL

Figure 3
pulls the eye ball upwards, with the help of Inferior Oblique by its contraction.

(2) The Inferior Rectus is attached to the under surface of the eye ball. It is controlled by the Third Cranial Nerve. It pulls the eye ball downwards with the help of Superior Oblique by its contraction.

(3) The Internal Rectus is attached to the inner side of the eye ball towards the nose. It is supplied by the Third Cranial nerve. It pulls the eye ball inwards i.e. towards the nose by its contraction.

(4) The external Rectus is attached to the outer part of the eye ball. This muscle is controlled by the sixth cranial Nerve. When this muscle contracts, the eye ball is pulled outwards.

(5) The Superior Oblique has its functions which are somewhat intricate. It begins from the external or temporal side of the orbit and passes over the eye ball and reaches the nasal side of the orbit. It passes round a hook at this place and turns outwards, towards the upper and outer part. It is inserted between the superior and external rectii muscles. It is controlled by the Forth Cranial Nerve. When it contracts, it helps the Inferior Rectus to pull the eye ball downwards.
(6) The Inferior Oblique also has complicated functions. It takes its origin from the nasal side of the orbit and is attached to the under surface of the eye ball between the insertions of the inferior and external rectiimcles. It is controlled by Third Cranial Nerve. When it contracts it helps the Superior Oblique to pull the eye ball upwards.

Movement of the Eye-Ball:

The six muscles named above are able to rotate the eye ball in all directions and when they all act together, the eye ball is said to be rolled in a round about manner.

It is noteworthy to see that the muscles of both the eye balls work in unison or in the complementary manner. Thus if the eyes are turned to the light, the External Rectus of the right eye and the Internal Rectus of the left eye contract simultaneously and thus turn both the eyes to the right

(iv) How We See Things:

Light rays emanating from various objects of the outside world fall on the eye and pass through the cornea, the clear transparent portion of the outer coat of the eye ball; through aqueous or watery fluid behind the cornea; and through the lens. The amount of light reaching the lens is controlled by the pupils or opening in the coloured iris (fig. 4). The
Figure 4

HOW WE SEE THINGS

Figure 4
lens serves as a focussing agent by blending the light rays so that they come to focus on the retina, which contains the optic nerve cells. The retina then relays the light ray image through the optic nerve to the brain. Then the sensation of seeing a thing occurs. A defect in any one part of the eye, involved in this complicated process, may result in a visual problem. Two factors outside the eye itself are necessary for the process of seeing: light outside the body on an object and a brain to interpret or give meaning to the image.

(v) Causes of Blindness:

There are various causes of blindness which can be classified depending on different factors. Due to the defects in the various parts of the eye, blindness may be caused. There are different diseases in the eye for which an individual may become blind. There are some other factors viz. poverty, superstitions, Vitamin A deficiency etc. which are directly or indirectly responsible for blindness.

Trachoma is a disease of the eyelids in which certain granules are produced and these irritate the eyes by some secretion. This disease can also affect the cornea and conjunctive of the eye. It can lead to the dropping of the
eyelids which adversely affect vision.

In the refractive system certain disorders such as myopia, hyperopia or hypermetropia, cataract, astigmatism and glaucoma may occur which are common eye-problems which affect the passing of the ray of light through the eye.

Myopia or near sightedness is the result of the eyeball being too long and the lens being far away from the retina so that the light focuses in front of the retina and not on it, leading to visual defect. On the other hand, hyperopia or far sightedness is the opposite of myopia, because the eye being too short, light is focused behind the retina. Glasses are used as aids for these two types of disorders to make the light focus directly on the retina.

Another disease of the eye is cataract which is caused by opaqueness of the lens which prevents the light rays from passing through the lens. Patients suffering from the disease are operated by removing the opaque lens and then correct type of eye glasses are substituted to allow the light to pass through freely and to focus on the retina.

Another disorder noted in the refractive system is astigmatism which is the refractive error when the ray of light from one point is not focussed on one point. This is due to the irregularity of the cornea or lens of the eyes.
Glaucoma is the disease which is caused by increased pressure on the eye due to accumulation of the aqueous fluid. This is marked by increased tension within the eye ball and growing dimness of vision.

The other type of disability is the directive type which involves the structure functioning of the six ciliary muscles of the eye which control its movement either upwards or downwards or on either side. The common defective muscle functioning may lead to (1) crossed eye or squint which is the failure of the two eyes to direct the gaze at the same time due to faulty muscle co-ordination (2) another sign of defective directive functioning is nystagmus which is the involuntary movement of the eye-ball affecting clear vision due to muscle weakness or other causes or brain injury. Another malfunction of the directive type is Amblyopia Exanopsia which is dimness of vision due to disuse of the weak eye resulting from proper muscle imbalance.

There may be defects in the receptive system which depends upon the retina, the optic nerve, the brain cortex in the occipital lobe where vision takes place. The common impairment of the receptive function is a condition of the retina caused by excessive oxygen given to premature infants and it is called Retrolental fibroplasia.
There are a number of conditions which affect the four functional systems of the eye which may be congenital or may be environmental. Conditions like epilepsy, meningitis, hydrocephaly or brain tumour which are the diseases of the central nervous system which affect the visual process. These factors affect the area of the brain where vision takes place which is the seeing part of the brain.

Before the birth of the child, if the mother is subjected to the use of drugs or poisoning or have infections or suffers from diseases such as syphilis or tumour then the child may become visually handicapped.

There are other environmental factors and diseases for which a large number of children become visually handicapped. For example, smallpox in our country is found to be the cause of large number of cases of partial or total blindness. In the poor families, due to malnutrition and unhealthy living conditions, the children suffer from various diseases of the eyes and due to lack of adequate and timely medical treatment, they become visually handicapped.

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15 Shankar, Uday, Exceptional children sterling publishers private limited., p. 203.
The 1988 study of the Model Reporting area showed that the most frequently reported affected areas in the school going age population were as follows.\textsuperscript{16}

At birth : transparency loss in lens as cornea, abnormally small eyes, absence of one or both eyes, defective optic nerve.

Between birth and age below 20 years : choroidal and retinal degeneration, near sightedness, optic nerve diseases. Glaucoma, a serious blinding disease which affects millions in the third world countries, still remain an unsolved mystery inspite of tremendous advances in the field of medical science. Although researchers have identified a number of factors responsible for the disease, yet a lot remains to be done to understand glaucoma at the molecular level.

At least two millions are blind as a result of trauma alone which affects 5 million people in the world.\textsuperscript{17} Another disease which contributes to the world-total of the blind is onchocerciasis, which is common in Latin America and Africa.

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Xerophthalmia, the blinding disease caused by the lack of Vitamin A is specially prevalent in India, Pakistan, Bangladesh and Indonesia. Filaria which is introduced into blood streams by mosquitoes, is also the cause of blindness and is prevalent in many tropical countries. Cataract is found not only in the developing countries but also in the developed ones.\textsuperscript{18}

In India, the main diseases recognised as responsible for blindness are cataract (53%), Infection of the eye (18%), smallpox (3%), Malnutrition (2%), Injury (1.25%), Squint (25%), Glaucoma (3%) and other diseases such as diabetes, hypertension etc. affecting the retina (18%).\textsuperscript{19}

Trachoma, which is both preventable and completely curable if treated in time, affects 400 million people in the developing world. Each year in India 15,000 children go blind before they reach the sixth birth day.\textsuperscript{20}

National plan for the control of blindness was formulated on the results of the study carried out in 1971-73 in which

\textsuperscript{18}Ibid., p. 34.

\textsuperscript{19}Dutta, L.C., Article - 'A ray of light for the blind' : Assam Tribune, April 7, 1974.

\textsuperscript{20}Ibid.
it was estimated that out of 9 million blind persons in the country, 5 million cases were due to cataract; but the 1982 study project gave detailed information in respect of the prevalence and epidemiology of cataract. However no conclusive etiology of cataract formation is known so far. Result of study on the prevalence of cataract carried out in 1982 jointly by the Indian council of Medical Research and National plan for the control of Blindness randomly selected 18 centres (including one in Assam) of the country showed that 482 out of 1,000 persons above the age of 40 develop cataract. (Recent estimates show that about 90 lakhs of people are functionally blind in Rural India due to cataract) Cataract is the commonest cause of blindness and in cataract sight can be restored by operation. Even now in Assam, there are about 100,000 patients waiting for cataract operation and 30,000 new cataract cases are added annually.21

Deficiency of Vitamin A in food grossly affects the eyes of the children below 6 years of age and once they are affected, the child becomes blind for life. In the developing countries this is the commonest cause of blindness.

21 Ibid.
However, due to the prevalence of adverse environmental factors, social and cultural patterns, poor sanitation ignorance about personal hygiene, illiteracy, peculiar beliefs and taboos are the causes of blindness in Assam which are a bit different from those of the rest of India. Trachoma is not very common and malnutrition is the commonest cause of blindness especially in children. In Kamrup district of Assam alone more than 100 children become blind annually due to lack of Vitamin A in food.\(^{22}\)

(vi) **The Impact of Visual Impairment:**

There are different variables which may have an effect on the development of the child. These include the age of onset, the type of onset, the etiology, the type and degree of residual vision.

(e) **Age of Onset:**

If in a child, loss of vision occurs before he attains the age of 5 or 6, the child is considered as congenitally blind specially in the field of education. These children forget all their visual images. But when blindness occurs after five years of age, it will bear some emotional and

\(^{22}\)Ibid.
educational implications. If such children are already in school, they will have to be taught a new medium for writing and reading. Mentally such children may resist the idea that they have become blind and non-inclined to learn through the medium of braille. Such emotional problems crop up with the age of onset of blindness in a child.

(b) Type of Onset:

Blindness may occur in a child slowly or suddenly. The child who loses his vision suddenly, suffers from emotional problems which are graver and more serious than the emotional problems of the child who loses his vision gradually and slowly. Both of these two types of onset affect the emotional adjustment pattern of the child. The reactions to loss of vision may vary from one individual to another as they are related to complex, social and personality variables.

(c) Etiology:

Sometimes the development of behaviour depends on the origin and causes of blindness. As for example, congenital glaucoma is often accompanied by pain which may have an effect on behaviour. Some eye conditions such as optic atrophy may be associated with brain damage which may affect learning and
behaviour. Some hereditary conditions such as retinoblastoma may give rise to some emotional reactions in the parents particularly, because each of them may blame the other for the child's handicap. In the west, such hereditary conditions may create some serious problems when these children grow up and want to get married and have a family of their own. Thus etiology of eye-condition is very important.

(d) **Type and Degree of Residual Vision**

A partially blind child is often frustrated because the little vision makes him want to see more and to be considered as sighted and thereby he may suffer from both physical and emotional strain out of frustration. But usually parents and teachers fail to realise the extent of his visual impairment and the peculiar characteristics of such impairment and hence expect more from him. A totally blind child can make adjustments more easily than partially sighted one.

(e) **Prognosis**

It is prediction regarding the probable result of future of the condition. If, in the case of a child, the prognosis

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shows that he will be totally blind, then, the child must not be considered as totally blind. In such cases, the parents and the teachers should watch the process of the gradual deterioration and help the child in accepting and adjusting to his decreasing vision. The effects of reduced sensory input in a child who has no usual vision and who is congenitally blind are discussed below.

(f) **Sensory Deprivation**:

When a child loses vision, he becomes deprived of a major sensory out-put. The total effect of such deprivation can be known to some extent through observation and experience.

(g) **Sensory Compensation**:

Sensory acuity (an objective measure of sensory ability) does not change, but the ability to discriminate (this ability accounts for the difference in using other senses) can be improved through experience and training. A blind person does not hear any better, that is, his auditory acuity does not change or become keener, but he uses his auditory senses more efficiently than a normally sighted man. The parents and the teachers should try to develop the discriminating ability of the blind child.
(h) **Use of Remaining Senses**

A blind child acquires the knowledge of the external world through the remaining senses. But such knowledge cannot be equal in extent to the knowledge that is acquired by a naturally sighted child. Whatever knowledge the blind child attains either through tactual sensation or through the eyes of others around him, is only inadequate and imperfect. The auditory sense plays an important role for the blind child. Hearing the sounds, he acquires the knowledge of different things and learns to speak and to acquire language. The sound sensation makes possible orientation of the blind child to his environment. The blind should be given proper training of using his remaining senses to the maximum extent.

(vii) **Effect of Visual Impairment on Growth and Development**

Although there are similarities in the process of growth and development of different children, yet these are individual differences in the process. It is similar because growth is sequential with identifiable stages of development but these differences in the rate of growth, depend on different factors. Similarly, in the case of blind children also, there are differences in the process of growth and development from normal children. The growth in respect to the following
aspects may be observed.

(a) Physical and Motor Development:

Physical growth and motor development are not retarded by visual impairment. Lack of opportunity because of over protective attitude of parents and misunderstanding of need, inability to acquire skills naturally because of deficient imitative learning; delayed development because of lack of visual stimulations that may be necessary to learn certain skills, inability to control environment—all these may affect optimal physical and motor development.

In the beginning of early childhood, learning to control arms, hands, fingers and other muscular controls take place. When the child begins to see different objects in the environment. But in the case of blind children, these experiences are not possible through vision. They are to depend on other senses. Walking may be delayed and sitting, standing etc. may be retarded. When the child becomes older, it is found that he is less interested to engage in physical activities partly because of proneness towards inactivity. Thus the child misses many opportunities for the development of skills in using his large muscles.

The blind child also finds some difficulties in learning how to play and how to participate in play activities with his
normal peers as much of the young child's play is imitative in nature. But play is much necessary on the part of the child as it provides an outlet for expending physical energy, learning and practicing physical and motor skills and acquiring social skills

**Mental Development:**

After birth, the child gradually begins to acquire experiences through his sense-organs. The stimuli surrounding his environment begin to stimulate his sense-organs and thereby sensations are created and gradually these sensations become perceptions and conceptions. The sense organ 'eye' plays the most important part in having perceptual experiences. In the case of blind child, due to his defect in his 'eye's', he has difficulties in forming perceptions and conceptions about different things correctly like the normal children. His perceptual processes are deficient and he needs more experiences than the normal children to develop perceptions. Thus the blind child may not be able to develop concepts as clearly as the normal child. This is particularly true of formation of abstract 'concepts' like 'colour', 'time' etc. A blind child may form the concept of 'distance' by walking a specific distance but the idea of great distance is not meaningful to him because he does not have a kinesthetic experience for that purpose.
An individual normally communicates with others through speech and language, oral or written. The process is the same for the blind also. However, if the blind child is slow in his physical development, he may be slow in the acquisition of speech and language. The lack of visual stimulation results in a slower rate of vocabulary acquisition.

**Emotional, Social and Personality Development**

A child, first makes his contact with the mother. But the blind child cannot see his mother, as the eye-contact is absent. If the parents overlook the lack of response from the blind child, some undesirable reactions may occur. This is such a crucial time for the parents that they need to be encouraged to learn to respond or to stimulate responses from the child. The blind child cannot form a healthy relationship with siblings due to his blindness. In this context, the position of the child among his siblings, the sex of the blind child, and his siblings and age-differences are considered as important variables. If the blind child be not accepted by the other siblings and if there be the absence of normal siblings-rivalry and competition, the blind child will be emotionally disturbed and his normal growth will be frustrated.

The blind child faces problems in making meaningful relationships with others outside the family. He may encounter
some reality based difficulties in attempting to participate in group activities with his peers. At that time, he should not be rejected but he should be accepted whole heartedly by his peers.

The development of self concept begins in infancy and continues throughout the life span undergoing constant modifications in response to the environment. In this respect vision plays the vital role in developing self concept in the case of normal children. But with the blind child the process of development of self concept is hindered by the lack of vision. The blind child can explore the object world through touch. It takes a longer time in the case of a blind child to develop his self-image or to form a body image because he explores the world around him through touch only. The blind child first knows his mother's presence only by touch and the association of her presence with the sound she makes.

If the blind child does not get sufficient scope in mixing with peers he takes longer time in developing an identity with one's own sex. During adolescence period, the blind child faces difficulty in sex identification, because, he does not get the opportunity to imitate others in dress, manners and behaviours. He thus find it difficult to assume a sex role,
that is, to look and act as a boy or a girl, a man or a woman. The blind child delays in attaining independence in all areas due to restrictions imposed by the visual impairment.

There may be certain adjustmental or developmental problems that may crop up in the social setting around the blind child. The other persons, his relatives, neighbours and the community show an attitude of discrimination to him and thereby the blind person gradually understands his disability. Such discrimination originates because of the lack of adequate knowledge and proper understanding of the problems of the blind. Besides, people also have a generalised attitude of discrimination concerning the handicapped. This attitude of negligence creates different emotional problems in the child. The rejection of the blind individual by others may retard his social development.

Some other problems also crop up when the blind child grows into adolescents. During adolescence relationships with the members of opposite sex assume significance. In this context blindness is likely to thrust itself into the forefront causing upset and frustration.

Again, in this stage, thinking about his future he becomes greatly distressed. A visually handicapped person can be engaged in only a limited number of occupations. Blindness considerably restricts the choice of employment open to him.
(b) **The Deaf and Dumb:**

(i) **Definition and Classification:**

The deaf are those in whom the sense of hearing is non-functional for ordinary purposes of life. Generally, loss of hearing at 70 (dB)* decibels or above 500, 1000 or 2000 frequencies will make residual hearing non-functional.

Hearing disability may be of a milder or severe nature. Some suffer from loss of hearing which is so severe from birth or from the most formative period of one's life that one is unable to hear anything at all and is deprived of the development of any language in him. But there may be also partially deaf children whose loss of hearing in early childhood or even later in life is not so severe as to completely disable him to learn any language; it is rather of a milder nature that enables them to learn some spoken language.

The following is the definition of the deaf accepted in the conference of the Executives of American schools for the deaf in 1975.24

*A deaf person is one whose hearing disabilities preclude successful processing of linguistic information without...*

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*dB refers to "decibel" which is logarithmic unit of sound intensity above an arbitrary reference. In this study reference level is normal hearing (0dB).

24The Annual Conference Reports for the Deaf, 1975; American Schools for the Deaf, New York.*
or with a hearing aid. A hard of hearing person is one who generally with the use of hearing aid has residual hearing sufficient to enable successful processing of linguistic information through audition.

Classification:

The group can be divided into 4 groups as under.

(a) Zero group having totally deaf children

(b) Group I with children having hearing of 250 CPS (cycles per second)

(c) Group II of children hearing from 250 CPS to 1000 CPS

(d) Group III of children with partial defects who can hear with hearing aids after proper training.

The deaf can be categorised as (1) Mild (20 to 54 db) (2) Moderate (55 - 69 db) (3) Severe (70 to 89 db) and (4) Profound (90 db and above).

Again, the deaf may be categorised according to gravity of deafness; the experts have suggested the following methods for educational care and training.

Group A (Loss of hearing from 26 db to 40 db) mild-no need of special school; hearing aid, if necessary, may be used.
**Group A** Loss of hearing from 41 db to 55 db.

Moderate loss - Loud speech needs in classroom, Articulation be corrected by lecturers, integration education—necessary, Hearing aid - necessary.

**Group B** (56 db to 70 db loss of hearing) - moderately severe hearing loss. Students may be kept closer to the teacher. Special care needed for language development. They are to attend special school with hearing aid.

**Group C** (71 db to 90 db hearing loss)

This is a group having severe hearing loss, needs loud voice, hearing aid is necessary. Depends mainly on lip-reading, language development is affected.

**Group D** (91 db and above) - This group is called profound deaf, requires loud voice and attends special schools, depends mainly on lip-reading, generally neglects the voice and speech sounds, language development is slightly affected due to profound deafness.

(ii) *Ear - Its Mechanisms and Hearing Sensations:*

The human ear has three important sections - the outer or the conductive, the inner or sensorineural and the Middle and deafness may be due to any defect, deformity or destruction of some elements in any of the three or all of these sections (Fig. 5).
(1) The external ear consists of two parts -

(a) The Pinna - It is an irregular funnel shaped flap of cartilage covered with skin, with an opening leading into the Auditory canal.

(b) The Auditory Canal - The canal which is 1½ inches long is lined with a thin layer of skin covered with fine hair and containing glands which secrete the ear wax. The hair and the earwax prevent dust particles and insects from getting in.

The Pinna receives and collects sound waves and reflects them into the Auditory canal. The auditory canal leads to the Drum of the ear or the Tympanic Membrane and conveys the sound waves to this Drum which is set in motion.

The drum is a thin and elastic membrane. It stretches somewhat tightly across the inner end of auditory canal and separate the middle ear from the auditory canal. If once broken, this delicate membrane cannot be repaired and deafness ensues.

(2) The Middle Ear

It is a small cavity hollowed out in the temporal bone. It is separated from the auditory canal by the Tympanic Membrane. It is connected at the front end with the Pharynx by means of a passage called the Eustachian Tube.
Across section of the human ear showing the various parts and inner anatomy.
Eustachian Tube is a tube about \( \frac{1}{2} \) inches long, which leads into the pharynx. This arrangement equalizes the pressure of the air on the two sides of the Drum.

Ear-drum, which is found in the middle ear, is attached to three small bones or ossicles known as the hammer, the anvil and stirrup (Fig. 6). The function of the bones is to transmit the sound waves from the Drum to the internal ear.

(3) The Internal Ear.

The inner ear is nothing but a small chamber filled with fluid. It receives the sound impulses, and carries them directly to the brain through a nerve.

The internal ear is like a irregular-shaped apparatus situated inside the Pyramidal internal portion of the Temporal bone. It is known as the Labyrinth.

The Labyrinth consists of three distinct portions (Fig. 7).

(1) The Vestibule
(2) The Semi-Circular Canals
(3) The Cochlea

(1) The Vestibule:

It forms the central chamber which communicates with
Inner Aspect of the Drum of the Left Ear and the Small Bones of the Middle Ear

Figure 6
the Cochlea or the shell in front and the semi-circular canals behind.

(2) The Semi-Circular Canals:

They are three in number. Two are vertical and the third is horizontal. Each bone canal contains within it a membranous canal, at the end of each is a swelling or an elevation known as Ampulla. They maintain the equilibrium of the body and make us aware of our position and movements in different directions and they are controlled by the cerebellum.

(3) The Cochlea:

It is like a snail's shell. There is the membranous Cochlea inside the Cochlea and at which the Auditory nerve terminates.

The Auditory Nerve or the Nerve of Hearing:

It passes from the brain through a passage in the solid bone of the skull to the inner ear. The vibrations affect the nerve fibres and the impulses are transmitted to the brain.

The Mechanism of Hearing:

When a sound is produced, it creates waves in the air which are spread all around. Some of the waves are received
Figure 7

SEMICIRCULAR CANALS

VESTIBULE COCHLEA

OVAN WINDOW

BONY LABYRINTH

Figure 7
by the pinna and reflected into auditory canal. These sound waves travel from their source at a speed of 760 miles per hour. The waves through the auditory canal strike the eardrum which converts the waves into vibrations. These vibrations are carried across the middle ear to the inner ear. The vibrations set the fluid of the inner ear in motion. The vibration creates a nervous impulse, which is taken up by the nerve and fibres of the Cochlea division of the auditory nerve and through this nerve the impulse goes to the auditory centre in the Temporal Lobe of the cerebrum, where the sensation is translated into consciousness and results in hearing. The frequency of sound waves is measured in CPS or Cycles Per Second. Thus the lowest tone that is audible to human ear is 20 CPS or Hertz (Hz).

The physical stimulus of sound may also possess various degrees of complexity. If a note has only one frequency, it is called a pure tone and it produces sinusoidal wave form or a sine-wave. Majority of the sounds that we may hear consists of a complex pattern of waves involving various frequencies. Pure tones are very rare but can be produced by an electronic sound generator.

The intensity in the sound stimulus corresponds to the amplitude of back and forth vibrations and the amplitude
is represented by the vertical distance of sound peaks from one another.

The sensation of pitch depends upon the frequency of the sound stimulus, so does the loudness of sound on the intensity. Frequency is measured in terms of CPS and intensity in decibels.

A just audible tone is known as a threshold sound. A whisper is the softest of all audible human speech and is about thousand times more powerful than a threshold sound at a distance of about 3 feet. At the same distance, a voice of normal conversation is 1,000,000 times more powerful than a barely audible sound and a loud sound is 1,000,000,000 (one thousand million) times more powerful. As compared to the least perceptible sound, a sound which is one million times greater than it, will be bound to produce a discomfort in the ear of the listener.\(^{25}\)

This range of power is so wide for the ear, that the power-ratios of ten folds have been used to indicate these levels. These units have been named 'bels' after the name of Alexander Graham Bell, the great scientist. A threshold

\(^{25}\)Ballantyne J. "Deafness", pp. 18-19.
sound is called 0 bel and a whisper which is 1000 
(10 X 10 X 10) times more powerful as 10^3. This power 
ratio is called exponent which is used in measuring 'power ratios' in terms of bels.26

In order to measure differences in hearing acuity more accurately, the bel has been split up into ten smaller units called decibel, (or db). So, a threshold sound is expressed as 0 db, a whisper 30 db louder, conversation 60 db louder, a loud sound 90 db louder and a stimulus of sound 120 db louder than the threshold sound will produce discomfort in the ear.

The decibel scale is given as follows27

The decibel scale represents here the sound pressure level of various familiar sound.

The Decibel Scale28

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>Painful sound</td>
</tr>
<tr>
<td>120</td>
<td>Thunder nearby</td>
</tr>
<tr>
<td>110</td>
<td>Twin-engined airplane</td>
</tr>
<tr>
<td>100</td>
<td>Boiler shop</td>
</tr>
</tbody>
</table>

26 Ibid. pp. 18-19.
90 Elevated train
80 Heavy street traffic
70 Motor truck
60 Normal conversation
50 Vacuum cleaner
40 Average Office
30 Ordinary room
20 Whisper
10 Gentle breeze of trees

The above scale is a logarithmic scale which begins with the weakest sound-pressure or intensity that can be heard by the ear and goes upward in a logarithmic manner. In this scale, the point of 0 decibel can be placed arbitrarily any where at our sweet will. But conveniently the 0 point is set at or in close proximity to the weakest sound, audible to the human ear, a sound fixed at 0.0002 dynes per square. A sound that is 10 times more powerful than the sound of 0 db falls at 10 db. A sound of 40 db is 10,000 times more powerful than the 0 db and a sound of 60 db (conversational sound) is 1,000,000 times stronger than the weakest sound that is audible to us. The unit of decibel is highly useful for clinical purposes, for, it has been found that one decibel roughly corresponds to

\[2^9\text{Haber, R.N. and Fried A.R.,} \quad \text{An Introduction to Psychology, pp. 62-68.}\]
the lowest perceptible differences of loudness detectable by the human ear, so far as the frequencies are concerned with our hearing of sound.

Now, the ability to hear is measured with the help of an audiogram. An audiogram consists of four parts (a) an oscillator that produces by means of electric devices tones of any desired frequency. (b) a frequency selector that delivers these tones either in fixed discrete frequencies or in sweep frequency. (c) An attenuator which alerts this intensity usually in 5 db steps and (d) a receiver that transmits pure tones to the ear.

It is to be remembered in this connection that the human ear can hear sounds to the extent of 125 or 130 db. But at these levels of intensity, the sounds become painful for the ear and when they become more intensive, the whole mechanisms of the ear may be damaged.

(iii) Classification and Causes of Deafness:

From the point of origin, deafness may be classified into two types.

(1) Congenital (2) Adventitious.
Congenital Deafness

- Hereditary
- Sporadic

(a) Hereditary

- Congenital
- Adventitious

(b) Sporadic

Hereditary deaf are those who are deaf from their very birth due to hereditary factor. Heredity is the transmission of a physical aberration or some particular diseases from one generation to another in accordance with the genetic laws.

In the case of the sporadic deaf the hereditary factor is found to be absent but they are deaf from the very birth like the hereditary deaf. Sporadic congenital deafness is generally found in the poor families where the parents are deprived of sufficient nutritious food and favourable environment which are essential for a healthy and happy life. This type of deafness is not genetic and does not produce deaf
offsprings.

(2) **Adventitious**: 

This type of deaf is born with normal hearing capacity but in some, partial or total deafness may occur due to environmental factors such as accident, or an injury or a disease.

This type of deafness also occurs due to negligence, ignorance of the guardian and improper treatment of infectious diseases such as influenza, typhoid, small pox, rubella (German measles), meningitis and common respiratory afflictions etc. The otologists classify deafness into two principal varieties (1) Conductive deafness (2) the perceptive (Sensori-neural deafness).

(1) **Conductive Deafness**: 

This kind of deafness is caused when the conductive apparatus in the ear viz. the external auditory canal, the middle ear, Cleft or the labyrinthine (window) is affected. Thus conductive deafness is produced by a defective system of bones and membranes that transmit pressure changes from the external to the inner ear. If the external ear is plugged with wax, sound waves cannot travel from the outer to the inner ear. Sometimes the ossicles may have also some defects
which result into obstructing the sound waves on their way to the inner ear where they can trigger off nerve impulses. Conductive deafness may often be remedied with the help of devices that can amplify or magnify sound vibrations and transmit them directly through the skull to the internal ear. There are other devices like the hearing-aids that amplify the sound-stimulus so that it can be transmitted through regular channels with enough force to overcome some structural defects.

(2) Perceptive Deafness or Sensori-neural Deafness:

This kind of deafness is also known as 'discriminative deafness'. Formerly, it was called 'nerve deafness'. Perceptive deafness occurs on account of a defective perceptiving apparatus - the Cochlea and the auditory nerves. Since the apparatus consists of sensory and neural structures, perceptive deafness also called Sensori-neural deafness. When the auditory nerves or the delicate mechanism within the Cochlea in the inner ear are damaged or injured, perceptive deafness occurs. Very frequently, a person suffering from the loss of auditory discrimination cannot hear high frequency sound or can hear them less well than he is able to hear the low-frequency sounds. A person who has such defects encounters particular difficulty in hearing speech sounds for the crucial clicks and hisses add many tones of relatively high frequency.
Another type of deafness may be added to the above list. It is called Mixed deafness. Such deafness may be considered as a mixture of conductive and perceptive deafness, occurring in one and the same ear.

Conductive Deafness and Perceptive Deafness - Characteristics:

1. Characteristics of Conductive Deafness:

The most distinctive characteristic of conductive deafness is paracusia of Willis which occurs in Otosclerosis. Its exact nature remains unknown as yet, though a simple explanation may be offered. In this kind of deafness, the patient can hear or understand a loud speech, but he fails to hear and understand softly spoken words in a quiet room. But when in a noisy room, we speak more loudly in order to be audible, he can hear it better. This distinctive feature is more common in all cases of Otosclerosis than in any other affections of the conductive apparatus of the ear. But even when this feature is absent, deafness may occur. This characteristic may be said to be almost diagnostic.

Only a small number of children is born deaf due to non-development or partial development of the conductive apparatus. There may simple plug of solid tissues obstructing
the outer part of the external auditory canal. At the other end, it may be mal-formed or underdeveloped. These may be other defects associated with it. Sometimes congenital deafness may occur in a child born with deformed limbs because during pregnancy his mother was injected with thalidomide.

Bone conduction plays a great part in the case of a person suffering from conductive deafness when he hears his own voice. Even when he normally speaks, he thinks that he is only shouting. This is, often noticeable in Otosclerosis, when the patient hears a faint speech in a noisy environment.

2. Characteristics of Perceptive Deafness:

The most distinctive feature of perceptive deafness is the "loudness recruitment" phenomenon. As the sensation of loudness increases in abnormal rapidity, the recruiting patient cannot tolerate more than a slight increase. But in a normal speech, there is frequent, sudden or rapid increase and it has been observed that the difference between the loudest and the faintest sound may be as great as 30 db.

A person suffering from perceptive deafness does not hear his voice very well and thinks that he is not speaking loudly enough. Most of the born-deaf children have defective perceiving apparatus from their birth. Such defects may occur due to pre-
natal underdevelopment or non-development or damaged or defective cochleas or auditory nerves at the time of birth or about the time of birth.

(a) Congenital Perceptive Deafness:

The causes of congenital perceptive deafness may be divided into three groups according to chronological order. (i) the hereditary group (ii) the pre-natal group (iii) the perinatal group. In the hereditary group, genetic influences are found to be active. In the pre-natal group, detrimental influences over the embryo in its developing stage cause deafness. But in the perinatal group, accidents during birth or shortly after birth are the causes of deafness.

In the pre-natal stage, if during the first three or four months of pregnancy, the mother is affected by Rubella or German measles, congenital deafness will occur. After three or four months of pregnancy, the neural structure of the embryonic cochlea is more developed and becomes immune from danger of this type.

If the mother is affected by rubella during the first month of pregnancy, one in every two children is likely to become handicapped by deafness, blindness, heart-disease and mental disability. But if during the second month of pregnancy,
rubella develops, the incidence becomes one in four and
during the third month, one in six.

A small number of cases of deafness may occur on
account of influenza. Some drugs may cause damaging effects
in the Cochlea that is immature during the first few critical
months of pregnancy. If in this period of development of
embryo, abortifacient drugs assumed to terminate pregnancy
but the attempt is unsuccessful, tragic effects may result
so far as the child is concerned.

Another cause of deafness is congenital Syphilis.
At the time of birth the symptoms of deafness are hardly
visible and the dangerous and noxious influenza are trans­
mittted from the diseased mother to the child in the womb.
The Perinatal Group (Hazardous Birth) - The perinatal period
includes the period that immediately precedes birth, the
moment the body is born and shortly after birth. Taxaemias
during later stages of pregnancy, premature birth, birth
injury instrumental or accidental, anoxia or lack of oxygen
and neonatal jaundice are the perinatal causes of congenital
deafness.

(b) The Acquired Perceptive Deafness:

The traumatic sensori-neural deafness may occur on
account of head injuries, pressure changes affecting the
inner ear and exposure to excessively loud sounds. Perceptive deafness may be caused by head-injuries and sometimes it may be associated with fractures on the skull.

(i) Fracture on the Skull:

When the middle ear is affected by fractures, conductive deafness occurs. Sometimes the line of fracture passes through the inner ear or the internal canals and produces haemorrhage into the Chooces or Vestibule labyrinth on the internal canals. There may be ruptures in the organ of corti or fracture of the bony spiral lamina. Sometimes the fractures may be untraceable even in the X-Ray plates. But the more extensive ones may be radiographed.

(ii) Concussion of the Labyrinth:

This occurs when the skull is struck with a blow or by a fall. But in this case, no fracture is detected on the X-Ray plate. But here, the hearing-loss is less severe and reflected by a V-shaped "dip" at 4000 Hz on a pure tone audiogram. Sometimes a recovery may be effected in a few days but the defect may persist for weeks or months. But if the deafness persists for six months or more a microscopical fracture must be assumed to be there and there is the possibility of a permanent deafness.
(iii) **Perceptive Deafness due to Pressure Changes:**

(a) **Blast Injuries of the Inner Ear:**

There are two phases of the blast injuries - a primary wave of increased pressure which is followed by a secondary wave of decreased pressure. It is this secondary wave that causes damages to the inner ear by producing a haemorrhage into the labyrinth or a rupture of the organ of corti.

Blast and explosions may cause damage to the middle ear or the inner ear or both, but a pure conductive deafness rarely occurs. The extent of injury to the inner ear determines the final degree of disability.

(b) **Barotraumatic Otitis Interna:**

It commonly affects the middle ear cleft. But a raised atmospheric-pressure rarely causes perceptive deafness.

(c) **Noise (or Acoustic Trauma):**

There are two types of this kind of deafness - the acute and the chronic. There may be various causes of acute trauma viz. nearby explosion or firing of guns, atmospheric and other disturbances in the telephone receivers or a very shrill high pitched whistle and so on. The chronic acoustic trauma occurs
When the ear is exposed to highly intensive noise and is generally associated with specific occupations. So, this is often found in boiler-makers, welders, turners etc.

In the modern world, industrial noise is a growing concern and attempts are being made to counteract its disastrous effects.

(d) Infection:

Infection fevers like measles, mumps and meningitis are more serious causes of perceptive or sensorineural deafness. Conductive deafness may occur due to otitis media and perceptive deafness due to measles in which partial deafness, moderately intensive may occur in both the ears especially to high tone sounds rather than low tones. Mumps causes deafness, that is, unilateral and perceptive deafness in the affected ear and the patient becomes totally deaf. Other serious causes of deafness are meningitis and this kind of deafness is total or almost total. The less common causes are scarlet fever and influenza. Syphilis can also produce any kind of deafness perceptive or conductive. The perceptive deafness that occurs due to Syphilis may be congenital or acquired. But this type of deafness is severe and commonly affects any frequency. Sometimes perceptive deafness may occur from "otitis herpes" in which deafness constitutes a
part of a more widespread symptom complex. In this case, there is ear-ache which is followed by a rash in and around the ear. In a prolonged infection of the middle ear when infection passes from the middle to the inner ear during acute exacerbation, otitis labyrinthitis occurs. Sometimes inner ear receiving a severe infection and as a result permanent sensori-neural deafness occurs.

(e) Toxic Deafness:

One account of intake of certain toxic drugs like aspirin, Quinine sensori-neural or perceptive deafness may occur. Certain drugs like Sulpha drugs and antibiotics may also produce sensori-neural deafness (e.g. neomycin, Kanamycin, Vancomycin). Streptomycin may also cause perceptive deafness. Some diuretics like polyrene and ethasyrnic acid may produce deafness in certain cases. Heavy smokers or person addicted to liquor may be affected by partial deafness.

(f) Acoustic Tumours:

No primary tumour benign or malignant has ever been known to affect the inner ear. Some rare benign tumours arising from the sheath of auditory nerves are found to be highly dangerous. Perceptive deafness exhibits the first
Symptom. But it is unilateral and is often confused with conductive deafness. The reason seems to be that in certain cases conductive deafness may also occur.

(g) **Menier's Disease:**

In Menier's disease, recurring attack of severe and crippling vertigo take place. These are known as sense of rotation that is associated with nausea and occasional vomiting. But the deafness is the more serious factor that is accompanied by the disease. Generally such deafness occurs in only one ear but it has a tendency to affect the other in about 10 to 20 per cent cases. The hearing loss in such cases concerns low tones first and then high tones. But the deafness that occurs on account of Menier's disease is a recruiting perceptive deafness and tends to be more severe in succeeding attacks.

(h) **Senile Deafness:**

Senile deafness occurs and advances in old age. Such deafness is caused by atrophy of the auditory nerve fibres in the cochlea and is generally noticeable in the old men of the age of sixty. Such deafness may occur in a child also suffering from otitis media on account of the prolonged exposure of the ear to noise in working life.
(1) **Unilateral Sensori-neural Deafness**: 

This type of deafness which occurs in one ear is less severe than bilateral deafness. But such handicap limits the person both educationally and socially. Unilateral deafness does not affect a child in his educational development if it is detected in proper time. Unilateral deafness may occur in a child suffering from mumps at any age.

(2) **Sudden onset of Sensori-neural Deafness**: 

Whether unilateral or bilateral, a sudden onset of deafness is alarming. The onset may be either instantaneous or non-instantaneous. Such incidence may be caused by accumulation of wax or infection in the middle ear-cleft, but in most cases, it is due to severe affection in the neural apparatus like cochlea or the auditory nerve and its connections. Toxic neuritis may result from measles, mumps, scarlet fever and herpes. Encephalitis may also produce unilateral deafness in some cases. Sudden, severe and permanent deafness may occur in suppurative labyrinthitis, meningitis, congenital syphilis or from anaphylactic reaction to the injection of a vaccine.
(k) **Psychogenic Deafness**

Hysteria is a psychogenic disturbance which is manifested through various somatic disorders like paralysis, loss of memory, loss of sensation and occasionally deafness. In times of war, this type of deafness occurs frequently. In these cases no predisposing disease or injury is traceable in puberty or menopause. True hysterical deafness is total, severe and usually bilateral. Such deafness does not persist in hypnotic conditions but only in sleep. Only suggestion and persuasion are the methods by which it can be cured.

(iv) **Speech Development in a Child**

A child develops his speech gradually after birth. The instruments by which he develops speech are the bellows of the lungs, the larynx or the wind pipe and the organs of articulation. Speaking is a complex process which is the most highly skilled process of all kinds of motor control. It involves a long series of movements that require persistent imitation in order to be learnt. If the child fails to hear the many complex sounds of speech, he cannot imitate them and cannot speak and thus become dumb.

The ear is connected with those areas of the brain which are responsible for development of speech. During the first three months of infancy, sounds have no meaning to the
infants, all babies either deaf or otherwise vocalise these sounds. At the third month, sounds start to be meaningful for them. Thus on hearing his mother’s voice, he turns his head at this age-level. When he sees, hears or feels people around him, his sensations reach the primary centres of his brain. Then he begins to associate the various sounds with his own sensations of their appearances and their feel. These associations are accumulated in his memory in the psychic areas of the brain and the process of sensory recognition and intellectual comprehension is complete, the child uses the language efficiently. These psychic areas constantly build up and conserve a mutual understanding about the world and at the same time he learns how to control his speech. When he attains the age of nine months, words that he hears begins to be meaningful and he acts according to the instructions given to him. As he goes on imitating more and more, his new faculty develops and by the age of 18 months he speaks 20 words correctly. These six months of the second year of the baby’s life constitutes the natural period of his readiness for speech. This process continues and at the end of his second year, he is able to put two or three words together to make intelligible short sentences. Day by day, his vocabulary becomes enriched and his speech acquires the dignity of language.
In the case of totally deaf child the whole process is thwarted because he cannot hear.

(iv) Identification:

The teacher in the class room can easily detect the hearing disability in a child. If the child shows some degree of absentmindedness in his behaviour or if he tries to listen by turning to one side or by putting his ear towards the speaker or puts his hand behind his ear or is inattentive, he may indicate some hearing disability which may be evident by some confusion or abstinence or in his failure to do his homework. The teacher can also suspect the deficiency if a child is reluctant to participate in class activities and shows some behaviour-problems, as to show off or to overdo things in order to overcompensate for his failure to grasp the classwork. The child may also give indication of impaired hearing if there is delay in the development of language-speaking or if his use of language, written or spoken is defective. Such a child cannot comprehend verbal messages or speak, read or write properly as the language output in many of these forms depends on the language input.

With the help of instruments hearing quality of a child can be properly measured. Assessment of hearing can be made,
rather reliably, vary early in the child's life. If physical or behavioral clues arouse the suspicion that a child may have an auditory disorder, steps should be taken to have him evaluated comprehensively.

Since there are many reasons why a child behaves as though he does not hear, factors other than hearing impairment alone need to be considered when assessing a child's communication difficulty. It is true that, alone or in any combination, hearing impairment, mental retardation, emotional disturbance, aphasia, and brain injury can produce disorders of communication.30

(i) The Orthopaedically Handicapped:

(ii) Meaning and Definitions:

Orthopaedically handicapped children include all children with defects in size and structure of bones and joints with deviation in muscle strength, co-ordination or control. The orthopaedically handicapped are those who have a physical defect or deformity which causes an undue interference with the normal functioning of the bones, muscles and the joints.

The positions and movements of different parts of our body make us active and help us to perform motor functions.

The different sense-organs, muscles, bones, joints work in co-ordination and thereby make us able to make various types of movements in order to adjust in different situations.

The sense-organs are stimulated due to different stimuli in the environment and those stimulations are carried by the sensory nerves and are received by the brain and the brain makes the responses with the help of the muscles and glands. In this way the psychological system works. Without such a mechanism it would not be possible for us to maintain postures of the body or walk or climb or control various voluntary movements.

After birth, gradually the sense-organs, the nervous system, the effectors become active in the environment. The child learns to respond in various situations and his sense-organs, muscles and glands, his nervous system are involved in making responses in various situations. Gradually, he acquires the motor skills and thereby he can make proper movements of different parts of the body and make proper responses in the environment.

In all these activities, proper co-ordination of the different systems of his body is necessary. His proficiency in motor skills, his speed force and precision in making responses depend on the response mechanisms. Consisting of
the control of the nervous synapse, motor nerves, neuromuscular junction and muscles. The above system makes possible the various motor activities which are performed by us in various situations of our life. But various congenital and environmental factors are responsible for damaging the systems and thus cripple the child.

(ii) Factors of Orthopaedic Handicaps:

Disabling conditions manifest themselves in numerous ways and result from various factors such as

1. Congenital abnormalities
2. Infection
3. Metabolic disturbances
4. Traumatic conditions
5. Progressive diseases
6. Unknown miscellaneous causes

Due to the influence of pre-natal and immediate post-natal conditions congenital abnormalities are caused. During infancy and childhood infection and metabolic disturbances, including nutritional influences, are developed and persist for a considerable length of time. Progressive disease or illness may be of hereditary origin and may lead to gradual loss of movement and functions of the body organs and to eventual death. Traumatic conditions result from sudden accident and
shock. But it is very difficult to diagnose crippling which results from unknown or miscellaneous causes. These six classifications are not mutually exclusive. For example, a congenital abnormality may exist concomitantly with infections and a perceptual motor difficulty may be suspected from and coincide with malnutrition.

(iii) Classification and Causes of Orthopedic Disability:

The following classifications are made taking into account the primary systemic impairment and not so intimately connected with etiological causes.

Neurological Impairment:

One very common ailment of the orthopaedically handicapped is cerebral palsy. It is a complex neuromuscular disability which is characterized by disturbances of motor functions which result from damage to the brain and the central nervous system. Symptoms of cerebral palsy are weakness of the muscles or excessive involuntary motion of parts of the body such as the hands, arms, legs and mouth. Other symptoms are postural imbalance and plasticity and lacking of spatial relations. Some children suffering from cerebral palsy have hyperactive stretch-reflex that interferes with voluntary movement. A small number of children with cerebral
palsy have a condition of tremor manifested by small rhythmic movements or uncontrolled shaking of certain muscle groups. Sometimes, there are multiple handicaps found in children who suffer from cerebral palsy. The other disabilities connected with this are found to be visual defects (about 50% of the children), hearing impairment (25%) and speech defects (50 to 75%) and convulsive disorder in 50% of the cases. Independent researches were carried on in this respect and it was found that 75% of these children were below average in intelligence and at least 50% are seriously retarded or mentally defective.31

**Epilepsy:**

The causes of epilepsy are not clear. The seizure is however, a symptom of disturbance in the electro-chemical activity of the discharging cells of the brain, produced by a variety of neurological disorder. According to Peternann32 after intensive study with convulsive disorders, 33% are caused by acute infection, 25% are of unknown origins, and


14% are the result of trauma. Other causation factors include heredity, allergy, abnormality or pre-natal treatment. Children with epilepsy can be provided regularly self-administered treatment provided by medical science. As a result of such treatment children have been found to attain almost a normal pattern of life. In these cases some obvious changes in their behaviour and appearances can also be noticed and thereby some physical and adjustmental problems can be solved.

**Psychomotor seizures:**

The child, undergoing psychomotor seizures, might unconsciously make sucking noises with his mouth, move his hands aimlessly but with force, strike a child, tear up paper or move about the room in a daze. These movements might continue for two or three minutes. But after the period of seizure is over, the child fails to recollect the episode.

**Malnutrition:**

Recent researches have shown that due to undernutrition in infancy there are subsequent sub-normal growth and there is no proper intellectual development. The results provide strong evidence that severe under nutrition during the first two years
of life, when brain growth is most active, results in a permanent limitation of brain size and restricted intellectual development. In addition to sub-normal brain function the child is under sized and has reduced resistance to infection and illness. Sub-normal cerebral functioning interferes in learning the normal skills that are required in ordinary life. For example inadequate auditory visual integration would significantly interfere with learning to read. In such cases the child would probably not be able to profit from ordinary methods of learning. Malnutrition also is noted to lead to low vitality, sluggishness, incapacity to learn and also other physical handicaps such as rickety legs. Since physical handicaps due to malnutrition are more prevalent in the underdeveloped and poor countries, the victims of malnutrition are found in abundance in India.33

**Perceptual Motor Problem**

A less severe physical handicap which is not detected by cerebral examination is noticed in a child when his nervous system fails to translate perceptual learning in motor task. It also depends on the tactile and kinesthetic senses to

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experience movement. So, the organism must comprehend what the tactile and kinesthetic experience is, otherwise there will be no meaning and thereby will have little or no influence on motor behaviour. In most of the perceptual motor experiences in childhood, eye-hand co-ordination and compensation are involved. Afterwards the child acquires the knowledge of visual-motor discrimination of figure-ground relationships including the elimination of unessential information.

The perceptual experiences from all the senses must be integrated to enable the individual to establish equality, similarity and differences in the sensory information, including touch and kinesthesia. These in turn must connect to motor activity, motor control and motor memory. The perceptual motor development in a child may be retarded by several factors like environmental deprivation, retarded neurological development or cerebral injury and an overload of stimuli or over stimulation etc.

**Spina Bifida**

It is a congenital spinal cord injury and is associated with complete or partial paralysis of both lower extremities, loss of sensation, loss of bladder and bowel control and very often knee and foot contraction. Such disabilities are due
to incomplete closure of the vertebrae in the lower spine and as a result of which there is total or partial compression of the spinal cord. The child can walk short distance with braces and crutches but he spends most of his time at school in a wheel chair.

The main problems for the child in getting education is his lack of bladder and bowel control which the teachers and administrators cannot accommodate. Moreover due to lack of sensation in his legs and buttocks, the child may need to take frequent short walks and change his sitting positions to avoid pressure sores developing over boney areas. Hydrocephalus is common in children with spina bifida.

**Degenerative Neuromuscular Diseases**:

There are many neuromuscular diseases like multiple sclerosis which gradually destroy motoric functioning, impair the senses and ultimately end in death from medical complications. In such cases the child can understand the gradual failures and inability to perform normal functions of life and senses his own impending death. So, it may be difficult to maintain the normalcy and on going routine for the child.

**Poliomyelitis**:

It is a neuro-motor disease which is noted in large number of children. It is an acute infectious disease caused
by some virus infection and approximately one out of one hundred becomes paralysed. Polio is caused by the poliovirus which attacks the nerve cells in the spinal cord leading to paralysed muscles, pain and deformity. The flaccid type of poliomyelitis usually affects the lower limbs though it can affect any part of the body. Ninety percent of the cases of polio in India are found between the age of six months and five years but it could strike even at the age of 30.\textsuperscript{34}

The virus multiplies in the intestines and passes into the bloodstream and affects the spinal cord and then affects the motor cells but sensations may remain normal. The motor cells being affected, the motor power is also affected and as a result of which the patient has placid limbs or bad postures. There may be contracture of the limbs also. The disease does not affect intellectual functioning or ability to learn. Most children suffering from polio can attend classes but need adequate facilities and equipment such as wheel-chairs, crutches or braces.

**Hib's Palsy:**

Flaccid paralysis and loss of sensation of the shoulder

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\textsuperscript{34} Shankar, Uday, Exceptional Children, Sterling Publishers Private Limited, 1975, p. 186.
arms and or hand muscles may occur as a result or breech birth presentation. Through gradual nerve degeneration, muscles functions may gradually be thwarted but if therapeutic measures are not taken to prevent disease and deformity, the affected limb may remain limp and functionless inspite of healing.

Orthopaedic Conditions,

**Congenital Amputations:**

Most childhood amputations are caused by trauma or congenital anomaly. The less frequent causes are tumors, infections and vascular accidents. The amputations may involve an entire limb or only a distal portion of it. It depends on the cause and severity of the problem. The lost function is compensated by prosthesis or artificial replacement. These children often have many psychological problems in accepting the prosthesis and may refuse to wear it or become hostile to it.

**Torticollis:**

This defect known as Wryneck occurs due to contraction of neck muscles and as a result of which the neck is drawn to one side and the chin points to the opposite direction. These children are to be treated early by muscle reduction and
corrective posture. The patients are not to be neglected because negligence of this condition may lead to facial distortion, poor ocular alignment, body imbalance or serious curvature of the spine.

**Postural Foot Condition:**

The club foot is another deformity of the orthopaedically handicapped. Congenital club foot (talipes) is easily detected in the new born child and early corrective measures are usually effective. When deviation e.g. if the child walks on the inside his foot or who wears down the outside of his shoes, are found in the school age children, the children are to be treated immediately. Sometimes foot pain may also be caused by improperly fitted shoes or by exaggerated arch or flat feet. An early discovery of the causes will prevent future troubles, body imbalance and more serious orthopaedic defects.

**Arthrogryposis:**

It is a severely crippling congenital disease. It is thought to be the outcome of incomplete muscle development early in the embryonic life. Many or all of the child's joints may be ankylosed or fused and multiple surgeries may be necessary
in order to be able to put the child in a sitting position. In this case, the education of the child depends on visual and auditory experiences.

**Congenital Dislocated Hips (Hip Dysplasia)**:

It is a common congenital deformity particularly found in the case of females. It usually involves one hip though occasionally both the hips have been found to be deformed.

The exact cause of such deformity has not been identified. Timely treatment is necessary otherwise these children suffer from hip weakness, fatigue and pain while walking.

**Osteogenesis Imperfecta**:

This is a rare-inherited bone disease characterised by extreme weakness in the child's bone structure. In this case the bones may be fractured frequently with the slightest movement like coughing or sneezing or holding some objects like a book. Immobility is required though it may increase further weakness of the bones.

**Tuberculosis and Osteomyelitis**:

A number of children are found to suffer from tuberculosis of the bones or of the joints. New drugs and surgical procedures now available have reduced the number of children
thus afflicted. A similar situation exists for children with Osteomyelitis. But as there are large number of antibiotics and other drugs, limbs need not be amputated and children need not spend years in hospitals. Precautions should be taken so that there may not be further injury especially to vulnerable areas.

**Juvenile Rheumatoid Arthritis**

Another physical disability which may be some sort of an illness is Rheumatoid Arthritis in which the patients may suffer from inflammation of the joints and the tendons or swelling with stiffness and pain in the joints. Such children may suffer from muscular weakness. The possible causes for this disability include infection, endocrine or metabolic imbalances, an allergy of one body tissue to another or psychic disturbances. Single or multiple joints are swollen, hot and painful and since this disease affects a child between 1½ years and 3 years of age, the growth of the child is interfered with. A comprehensive programme of treatment and care should be extended to them. Moreover, the children are to take frequent mild exercises and movements to prevent severe joints-stiffening and increased pain. The children should not suffer from mental stress and strain or tension which aggravate their pain and discomfort in his joints.
A Scoliosis:

In this case the persons are noted to have lateral curvature of the spine due to which the person might bend on one side. If the deformity becomes severe, then it will cause limitation of the movements and the individual may be very much handicapped in his adjustment, learning and progress in his work or studies in school.

There are also cases of rheumatic fever, asthma, diabetes, hepatitis which is a disorder of the liver and other ailments which are found to impair the child's stamina and capacity to learn.

Malnutrition has also been found to lead to low vitality, sluggishness, incapacity to learn and also other physical handicaps such as rickety legs. The victims of malnutrition are found in abundance in India. If the mother or parents are addicted to drugs, their children may have some deformities.

Most of the types of orthopaedically handicapped children and their causes have been discussed. The crippling conditions badly affect his physical development and at the same time, it also affects his mental health. The child develops various types of physical and mental problems and it will be very difficult to develop a balanced personality in the child.
Therefore, the problem of care, attention and adjustment of the different types of orthopaedically handicapped cannot be ignored.