failure to progress in school, which cannot otherwise be accounted for.

IN CONCLUSION
I would emphasize that:
1) Vision is a complex process involving two eyes and the mind.
2) Visual acuity improves with maturity and may be normal in spite of a significant refractive error.
3) Recurring and continuing discomfort may suggest a significant refractive error or a latent strabismus.
4) Learning difficulties rarely have the eyes as a primary cause, though at times they may be a contributory factor.

OFFICE EVALUATION OF INTELLIGENCE OF CHILDREN

By Ruth M. Bakwin, M.D.
Departments of Pediatrics, New York University and New York Infirmary

An estimation of intelligence in office practice is possible within the broad classification of average, defective and superior. I will first discuss the diagnosis of mental retardation in the young child.

DIAGNOSIS OF MENTAL RETARDATION IN INFANCY

When the infant, less than 2 years of age, comes for intelligence testing, mental retardation has usually been suspected. It is very difficult, at so early an age, to differentiate simple feeblemindedness from organic retardation. What the parent wishes to know is, is the child mentally defective and if so what can be done about it?

Severe Mental Retardation

The diagnosis of severe retardation offers little difficulty. The behavior of the infant in the office and the developmental history will establish the diagnosis. The imbecile and idiot (I.Q. below 50) are unable to do what the average child half their age can do. It takes them 2, 3, 4, or more years to learn what the normal infant learns in 1 year. Motor development is retarded and efforts at speech (babbling) are few and feeble. Inability to support the head, to sit up, to stand, to smile, to hold and handle objects at the proper time are valuable indices of mental defect.

It is rarely necessary to give an intelligence test to these severely defective children, as the level of retardation makes little difference in management and the prognosis for their mental development is already known to be poor.

The most severe cases of mental deficiency are easily recognized clinically. Usually the child is apathetic, lying quietly in the mother's arms but never looking at her or showing any awareness when she speaks. When picked up the child does not adjust to change in position, as does the normal infant, but remains quite still and relaxed.

Less often the child is extremely irritable, moving the jaws, rolling the eyes and crying constantly.

Severely defective children often show associated anomalies which can be recognized during the examination. Mongolism and cretinism need no discussion. Microcephaly and hydrocephaly are readily recognized, but one must be cautious in children with hydrocephalus as they are not always mentally retarded. Even moderate degrees are compatible with normal or superior mental functioning. Some deviations such as gargoylism, ocular hypertelorism,
tuberose sclerosis and the various types of premature cranial synostosis are less obvious. Examination of the optic fundi is essential in making the diagnosis of amaurotic familial idiocy and toxoplasmosis.

Severely defective children often have strabismus, high arched palates, irregular teeth, open mouth with protruding tongue, and vacant look. They rarely look you in the eye with the signs of recognition that the normal infant of even 9 months will have. Mentally defective children of low intelligence who are abnormally inert and placid, rarely smile.

Cranial deformities, anomalies of the eyes, deformities of the ears, web-fingers and polydactylism occur with some frequency but are not necessarily diagnostic of mental deficiency.

**Lesser Degrees of Retardation**

Diagnosis becomes much more difficult as the intelligence of the infant approaches the average. It is necessary to take a detailed history, observe the infant, do a physical examination, including funduscopic, and sometimes to give a psychometric test.

The reason for referral is important and may give the clue to organic and endocrine conditions. A comprehensive history is essential. Most parents are eager to pour out their troubles and they should be allowed to talk.

If there is a question of retardation, most mothers have already suspected that something is wrong with the child. It is surprising how often the mother will say “I have felt for months that he is not developing normally but the doctor says he’s all right”—or “there is something wrong, something strange about him, he doesn’t act like other children.” Much less often is the father aware of any difference, usually he finds the mother too apprehensive.

The usual questions about the birth and neonatal history should be asked and, if possible, information obtained about cyanosis, convulsions and the use of oxygen during the neonatal period.

A developmental history is most important but unfortunately many parents are vague about the ages of sitting, walking, talking, etc. Also our own criteria are confused. Does age of sitting mean sitting with support, sitting without support, being able to sit himself up? Does talking mean saying words, saying words with meaning, phrases, sentences or carrying on a conversation? More information is gained by inquiring whether these phenomena took place at the usual time, early or late, or by comparing this child’s development with that of the siblings.

The defective child is retarded in development all along the line. This is not as easy to elicit as one would think, because of the wide variation in normal development. Sitting without support, crawling, walking, talking, bowel and bladder control, holding the bottle, drinking from a cup and feeding himself are usually accomplished at significantly older ages than in the normal child. The mother’s memory need not be relied on in all instances as many of these actions can be observed in the office.

A history of illnesses (their severity and complications) may suggest the possibility of encephalitis. A change in behavior after an illness is highly significant. Diseases of the central nervous system may be followed by mental retardation. The parent should be questioned about head injuries and convulsive seizures, as cerebral damage may occur with or without mental deterioration. History of mental defect in other members of the family will help in differentiating hereditary feeblemindedness from other types. If galactosemia or phenylpyruvic oligophrenia has been known to occur in any member of the family, the urine and blood should be tested frequently, especially during the early weeks of life. Analyses for phenylalanine in the blood should be made as the urine is not always positive in the beginning. Where the diagnosis is made early, the prognosis is not so grave.

A diagnosis of mental deficiency should be made with caution when a neurologic defect is present. Since much of the intelligence of infants is measured by the motor
development, a careful physical examination with particular attention to muscle weakness or spasticity is often indicated. Myotonias which interfere with motor performance are sometimes seen. Children with cerebral palsies (either spastic diplegia or basilar ganglion lesion) are delayed in motor development but may have normal intelligence. Special tests must be used for these children.

In the retarded infant one should look carefully for signs of cretinism, as the prognosis for mental development depends upon how early treatment is commenced. Laboratory aids (tests for protein-bound or butynol-extractable iodine, radioactive iodine uptake) and roentgenograms of the centers of ossification should be used as necessary.

In making a diagnosis of mental retardation it is necessary to exclude sensory handicaps, such as impairment of hearing or poor vision.

Although observation of the infant together with the medical and developmental history are usually sufficient for a diagnosis of mental retardation, it is sometimes useful to have a more accurate estimate of the child’s level of intelligence, as a basis for prognosis and for advice about management.

<table>
<thead>
<tr>
<th>Material Needed</th>
<th>Age and Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pencil</td>
<td>3 Months</td>
</tr>
<tr>
<td></td>
<td>Holds head erect on shoulders</td>
</tr>
<tr>
<td></td>
<td>Smiles to social approach</td>
</tr>
<tr>
<td></td>
<td>Eyes follow pencil</td>
</tr>
<tr>
<td></td>
<td>Opens mouth expectantly for feeding</td>
</tr>
<tr>
<td>Ring</td>
<td>4 Months</td>
</tr>
<tr>
<td></td>
<td>Lifts head and shoulders in dorsal position in effort to sit</td>
</tr>
<tr>
<td></td>
<td>Laughs aloud</td>
</tr>
<tr>
<td></td>
<td>Uses both hands to grasp ring</td>
</tr>
<tr>
<td></td>
<td>Inspects own hands in play</td>
</tr>
<tr>
<td>Bell</td>
<td>5 Months</td>
</tr>
<tr>
<td>Toy</td>
<td>Rolls from back to stomach</td>
</tr>
<tr>
<td></td>
<td>Turns head to voice or bell</td>
</tr>
<tr>
<td></td>
<td>In dorsal position, recovers fallen toy within reach</td>
</tr>
<tr>
<td></td>
<td>Looks at toy in hand as he plays</td>
</tr>
<tr>
<td>Two cubes</td>
<td>6 Months</td>
</tr>
<tr>
<td>Spoon</td>
<td>Can hold cube in each hand</td>
</tr>
<tr>
<td></td>
<td>Crows and coos actively</td>
</tr>
</tbody>
</table>

* Modification from Gesell Developmental Inventories and Stanford Binet Test.
It is relatively simple to see if the infant can respond and what level of performance he reaches. If he is 18 months of age, and can accomplish only some of the things that the normal child of 12 months can do, he is functioning below the 12-month level.

### DIAGNOSIS OF MENTAL RETARDATION IN CHILDHOOD

The diagnosis of retardation in the older child is easier. First, one must see if the child is functioning mentally at a level below normal, then approximately how retarded he is. In addition, the parent wishes to know if he will always be defective. Therefore the effort should be made to differentiate true feeblemindedness and pseudofeeblemindedness secondary to sensory defects (vision, hearing, etc.), developmental delay in speech, cerebral damage, or schizophrenia. In the case of true feeblemindedness, the prognosis is always unpromising for making up the deficiency, al-
though the child will usually continue to develop at his own slower rate. When the deficiency is due to a condition such as hypothyroidism or impaired hearing, which may be corrected, the child will develop as a normal child. With cerebral damage or schizophrenia there may be co-existent mental retardation or the child may have normal intelligence, in which case the emphasis must be on the child’s learning how to exercise his intellectual faculties in a useful manner.

At school age, the added problem of reading disability enters the differential diagnosis.

Severely defective children are easy to diagnose from appearance, history of development and disease, physical examination and their behavior in the office.

Many mildly defective children (those with I.Q. between 50 and 70) can also be diagnosed clinically. The facial expression is often revealing. There is a vacant, foolish look and sometimes facial grimaces. Even morons can sometimes be recognized in this way. The retarded child is often awkward, the posture poor and the child unusually placid and docile or unusually restless and irritable.

Sometimes a child with a severe speech defect will be mistakenly considered retarded on first acquaintance.

A good history is of great importance and may actually make the diagnosis. In some instances the symptoms are more or less specific. Thus, the combination of hyperactivity, distractibility, shifts of mood and variable memory strongly suggest cerebral damage. Slow development from the early months, delay in speech development and immature behavior suggest mental retardation.

Delay of speech to 2½ or 3 years of age is occasionally seen in children who are mentally normal. It may be familial. When speech has not occurred by 3½ years or more, symptoms of infantile autism should be looked for.

Information about the daily routine and ease or difficulty in training may be of value in estimating to what extent the child is self-reliant and responsible. Is he able and willing to do for himself the things which may be expected at his age? And does his parent permit him to do them? Does he understand as well as other children of his age and can he carry out directions with equal ease?

A great deal of information can be gained from the knowledge of the play interests of the child, and the age and sex of his playmates. Play interests roughly correspond with mental age. The retarded child likes to play the games and with the toys of younger children. Most schizophrenic children do not know how to play or to use toys. In general, retarded children prefer younger children or very much older children, while bright children prefer to play with older children, but there are exceptions.

The retarded child may lack skill in the handling of materials and in actions. He is rarely as clumsy in small or in large muscle movements as the brain-damaged child. Aptitude in sports is a good indication of motor co-ordination. Most brain-injured children hate anti-gravity play. By contrast, emotionally disturbed children love swings, merry-go-round and rhythmic movement.

A general idea of the child’s intelligence is gained by observing how he conducts himself in the physician’s office. When blocks, drawing materials, puzzles and books are available, the child’s choice of interest throws considerable light on his intelligence. The mentally defective child usually prefers activities more suitable for a younger child. Tests for estimating social maturity are available but are rarely necessary for finding the retarded child.

Observation of the period of concentration helps in the differential diagnosis of the retarded from the pseudodefective child with organic brain disease. It seems impossible for the latter child to stick to anything for long. He is easily distracted. Even when interested, he displays hyperactivity and leaves what he is doing to investigate everything in the room, afterwards returning to his original task, then shortly leaving it again. The retarded child may have a short attention span also, but he is not so dis-
tractable and usually, when he gives up a game or a task, he has lost interest in what he was doing, and does not return to it.

The behavior of emotionally disturbed children is most variable and cannot be predicted from child to child or even from day to day in the same child. If he likes what he is doing, he may continue the same activity for long periods of time. If nothing interests him he will indulge in unbelievably repetitious activity such as whirling, swinging and turning lights on and off. By contrast the brain-damaged child's overactivity is purposeful.

The defective child is usually not facile in speech. In the brain-damaged child the normal smooth co-ordination between the act of talking and respiration may be disturbed. The absence of appropriate facial expressions and the presence of dissociated gestures during speaking may be evident.

A physical examination is indicated with special attention given to motor development, handicaps of any type and neurologic abnormalities. In many cases of cerebral damage the neurologic examination is negative, but changes in postural tests and motility can sometimes be elicited; inability to hold the extended hands still while concentrating on another task (e.g., counting), drifting of the hands to one side, inability to make the eyes converge on a near object, and inability to discriminate two points on the skin touched at the same time (two-point perception). In the differential diagnosis of simple feeblemindedness and pseudofeeblemindedness of organic brain disease, these tests are useful.

**Psychometric Tests**

Comparison with the mental development of the normal child at various ages is easily carried out in the office with simple materials:*

<table>
<thead>
<tr>
<th>Material Needed</th>
<th>Age and Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pencil</td>
<td>3 years</td>
</tr>
<tr>
<td>Picture book</td>
<td></td>
</tr>
<tr>
<td>Six cubes</td>
<td></td>
</tr>
<tr>
<td>Buttons and button holes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Draws a circle from copy</td>
</tr>
<tr>
<td></td>
<td>Uses pronouns, past and plural</td>
</tr>
<tr>
<td></td>
<td>Names three objects in a picture</td>
</tr>
<tr>
<td></td>
<td>Repeats six syllables</td>
</tr>
<tr>
<td></td>
<td>I have a little dog.</td>
</tr>
<tr>
<td></td>
<td>In summer the sun is hot.</td>
</tr>
<tr>
<td></td>
<td>Repeats three digits in correct order (1 in 3 trials)</td>
</tr>
<tr>
<td></td>
<td>6-4-1  3-5-2  8-3-7</td>
</tr>
<tr>
<td></td>
<td>Builds bridge imitatively</td>
</tr>
<tr>
<td></td>
<td>Builds tower of 4 or more blocks</td>
</tr>
<tr>
<td></td>
<td>Gives sex</td>
</tr>
<tr>
<td></td>
<td>Are you a boy or a girl? (own sex first)</td>
</tr>
<tr>
<td></td>
<td>Gives last name</td>
</tr>
<tr>
<td></td>
<td>What is your name?</td>
</tr>
<tr>
<td></td>
<td>Can do two buttons (less than 3 minutes)</td>
</tr>
<tr>
<td></td>
<td>Action agent (4 of 9 correct; any appropriate answer)</td>
</tr>
<tr>
<td></td>
<td>What runs</td>
</tr>
<tr>
<td></td>
<td>What scratches</td>
</tr>
<tr>
<td></td>
<td>What swims</td>
</tr>
<tr>
<td></td>
<td>What blows</td>
</tr>
<tr>
<td></td>
<td>What sails</td>
</tr>
<tr>
<td></td>
<td>Can put on shoes</td>
</tr>
<tr>
<td>Card with two lines of unequal length</td>
<td>4 years</td>
</tr>
<tr>
<td>Pencil</td>
<td>Draws square from copy</td>
</tr>
<tr>
<td>Four pennies</td>
<td>Counts 4 pennies</td>
</tr>
<tr>
<td>Two-piece puzzle</td>
<td>Uses descriptive words of pictures</td>
</tr>
<tr>
<td>Three-piece puzzle</td>
<td>Buttons clothes</td>
</tr>
</tbody>
</table>

* Modification from Gesell Developmental Inventories and Stanford Binet Test.
AMERICAN ACADEMY OF PEDIATRICS — PROCEEDINGS

Picture book

- What must you do if you are sleepy?
- What must you do if you are hungry?
- What must you do if you are cold?
- Two-piece puzzle in 4 seconds or less
- Repeats 10 words (1 of 3 absolutely correct)
- We will have a good time at the big picnic.
- When the train passes you will hear the whistle blow.
- Compares lines— which is longer? (3 times correct)
- Draws cross from copy
- Repeats 4 digits in correct order
  4-7-3-9  2-8-5-4  7-2-6-1
- Three-piece puzzle (in 45 seconds or less)

Pencil

5 years

- Draws triangle from copy

Box

Four colors

13 pennies

6 years

- Right hand, left ear, right eye (no errors)
- Counts 13 pennies (2 trials) (no errors)
- Same row, right hand (no errors)

Nickle

Dime

Quarter

7 years

- How many fingers on one hand, on other hand, on both hands
  (no error)
- Ties bow knot (less than 1 minute)
- Copies diamond
- Names days of week
- 3 digits backwards (1 of 3 correct)
  2-8-3  4-2-7  9-5-8

Pen

8 years

- Counts 20 to 0 (less than 40 seconds only 1 error)
- Definition superior to use (2 of 4)
  - balloon  - tiger  - football  - soldier
  - What’s the thing for you to do (any appropriate answer)
  - If you’ve broken something that belongs to someone else?
  - If a playmate hits you without meaning to do so?
  - When you are on your way to school and notice you are in danger
    of being late.
- Writes with a pen (must be easily legible—1 minute only)
  - “See the little boy.”

9 years

- Date (allow a 3-day error only)
- Repeats 4 digits backward (1 of 3)
  6-5-2-8  4-9-3-7  8-6-2-9
- Names months (15 seconds, 1 error)
- Makes a sentence with these three words in it: (2 of 3)
  - work  - - -  money  - - -  men
  - boy  - - -  river  - - -  ball
  - desert  - - -  rivers  - - -  lakes
Another means of estimating the intelligence is the drawing of forms. The child is asked to copy the drawing you make:

The average child can copy:
- a circle at 3 years
- a square at 4 years
- a cross at 5 years
- a triangle at 6 years
- a diamond at 7 years

The retarded child is usually retarded in his ability to do this and the superior child usually can pass the items beyond his chronologic age, while the brain-damage child scores well below his intelligence level.

**Goodenough Draw-A-Person Test:** In general the Goodenough Draw-A-Person Test correlates well with the Stanford-Binet Test, is simple to give and not difficult to score. The child is asked to draw a person—any person he wishes. If necessary, he is urged to do as well as he can. This test may be used from 3 to 11 years of age, but in the upper range it is not so accurate. If the child draws a circle he is given a score of 3 years, and for each four details added, he is given 1 more year of credit. Fifty-one different details are possible.

The following outline adapted from Goodenough shows the simplicity of the scoring:

- Head present
- Legs present
- Arms present
- Trunk present
- Length of trunk greater than breadth
- Shoulders indicated
- Both arms and legs attached to trunk
- Legs attached to trunk; arms attached to trunk at correct point
- Neck present
- Neck outline continuous with head, trunk or both
- Eyes present
- Nose present
- Mouth present
- Nose and mouth in two dimensions; two lips shown
- Nostrils indicated
- Hair shown
- Hair nontransparent, over more than circumference
- Clothing present
- Two articles of clothing nontransparent
- No transparencies, both sleeves and trousers shown
- Four or more articles of clothing definitely indicated
- Costume complete, without incongruities
- Fingers shown
- Correct number of fingers shown
- Fingers in two dimensions, length greater than breadth, angle less than 180 degrees
- Opposition of thumb shown
- Hand shown distinct from fingers or arms
- Arm joint shown, elbow, shoulder or both
- Leg joint shown, knee, hip or both
- Head in proportion
- Arms in proportion
- Legs in proportion
- Feet in proportion
- Both arms and legs in two dimensions
- Heel shown
- Firm lines without overlapping at junctions
- Firm lines with correct joining
- Head outline more than circle
- Trunk outline more than circle
- Outline of arms and legs without narrowing at junction with body
- Features symmetrical and in correct position
- Ears present
- Ears in correct position and proportion
- Eyebrow or lashes
- Eye pupil
- Eye longer than high
- Eye glance directed to front in profile
- Both chin and forehead shown
- Projection of chin shown
- Profile with not more than one error
- Correct profile

If the child draws seven details, his drawing age will be 3 years plus 1 ½ years or 4 ½ years. If he draws 16 details, his drawing age will be 3 years plus 4 years or 7 years. This can be compared to his chronologic age and a fair idea obtained as to whether he is average, retarded or superior in intelligence.

The drawings of brain-damaged children and of schizophrenic children are the exceptions to the close correspondence between the Draw-A-Person Test and the Binet. In brain-damaged children the drawings may score 2 or more years below the
OFFICE EVALUATION OF SPECIFIC READING DISABILITY IN CHILDREN

By Leon Eisenberg, M.D.

Children’s Psychiatric Service, Harriet Lane Home

The purpose of this paper is to consider the child who hears well, whose vision is intact, whose general intelligence is good, but who, nonetheless, is unable to learn to read with normal proficiency. This, then, may suffice us as an operational definition of a specific reading disability.

It should not be necessary to expound at length on the importance of this problem. Not one of us, as physicians, would have been able to attain his present position without fluency in reading. Whatever hopes we may have for our own children presuppose the development of adequate reading skills; in a society in which the written word occupies so central a position as it does in ours, illiteracy is an almost insuperable barrier to an adequate social adjustment. Reading disability, like mental deficiency of all but the most severe degree, is a disorder which is only discernible in literate society. Moreover, its diagnosed prevalence will depend upon the extent to which education is compulsory. The re-
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Ruth M. Bakwin

Pediatrics 1959;23:989

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