THE JOURNAL OF NEUROLOGY AND PSYCHOPATHOLOGY.

Vol. IX.

APRIL, 1929.

MAY 27 1929

Original Papers.

CONGENITAL AUDITORY IMPERCEPTION (CONGENITAL WORD-DEAFNESS) : INVESTIGATION OF A CASE BY HEAD'S METHOD.*

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IN a previous communication¹ we recorded a case of 'congenital auditory imperception' in which word-meaning-deafness was the outstanding important element. As some degree of auditory agnosia was also present, and, in addition, slight word-blindness, some agraphia and a pronounced speech defect, the term 'congenital word-deafness' appeared too limited in scope to apply to the condition. Similarly, 'congenital auditory agnosia' had too broad a connotation as implying total inability to differentiate between any sounds whatever. We preferred, therefore, the term 'congenital auditory imperception' as it was free from both these objections and probably indicated more completely the fundamental defect. It was pointed out that the disorganisation of speech-mechanism resulting from the auditory imperception had led to the development of a method of vocal expression of the nature of so-called 'idioglossia,' a purely 'individual' language representing an extreme form of mispronounced and ill-expressed conventional language. The clinical features of the case were described in some detail, the observations being based upon the usual routine methods of investigation.

In the present communication we record the results of the examination of the same patient by the methods employed and described by Henry Head² in the investigation of aphasia and associated speech defects. One variation from the original method, however, has been adopted. For each test that depends upon an oral request, two separate tests have been substituted: (1) with the command given where the patient can hear but not see the speaker, and (2) with the command given where the patient can both hear and see him. This variation was rendered necessary in order to distinguish between the patient's actual word-hearing and his ability to lip-read.

It has not been considered necessary to describe in detail the technique of the tests, as with the exception of the variation mentioned Head's methods as described by him in 1920² have been adhered to strictly.

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TABLE

TEST I: NAMING AND RECOGNITION

Object.	(1) Pointing to an object on the table which corresponds to one shown to him.	(2) Pointing to an object named verbally by the observer (in his sight).	(3) Pointing to an object named verbally by the observer (out of his sight).
Penny.	Correct ; rapid.	Pointed to florin.	Repeated name imperfectly ; no response.
Scissors.	„ „	Correct ; rapid.	Repeated word imperfectly ; pointed to florin.
Match.	„ „	Said " match " ; correct ; rapid.	Repeated word imperfectly ; no response.
Card.	„ „	Said " card " ; correct and rapid.	Repeated word imperfectly ; pointed to scissors.
Florin.	„ „	Said name imperfectly ; correct and rapid.	Pointed to penny.
Card.	„ „	Pointed to penny.	Repeated name imperfectly ; pointed to match.
Penny.	„ „	Said name imperfectly ; pointed to penny quickly.	Pointed to match.
Match.	„ „	Said name imperfectly ; pointed to match.	Repeated name imperfectly ; pointed to card.
Florin.	„ „	Pointed to florin ; then to card, repeating name im- perfectly.	Repeated name imperfectly ; pointed to match.
Match.	„ „	Correct ; rapid.	Repeated name imperfectly ; pointed to scissors.
Penny.	Pointed to florin ; at once changed to penny.	Repeated name imperfectly ; pointed to penny.	Repeated name imperfectly ; correct.
Scissors.	Correct ; rapid.	Hesitated ; finally correct.	Repeated name imperfectly ; pointed to florin.
Card.	„ „	Repeated name imperfectly ; correct.	Pointed to match.
Florin.	„ „	Correct ; rapid.	Pointed to penny, saying " penn ".

I.

OF COMMON OBJECTS.

(4)	(5)	(6)	(7)
Pointing to an object named in print.	Duplicate placed in left hand out of sight.	Naming an object indicated.	Writing the name of an object indicated.
Correct ; rapid.	Correct ; rapid.	Said " penna ".	Said " penna " ; wrote " Sag".
" "	" "	Said " tisses ".	Said " tisses " ; wrote GASF slowly ; then stopped.
" "	" "	Said " mat ".	Said " mat " ; wrote MTLA.
" "	" "	Said " chad ".	Made an indistinguishable sound ; wrote DSTH.
Pointed to penny.	" "	Said " too ".	Wrote DSTD without speaking.
Pointed to florin.	" "	Said " chad ".	Wrote MSGD.
Correct ; rapid.	" "	Said " penna ".	Wrote STAD.
" "	" "	Said " mat ".	Wrote MTLA.
" "	" "	Said " too ".	Wrote MLSD.
" "	" "	Said " mat ".	Wrote MTLA.
Hesitated ; then pointed to penny.	" "	Said " penna ".	Wrote SLWOD.
Pointed to card ; then to scissors.	" "	Said " tisses ".	Wrote GHTLD.
Pointed to florin.	" "	Said " chad ".	Wrote MTLH.
Pointed to scissors ; then match.	" "	Said " too ".	Wrote GHLSD.

OBSERVATIONS ON TEST I: NAMING AND RECOGNITION OF COMMON OBJECTS (TABLE I).

(1) All the tests involving pointing to an object on the table corresponding to one shown to the patient were performed correctly; the only error was the choice of the florin in place of the penny on one occasion, an error which was corrected at once. The routine of the test was appreciated without any difficulty. As the test proceeded, each object shown was pointed to more and more rapidly.

(2) Pointing to an object named by the observer in his sight produced only one error—that of pointing to the florin instead of the penny. In each case the name was repeated imperfectly when the observer was seen saying it, and then the object was pointed out. The objects were pointed to much less rapidly than in the previous test; the speed did not increase with successive tests but rather lessened and in two cases towards the end there was a definite hesitation before the correct object was chosen.

(3) Pointing to an object named by the observer out of sight produced only one correct result. In each case the sound of the word was repeated imperfectly before a choice was made; in two of the earlier tests there was no response; while in the last test, when he was asked to point to the florin, the penny was chosen and at the same time the word "penn" said.

(4) Pointing to an object named in print was performed correctly and rapidly for the first few tests; then, with apparent fatigue, two errors were made; following this several correct choices were made; and finally a number of objects were chosen incorrectly. With the earlier tests, it seemed as though he waited to associate the printed name with the object and so chose correctly; whereas, with the later tests, he did not wait to do so but chose at random and usually incorrectly.

(5) In every case pointing to the duplicate of an object placed in the left hand out of sight was performed correctly.

(6) The endeavour to name an object pointed out to him resulted in the production of names which were apparently mispronounced versions of the 'conventional' names and, assuming that they were the names of the objects in his 'individual' language, were applied in each case correctly.

(7) The writing of the name of an object indicated resulted in the production of a series of letters in each case which had no relation either to the 'conventional' or 'individual' name of the object; and were, as a rule, applied indiscriminately to different objects. The only exception to this was the writing of MTLLA, MTLLD, and MTLLD on different occasions for a match. In no case, with any of the tests shown, was there any evidence of dissatisfaction with an incorrect result.

CONCLUSIONS FROM TEST I.

Part (1). No visual agnosia for common objects: visual memory for images (of common objects) intact.

Part (2). Lip-reading: fairly good for names of common objects but inclined to rapid fatigue.

Part (3). Word-meaning-deafness. No absolute word-sound-deafness but word-hearing is not perfect: distinguishes words from other sounds, but repetition of words heard (in 'conventional' language) is imperfect.

Part (4). Some degree of alexia in the sense of word-meaning-blindness—imperfect interpretation of printed names of common objects in conventional language.

Part (5). No tactile agnosia; stereognostic sense with consequent image-formation and correlation with that visual memory, normal.

Part (6). The patient has an idioglossic name for each common object.

Part (7). The patient is unable to write in conventional language the names of common objects seen (expressive agraphia for ordinary language), but makes an imperfect attempt to write the name in his individual language (partial expressive agraphia for idioglossic words.)

OBSERVATIONS ON TEST II: NAMING AND RECOGNITION OF COLOURS (TABLE II).

(1) Pointing to a colour similar to that shown was in every case performed correctly and rapidly.

(2) Pointing to a colour named by the observer in his sight produced varying results, but in only one case was the choice correct. In every case the name of the colour indicated was repeated imperfectly after the observer, after which a choice was at once made. It was doubtful at this stage if the errors in this test were due to the subject's imperfect knowledge of lip-reading, upon which he obviously depended, or to his imperfect knowledge of the names of colours. That the former is the more probable explanation was shown by the results of the test of naming colours shown.

(3) Pointing to a colour named by the observer out of his sight was, with one exception, performed in silence. The choice was made rapidly, without any hesitation, and in every case but two incorrectly. With the first test for green the colour was chosen correctly but with a subsequent test blue was chosen; while in the first test for white the choice was correct but with a subsequent test black was chosen.

(4) Pointing to colours named in print was incorrect with two exceptions, viz., black and orange, but in both these cases a different colour was chosen at the second test, viz., red and white.

(5) Naming a colour shown revealed a definite acquaintance with colours and the presence of *'individual' names for each of them*. Black was consistently called "trem"; red, "gee"; blue "weeve"; green, "cree"; orange, "drapoo"; and violet, "ruve." Yellow was named in one test "jumbu," and in a second test "drapoo"; the latter result suggesting that it may have been confused with orange. However, in the test immediately following, that for white, the name "drapoo" apparently persisted in the name "drap". In spite of these two errors, it was apparent that the subject was acquainted with the individual colours and had applied to each of them a name in his *'individual' language*.

(6) Writing the name of a colour indicated, produced only one set of symbols applied constantly to a colour, viz., "tree" for green. With red and blue, however, there was some similarity in the symbols used—for the former "HSTG" and "HSTLD", and for the latter "with" and "WiHS".

(7) Reading aloud the name of the colour printed by the subject himself revealed the most interesting feature of the test. With the first five names, the name read coincided exactly with the name used when naming the colour shown, in spite of the apparently strange combination of symbols employed in each case. Subsequently, however, the name read varied on each occasion, with the exception of those for blue and green. Blue, written as "with" and "WiHS", was in each case read as "weeve"; while green, written as "tree", was read as "cree", the name read in each case coinciding with that used when naming blue and green as they were pointed out. The two sets of symbols written for red, viz., "HSTG" and "HSTLD" were read as "gee" and "gem", the former being the expression used in naming the colour.

TABLE

TEST II: NAMING AND

Colour.	(1) Pointing to similar colour to that shown.	(2) Pointing to colour named by observer (in his sight).	(3) Pointing to colour named by observer (out of his sight).
Black.	Correct ; rapid.	Said " blu " ; pointed to blue.	Pointed to blue.
Red.	" "	Said " red " ; pointed to black.	Pointed to black.
Blue.	" "	Said " blu " ; pointed to white.	Pointed to red.
Green.	" "	Said " green " ; pointed to red.	Correct ; rapid.
Yellow.	" "	Correct ; rapid.	Pointed to violet.
White.	" "	Said " white " imperfectly ; pointed to violet.	Correct ; rapid.
Orange.	" "	Said " green " imperfectly ; pointed to green.	Made a sound ; and pointed to black.
Violet.	" "	Made a sound ; pointed to blue.	Pointed to blue.
Orange.	" "	Said " orung " ; pointed to blue.	Pointed to white.
White.	" "	Hesitated ; pointed to violet.	Pointed to black.
Green.	" "	Correct ; rapid.	Pointed to blue.
Red.	" "	Said " red " ; pointed to yellow.	Pointed to yellow.
Black.	" "	Said " bwak " ; pointed to green.	Pointed to orange.
Blue.	" "	Said " blu " ; pointed to yellow.	Pointed to red.
Violet	" "	Said " vite " ; pointed to orange.	Pointed to green.
Yellow.	" "	Pointed to blue.	Pointed to violet.

II.

RECOGNITION OF COLOURS.

(4) Pointing to colour named in print.	(5) Naming colour shown.	(6) Writing name of colour indicated.	(7) Reading aloud the name of colour he had written.
Correct ; rapid.	Said " trem ".	Wrote CLSMD.	Read " trem ".
Hesitated ; then pointed to white.	Said " gee ".	Wrote HSTG.	Read " gee ".
Pointed to green ; then red.	Said " weeve ".	Wrote With.	Read " weeve ".
Pointed to violet.	Said " cree ".	Wrote tree.	Read " cree ".
Pointed to green.	Said " Jembu ".	Wrote MOLSD.	Read " jumbu ".
Pointed to blue.	Said " ? " " white ".	Wrote GLSTO.	Read " gee ".
Correct ; rapid.	Said " drapoo ".	Wrote DOMTD.	Read " gem ".
Pointed to white.	Said " ruve ".	Wrote Werht.	Read " drap ".
Pointed to white.	Said " drapoo ".	Wrote CSLMTD.	Read " tee " , " gem ".
Pointed to violet.	Said " drap ".	Wrote MIDOG.	Read " drapoo ".
Pointed to black.	Said " cree ".	Wrote tree.	Read " cree ".
Hesitated ; pointed to green.	Said " gee ".	Wrote HSTLD.	Read " gem ".
Hesitated ; pointed to red.	Said " trem ".	Wrote DLTGG.	Read " gee ".
Pointed to yellow.	Said " weeve ".	Wrote WiHS.	Read " weeve ".
Pointed to white.	Said " ruve ".	Wrote GHSTD.	Read " gee ".
Pointed to black.	Said " drapoo ".	Wrote DSMLD.	Read " drapoo ".

CONCLUSIONS FROM TEST II.

Part (1). Visual memory normal, for colours.

Part (2). Lip-reading : imperfect for names of colours.

Part (3). Word-meaning-deafness.

Part (4). Some alexia in the sense of word-meaning-blindness for names of colours in written conventional language.

Part (5). The patient has an idioglossic name for each colour.

Part (6). Expressive agraphia for conventional language. (Idioglossic name written imperfectly for each colour). Slight expressive agraphia for individual language.

Part (7). Uses idioglossic terms in reading his own printed names for colours (although not quite perfectly).

OBSERVATIONS ON TEST III: THE MAN, THE CAT AND THE DOG TEST (TABLE III).

(1) Reading the printed words aloud was performed readily and showed that an individual sound was employed almost constantly for each word in the test.

(2) Reading from pictures resulted in the production of sounds for each object which resembled in general those produced in the previous test, but differed from them in minor details.

TABLE
TEST III: THE MAN,

Test applied.	(1)	(2)	(3)
	Reading aloud. Read :	Reading from pictures. Read :	Writing from pictures. Wrote :
The cat and the dog.	Ge arhn ahn ge ghu.	Kaht ; doee.	Cat ; bog.
The dog and the man.	Ge ghu ahn ge darm.	Doee ; mahn.	bog ; da-Daddy.
The cat and the man.	Ge art ahn ge darm.	Kaht ; mahn.	Cat ; Daddy.
The man and the dog.	Ge darm ahn ge ghu.	Mahn ; doee.	Daddy ; bog. (Formed "g" wrong; took paper back and changed it.)
The dog and the cat.	Ge ghu ahn ge arhn.	Doee ; kaht.	bog ; Cat.
The man and the cat.	Ge darm ahn ge arhn.	Mahn ; kaht.	Daddy ; Cat.

Again, an individual name was applied constantly to each object. No persuasion short of an actual demonstration elicited a whole phrase in relation to the picture demonstrated, and only the actual names of the objects represented were spoken. The names in the 'individual' language for the words read and for the objects represented were apparently mispronounced versions of the conventional words.

(3) Writing from pictures again failed to produce a complete phrase; again only the names of the objects were produced. The "d" of "dog" was always written as "b", an error in writing fairly common among young children who are learning to write. In the first picture in which a man was represented, "da" was written first, then there was a pause and the name was begun again with "D" and completed. A man was in each case represented by "Daddy" and not by "man". In one test, when writing "bog", the "g" was formed incorrectly, it was inspected, the paper taken back and the mistake corrected.

(4) When he was writing from dictation with the speaker visible, the words were repeated on each occasion before any attempt was made to write. An attempt to dictate the whole sentence before the subject began to write resulted in complete failure. The first dictation was performed correctly with the exception of "a" for "and"; but in the second piece he stopped before the final word and did not proceed. Following that, the results became more and more confused and even the word "the" was written incorrectly.

(5) Writing from dictation with the speaker out of sight resulted in every case but one in the writing of five words, in varying combinations of "cat" and "bog" and other words. It

III.

THE CAT AND THE DOG TEST.

(4) Writing from dictation, where he can see speaker. Wrote :	(5) Writing from dictation, where he cannot see speaker. Wrote :	(6) Repetition (speaker out of sight). Said :	(7) Reading what he has written. Read :	(8) Copying. Wrote :
the cat a the bog (repeats aloud).	The bog a the cat.	Ge kaht ahn ge doee.	Ge doee ahn ge kaht.	Correct ; rapid.
the bog a the . . . (stopped, repeated)	the bog me cat a.	Ge doee me doee ahn.	Ge doee me kaht ahns.	„ „
the bog a the bog (repeated words).	bog The me cat ahns.	Ge doee doee me aich.	Dog da me kaht ahns.	„ „
the the me a bog (repeated words).	Dog the a cat em.	Ge ahn em ge doee.	Doe gh u a kaht me.	„ „
the bog as bog cat (repeated words).	the bog me a cat em.	Ge dog ge ahn aich.	Ge doee me a kaht me.	„ „
bog me as em (re- peated words).	the bog em cat me.	Ge doee doee ge taht.	Ge doee me kaht me.	„ „

was noticeable that the final word of the first dictation, "dog", persisted throughout each phrase. In every case in which writing was involved in the test, the words were written in column and not side by side as in the usual method of writing a phrase.

(6) In repeating the phrases from dictation (out of sight) the first word was repeated correctly in the individual language in each case; in the first repetition, the whole phrase was repeated correctly, but subsequently no more than two words were ever repeated correctly. It seemed as if the early words of the phrase were remembered for a short period, while beyond that only the fact that there were five words in the phrase was appreciated.

(7) Reading aloud what was written resulted in an exact interpretation, in the individual language, of the symbols on the paper.

(8) The copying of words was in every case performed correctly, even to the relative positions of the separate words to one another.

CONCLUSIONS FROM TEST III.

Part (1). Idioglossic term consistently used for same word.

Part (2). Idioglossic term used (spoken) almost constantly for the same word.

TABLE
TEST IV: THE

Time directed.	(1) Direct Imitation.	(2) Clock set to oral command, where he can see.		(3) Clock set to oral cannot
		Ordinary.	Railway.	Ordinary.
5 minutes to 3 (2.55).	Correct.	2.15 (M.H. at 3).	5.10 (N.B. : 55).	5.15 (M.H. at 3 ; H.H. at 5).
20 minutes past 2 (2.20).	„	2.00	4.15 (M.H. at 1 ; H.H. at 4).	2.05
Quarter to 6 (5.45).	„	6.00	3.25 (M.H. at 5).	1.30 (M.H. at 6).
24 minutes past 4 (4.24).	„	4.10	3.10	2.55
5 minutes to 3 (2.55).	„	3.10	2.25 (M.H. at 5).	2.25 (M.H. at 5 ; H.H. at 3).
Quarter past 3.	„	1.15 (M.H. at 3).	3.20	5.05
10 minutes to 7 (6.50).	„	2.35 (M.H. at 7).	4.30 (said 'fifikee' ; M.H. at 6).	3.20
10 minutes past 6 (6.10).	„	6.05	6.25	1.35
25 minutes to 5 (4.35).	Reversed M.H. and H.H.	3.05	5.20 (M.H. at 4 ; H.H. at 5).	5.10
5 minutes past 2 (2.05).	Correct.	3.12	5.10 (M.H. at 2 ; H.H. at 5).	4.10 (M.H. at 2 ;

Part (3). Partial expressive agraphia for conventional language from pictorial representation.

Part (4). Lip-reading imperfect.

Part (5). Word-meaning-deafness.

Part (6). Word-sound-deafness not absolute. Recognises words as words but repetition is imperfect.

Part (7). No word-sight-blindness for own idioglossic written symbols ; reads his own writing as idioglossic spoken words.

Part (8). No word-sight-blindness for conventional language ; no total agraphia (i.e., copies written language perfectly).

OBSERVATIONS ON TEST IV: THE CLOCK TEST (TABLE IV).

The whole of this test was carried out with evident enjoyment in accordance with the patient's known fondness for anything mechanical.

IV.

CLOCK TEST.

command, where he see.	(4)		(5)	(6)
	Clock set to printed command.		Telling the time on a clock set by the observer.	Writing the time shown on a clock set by the observer.
Railway.	Ordinary.	Railway.		
6.10 (M.H. at 2).	3.25 (H.H. at 3 ; M.H. at 5).	2.10	lifoo tree (i.e., 11 ; 3).	11 3
1.00	5.10 (M.H. at 2).	1.05	fuore oo tu (i.e., 4 ; 2).	4 3
1.55	4.30 (M.H. at 6).	4.25 (M.H. at 5).	tik nihn (i.e., 6 ; 9).	9 6
2.25	4.20 (both hands at 4).	5.15	fuore (i.e., 4).	4
3.05	5.15 (H.H. at 5 ; M.H. at 3).	2.10	lifoo tree (i.e., 11 ; 3).	11 3
2.15	5.25	Correct.	tfree (i.e., 3).	3
2.30 (M.H. at 6).	Correct.	5.30 (M.H. at 6 ; H.H. at 5).	kivi kenn (i.e., 10 ; 7).	10 7
1.30 (M.H. at 6).	5.30 (M.H. at 6).	9.50 (both hands at 10).	tik ku (i.e., 6 ; 2).	6 2
1.10	4.25 (M.H. at 5).	3.20 (H.H. at 3 ; M.H. at 4).	five keven (i.e., 5 ; 7).	7 5
2.25 (M.H. at 2 ; M.H. at 5).	5.10 (M.H. at 2 ; H.H. at 5).	5.10 (M.H. at 2 ; H.H. at 5).	tu wahn (i.e., 2 ; 1).	2 1

(1) The direct imitation of the time on a second clock was performed correctly in every case but one, in which the positions of the two hands were reversed.

(2) Setting the clock at oral command with ordinary time when the speaker was visible was done incorrectly in every case. There was, however, in every case but one some relation between the time directed and that set by the subject. "Five minutes to 3" was set at 2.15, the minute hand being placed at 3; "20 minutes past 2" was set as 2.00; and so on. As a rule the last number dictated was seized upon and the hands moved until one pointed to the number, the other hand being left to take care of itself. The significance of the last word in the time dictated in relation to the numbers on the face of the clock was evidently appreciated, but the relations of the two hands to each other and their significance in terms of hours and minutes were apparently not appreciated. In setting the clock at command to railway time, the same effect was noticeable in every case but one; in most cases it was the last number dictated which was set; occasionally, it was the first; and in one case two numbers were set e.g., 1.20 set as 4.05, the minute hand being at 1 and the hour hand at 4. As before, the hour and minute hands were used indiscriminately, the first one to reach the number being accepted as correct by the subject. The case mentioned above in which two hands were set correctly produced an evident expression of satisfaction.

(3) Setting the clock at oral command (for both ordinary and railway time), with the speaker out of sight, revealed the same method though in fewer instances than in the previous test.

(4) Setting the clock to printed commands (ordinary time) showed some relation between the time printed and that set in every case but one. In two cases the correct time was set; in others, the hour or minute hand indiscriminately was set to one of the numbers (e.g., 5.10 for "20 minutes past 2," in which the minute hand was placed at 2); while in three cases both hands were set to numbers printed (e.g., "5 minutes to 3" as 3.25, the hour hand at 3 and the minute hand at 5; "5 minutes to 3" as 5.15, the hour hand at 5 and the minute hand at 3). Setting the clock by printed commands (railway time) produced one correct result; in four cases both hands were set to numbers showing some relation with the time printed (e.g., 6.50 set as 5.30, the minute hand at 6 and the hour hand at 5); and in the remaining cases only one number was set to a number related to the time printed (e.g., 5.45 set as 4.25, the minute hand at 5).

(5) Telling the time on a clock set by the observer resulted in the reading of the numbers to which the hands pointed, e.g., for "a quarter to six" "tik nihñ" was read. When both hands pointed almost to the same number, as in "24 minutes past 4" and "a quarter past 3", only the number 4 or 3 was read as "fuore" or "tfree".

(6) Writing the time on a clock set by the observer in the copying of the numbers to which the hands pointed. This test, in relation to actual times, was rendered difficult to interpret because the subject had probably never been educated properly in the use of the clock.

CONCLUSIONS FROM TEST IV.

Part (1). No apraxia in relation to correct imitation (and therefore interpretation) of positions (hands of clock).

Part (2). Imperfect lip-reading of oral commands to set clock at a particular time; relations of the two hands to each other and their significance in terms of minutes and hours not appreciated.

Part (3). Word-meaning-deafness, but some insight for sounds of numbers.

Part (4). Partial alexia for written commands in conventional language, but some insight for written numbers.

Part (5). Time by clock interpreted only imperfectly in idioglossic language. No word-sight-blindness for numbers.

Part (6). No word-sight-blindness for numbers. Imperfect education in use of clock.

OBSERVATIONS ON TEST V: THE COIN AND BOWL TEST (TABLE V).

This test was carried out in two sections: (a) using numerals in the commands both oral and printed, e.g., "2 into 3" for "second penny into third bowl"; and (b) using the full words in the commands, e.g., "second penny into third bowl." These two sections are tabulated and considered separately.

(a) *Numerals used in commands.* (1) Performing the actions on oral command when the speaker could be seen produced a correct result in over half the cases. In two others the numerals were reversed, e.g., in the command "1 into 3", the third penny was placed in the first bowl. In two other cases, the penny was chosen correctly but was placed in the wrong bowl. In one case the wrong penny was chosen but placed in the right bowl. Throughout the whole of this part of the test, the subject watched the lips and expression of the speaker intently.

(2) When oral commands were issued with the speaker out of sight, there were only two correct responses; in four cases the penny was chosen correctly, but the bowl incorrectly; and in only one case was the bowl chosen correctly when the choice of the penny was incorrect. That is to say, in many cases the first number spoken was applied correctly, but as a rule the second number was applied incorrectly.

(3) Performing the actions in response to printed commands not read aloud was correct in practically every case; in one case the numbers of the penny and of the bowl were reversed; and in one the penny only was chosen incorrectly.

(4) In every case the printed commands were read correctly in the individual language; that is, the conventional words for the numbers were mispronounced so as to be in some cases almost unrecognisable. The actions corresponding to the printed commands were carried out correctly in every case but one, in which the numbers of the penny and of the bowl were reversed. In two cases the penny was chosen correctly and placed in the wrong bowl, but at once withdrawn and placed in the right one. In one case the mistake in the action immediately preceding was carried over into the next action but at once corrected. This test, being of a comparatively simple character and requiring little thought, showed how in simple propositions the subject was mainly deficient in his appreciation of sounds, was not as proficient as he might have been in the appreciation of the movements of the lips of the observer and their association with ideas, and was relatively proficient in his appreciation of printed commands both when read silently and when read aloud.

(b) *Issuing the commands in a complete phrase without the use of numerals* placed a greater stress upon all the factors in the speech mechanism and upon the power of propositionizing, and resulted in confusion in every part of the test.

(1) Performing the action on oral command when the speaker could be seen was correct in only two cases; but, excepting that in three cases the penny alone was chosen correctly and in one the numbers were reversed, there was no relation between the numbers in the command and those of the penny and bowl chosen.

(2) The first five oral commands when the speaker could not be seen resulted in complete confusion; but following these a kind of stereotypy seemed to develop, for in every case the fourth penny was chosen and placed in a bowl incorrectly.

(3) This stereotypy appeared in a more perfect form in the actions performed in response to printed commands not read aloud. The first five commands again resulted in complete confusion, but in response to the following seven commands the first penny was chosen and placed in the second bowl in every case.

(4) The difficulty of transcribing satisfactorily the words spoken by the subject in reading the printed commands caused this part of the test to be abandoned. Two of the commands were executed correctly; in two cases the numbers were reversed; and in one case the penny alone was chosen correctly. It was apparent that the additional help afforded by the action of the muscles of articulation in forming the words improved the subject's performance, though not very much.

TABLE

TEST V.: THE COIN AND BOWL TEST, IN WHICH

(a) Numerals used in commands.

Command.	(1) Oral commands where he can see.	(2) Oral commands where he cannot see.
Second into third. First into third. Second into first. Third into second.	Second into fourth. Third into first. Correct. Correct.	First into second. First into fourth. Second into third. Second into fourth.
First into fourth. Fourth into third.	Correct. Fourth into second.	Correct. Fourth into second.
Second into fourth.	Correct.	First into third. (Long hesitation).
Fourth into first.	Touched fourth, then first into fourth.	Third into first.
Third into first. First into second.	Correct. Correct.	First into second. First into fourth.
Third into fourth. Fourth into second.	Second into fourth. Correct.	Correct. Second into fourth.

(b) Full words used in commands.

Second into third. First into third. Second into first.	First into fourth. Third into first. First into third.	Third into first. First into fourth. Fourth into second.
Third into second. First into fourth.	Third into first. Correct.	Third into first. Second into first.
Fourth into third. Second into fourth. Fourth into first. Third into first.	Third into first. Fourth into first. Correct. First into third.	Fourth into first. Fourth into second. Fourth into third. Fourth into third.
First into second. Third into fourth. Fourth into second.	Third into first. Third into first. Fourth into first.	Fourth into first. Fourth into third. Fourth into first.

CONCLUSIONS FROM TEST V.

(a) Part (1). Lip-reading for simple numbers moderate but imperfect.

Part (2). Word-meaning-deafness (for numbers).

Part (3). No absolute alexia (word-meaning-blindness) for numbers ; fairly good interpretation.

Part (4). Reads (aloud) printed numerals in idioglossic language with good interpretation into action.

V.

NUMBERED COINS ARE PLACED IN NUMBERED BOWLS.

(3) Printed command not read aloud.	(4) Printed commands read aloud.	
	Said :	Action :
First into third. Correct. Correct. Second into third. Correct. Fourth into first, then correct. Correct. Correct. Correct. Correct. Correct. Correct.	tu tfree wun tfree ku wun tfree ku wun fuore fuore tu tu fuore fuore wun tfree wun wun tu tfree fuore fuore tu	Correct. Correct. Correct. Third into first ; then corrected. Correct. Correct. Correct. Correct. First into third. First into third ; then corrected. Correct. Correct.
First into third. Fourth into first. Second into fourth. First into second. Fourth into first. First into second. First into second. First into second. First into second. First into second. First into second. First into second.	Haish tufee wuku tharf jun Faish aush muku tharf tu —— (The difficulty of transcrib- ing long sentences pre- vented further record of the manner in which the subject read the printed commands). —— —— ——	First into second. Third into first. Fourth into first ; then into second. Third into first. Second into third ; then into fourth. Third into first. Correct. Correct. Fourth into first ; then into second. Second into first. Fourth into second. Touched second ; then third into fourth.

(b) Part (1). Lip-reading for words very imperfect.

Part (2). Word-meaning-deafness.

Part (3). Partial alexia (word-meaning-blindness) for conventional words.

Part (4). Attempts to read (aloud) words in idioglossic language, but is very imperfect.

TABLE
TEST VI: THE HAND,

Movement.	(1) Imitation of movement made by the observer.	(2) Imitation of movements of observer seen in the glass.	(3) Carrying out pictorial commands.	(4) Pictorial commands seen in the glass.
L. hand to L. eye.	R. hand to R. eye.	Correct.	R. hand to R. eye.	Correct.
R. hand to R. ear.	L. hand to L. ear.	Correct.	L. hand to L. ear.	Correct.
R. hand to L. eye.	L. hand to R. eye.	Correct.	L. hand to R. eye.	Correct.
L. hand to R. eye.	R. hand to L. eye.	Correct.	R. hand to L. eye.	Correct.
L. hand to L. ear.	R. hand to R. ear.	Correct.	R. hand to R. ear.	Correct.
R. hand to R. eye.	L. hand to L. eye.	Correct.	L. hand to L. eye.	Correct.
L. hand to R. ear.	R. hand to L. ear.	R. hand to R. ear; changed; correct.	R. hand to L. ear.	Correct.
R. hand to L. ear.	L. hand to R. ear.	Correct.	L. hand to R. ear.	Correct.
L. hand to L. eye.	R. hand to R. eye.	Correct.	R. hand to R. eye.	Correct.
R. hand to R. ear.	L. hand to L. ear.	Correct.	L. hand to L. ear.	Correct.
R. hand to L. eye.	L. hand to R. eye.	Correct.	L. hand to R. eye.	Correct.
L. hand to R. eye.	R. hand to L. eye.	Correct.	R. hand to L. eye.	Correct.
L. hand to L. ear.	R. hand to R. ear.	Correct.	R. hand to R. ear.	Correct.
R. hand to R. eye.	L. hand to L. eye.	Correct.	L. hand to L. eye.	Correct.
L. hand to R. ear.	R. hand to L. ear.	R. hand to R. ear; changed; correct.	R. hand to L. ear.	Correct.
R. hand to L. ear.	L. hand to R. ear.	Correct.	L. hand to R. ear.	Correct.

OBSERVATIONS ON TEST VI: THE HAND, EYE AND EAR TEST (TABLE VI).

(1) Imitation of movements made by the observer resulted in the choice of the opposite hand, eye and ear in every case. In no case, however, was there failure to recognise that in such a movement as touching the right ear with the left hand the hand crossed the face to do so,

VI.

EYE AND EAR TEST.

(5) Oral commands where he can see.	(6) Oral commands where he cannot see.	(7) Printed commands not read aloud.	(8) Reading aloud and executing commands.	(9) Writing down movements made by the observer.
R. hand to R. eye.	R. hand to R. eye.	R. hand to R. eye.	R. hand to R. eye.	EDE HTND
Correct.	L. hand to L. eye.	L. hand to L. eye.	L. hand to L. eye.	DLLTD ETD.
R. hand to R. eye.	R. hand to R. ear.	R. hand to R. ear.	R. hand to R. ear ; changed ; correct	PigTHE HTND.
R. hand to L. eye.	L. hand to L. ear.	R. hand to L. eye.	L. hand to L. ear.	LFEH EAD.
R. hand to L. ear.	R. hand to L. eye.	L. hand to R. eye.	R. hand to L. eye.	PigIFT HTND
L. hand to R. ear.	L. hand to R. eye.	R. hand to L. ear.	L. hand to R. eye.	DILLH EAD
L. hand to R. eye.	R. hand to L. ear.	Correct.	Correct.	PigIED HLMD
R. hand to L. eye.	L. hand to R. ear.	R. hand to R. eye.	L. hand to R. ear.	PigLH EYD.
L. hand to L. ear.	R. hand to R. eye.	Correct.	R. hand to R. eye.	LEFT HTNLD
Correct.	L. hand to L. eye.	Correct.	L. hand to L. eye.	HTFED ETD.
R. hand to R. eye.	R. hand to R. ear.	L. hand to L. ear.	R. hand to R. ear.	EAD HTND
L. hand to L. eye.	L. hand to L. ear.	R. hand to L. eye.	L. hand to L. ear.	PigLD EYD.
R. hand to L. ear.	R. hand to L. eye.	L. hand to R. eye.	R. hand to L. eye.	PigTH HLED
L. hand to R. ear.	L. hand to R. eye.	R. hand to L. ear.	L. hand to R. eye.	PigLD EAD.
Correct.	L. hand to L. eye.	Correct.	L. hand to L. eye.	EYD HTMD
R. hand to R. eye.	R. hand to R. ear.	L. hand to L. ear.	R. hand to R. ear.	PigTH EYD.
L. hand to L. eye.	L. hand to L. ear.	R. hand to L. eye.	L. hand to L. ear.	ETD HTND
R. hand to L. ear.	R. hand to L. eye.	L. hand to R. eye.	R. hand to L. eye.	IgITH EYD.
L. hand to R. ear.	L. hand to R. eye.	R. hand to L. ear.	L. hand to R. eye.	HSNLD
R. hand to R. eye.	R. hand to R. ear.	L. hand to L. ear.	R. hand to R. ear.	DLLNH
L. hand to L. eye.	L. hand to L. ear.	R. hand to L. eye.	L. hand to L. ear.	IgISD EYD.
R. hand to L. ear.	R. hand to L. eye.	L. hand to R. eye.	R. hand to L. eye.	EYD HTND
L. hand to R. ear.	L. hand to R. eye.	R. hand to L. ear.	L. hand to R. eye.	IgITH ETD.
R. hand to R. eye.	R. hand to L. ear.	Correct.	R. hand to L. ear	HgILD ETD
(started c L. hand).	L. hand to R. ear.	R. hand to R. eye.	(started c L. hand)	HSTMD EYD.
L. hand to L. eye.	L. hand to R. ear.	R. hand to R. eye.	L. hand to R. eye.	HSND IgISD
				DLLND ETD.
				EYD HTND
				IgISH ETD.
				IgISD HSLD
				HTND ETD.
				EYD HTND
				IgISH ETD.

(2) Imitation of the movements of the observer seen in the mirror was correct in every case. On the two occasions when the observer placed the left hand on the right ear, the subject quickly placed his right hand on the right ear, at once removed it and then imitated the movement correctly.

B

(3) Carrying out movements to pictorial commands again resulted in the substitution of the opposite hand, eye and ear in every case, but again there was no failure to recognise that certain movements involved crossing the face.

(4) Carrying out movements to pictorial commands seen in the mirror was correct in every case.

(5) Carrying out movements to oral commands when the speaker could be seen was correct in two cases; in three cases the opposite hand, eye and ear were substituted; in five cases in addition to the above the hand was chosen correctly but the movement carried out incorrectly.

(6) In no cases were movements carried out correctly to oral command when the speaker was out of sight. The opposite hand, eye and ear were substituted in five cases; the opposite hand alone in twelve cases; the hand alone was chosen correctly in four cases; and in eight cases the eye was substituted for the ear or vice versa.

(7) Carrying out movements to printed commands not read aloud was correct in only three cases; in three the opposite hand, eye and ear were substituted; in seven the hand was chosen correctly but the rest of the movement was wrong; in some cases the crossing of the face was not performed and in others it was done when it was not ordered.

(8) Reading printed commands aloud and performing the movements was correct in only one case; and in five the movements were reversed.

(9) Writing down the movements performed by the observer in no case produced a description of the movements. As far as could be judged, "HTDN" and its variations represented "hand"; "PigTH" and its variations "right"; "LFEH" and similar symbols "left"; "EYD" "eye"; and "EAD" "ear." In some cases the phrasing was more or less correct, though the description of the movements was incorrect; in others, the groups of symbols were arranged indiscriminately, as in "EYD HTMD PigTH EYD".

CONCLUSIONS FROM TEST VI.

Part (1). Imitation of actual positions correct, but right is not distinguished from left when the patient faces the observer, i.e., absence of *inner sprach*t necessary to differentiate right from left.

Part (2). Imitation of movements seen in mirror all correct.

Part (3). Imitation of pictorially represented movements correct but transposed, as in (1).

Part (4). Imitation of pictorially represented movements seen in mirror all correctly performed.

Part (5). Lip-reading imperfect.

Part (6). Word-meaning-deafness.

Part (7). Some degree of alexia (word-meaning-blindness) for conventional language.

Part (8). Ditto.

Part (9). Partial agraphia for individual language; attempts to write description of movements in idiosyncratic language (imperfectly).

OBSERVATIONS ON TEST VII: THE ALPHABET (TABLE VII).

(1) An attempt to get the subject to repeat the alphabet spontaneously resulted in the repetition of the individual language equivalent for "A" three times, followed by a number of unrecognisable sounds which are represented more or less phonetically in the Table. The number of letters and the signal to proceed to the next letter were indicated by the observer beating with the hand.

TABLE VII.
TEST VII: THE ALPHABET.

	(1) Repeating letters.	(2) Repeating letters after observer (seen).	(3) Repeating after observer (not seen).	(4) Writing from dictation (seen).	(5) Writing from dictation (not seen).	(6) Reading letters.	(7) Arrang- ing letters in order.
A	aiee	aiee	aiee	A	a	aiee	A
B	aiee	bee	bee	B	B	bee	B
C	aiee	kee	fee	C	(nil)	hos	C
D	oa	kee	au	D	(nil)	aiee	D
E	neea	ee	ee	M	B	bee	F
F	wif	uff	(nil)	F	C	eff	E
G	dublu	gee	ee	E	K	tea	S
H	uu	aich	aich	S	S	gee	O
I	waiee	auu	(nil)	a	a	aiee	V
J	filluu	jace	uu	H	F	fum	J
K	aglewuu	kaee	keea	K	E	to	M
L	goop	hiee	heeu	a	H	orl	Y
M	fin	eeum	uugee	m	D	yem	U
N	nogu	aee	hee	K	Z	ko'	W
O	gergoo	oo	aich	O	O	oo	H
P	umbuu	pee	gee	B	S	pee	G
Q	noee	ku	ku	O	a	ker	P
R	figleeu	au	(nil)	a	A	puf	Q
S	teeku	ess	(nil)	S	S	ess & ets	X
T	feeku	kes	juu	B	H	tum	R
U	dublwaru	thu	uu	o	B	uu	T
V	odubeluu	duuvee	gee	Z	a	vets	K
W	ooamaku	dubeluu	auu	oo	A	wee & weet	Z
X	wuguku	ek	(nil)	Y	(nil)	dumu	N
Y	iu	wee	aiee	M	B	whale	I
Z	votu	dedge	hars	K	(nil)	wez	L

(2) Repeating the letters of the alphabet after the observer (when he could be seen) resulted in an individual equivalent for the letter in twenty cases; but in two cases the sound employed for one letter was carried on to the next, e.g., "kee" for "D" after "kee" for "C", and "kes" for "T" after "ess" for "S". In four cases the sound used bore no resemblance to that used by the observer. There was apparently inability to pronounce "C", "L", "N" and "R". In thirteen cases the sounds employed for the letters resembled closely those employed in reading the same letters.

(3) Repeating the letters of the alphabet after the observer (out of sight) resulted in a number of the letters—"A", "E", "K" and "Q"—being pronounced, but after each of these there was a repetition of the same sound or complete confusion until the next of the above-mentioned letters was encountered.

(4) Writing from dictation when the observer could be seen was done correctly for the first four letters; "E" was written as "M"; "F" was written correctly; thereafter only the more easily recognisable letters—"K", "O" and "S"—were written correctly, while for the others letters were written incorrectly in small or large type at will.

(5) Writing from dictation when the observer was out of sight was correct for only the first four letters and for "O" and "S"; in four cases there was no response, and with the remainder there appeared to be complete confusion. The only other case in which there appeared to be any resemblance between the letter dictated and that written was "A" for "R". In three cases the errors were the same as in the previous test—viz., "S" for "H", "a" for "I", and "a" and "A" for "R".

(6) Reading the letters in order resulted in individual names for them resembling closely those repeated after the observer in thirteen cases.

(7) Arranging the letters of the alphabet in order was successful for the first four letters; after that the arrangement was haphazard though the association of "P" and "Q" was remembered correctly.

CONCLUSIONS FROM TEST VII.

Part (1). Has an idioglossic term for almost every letter of alphabet. Spontaneous repetition of alphabet is in idioglossic language (imperfectly).

Part (2). Word-sound-deafness not absolute but partial; repetition of alphabet after observer results in a mixture of conventional and idioglossic terms for the letters.

Part (3). Word-meaning-deafness.

Part (4). Lip-reading imperfect even for letters.

Part (5). Word-meaning-deafness.

Part (6). No word-sight-blindness (for letters), but applies idioglossic terms imperfectly in reading alphabet aloud.

Part (7). Correct order of letters of alphabet not perfectly known.

TEST VIII: ARITHMETICAL TESTS.

(1) ADDITION.

(a) *No carrying over required.*

235	It is doubtful if the subject thoroughly understood what was
462	required of him in this test. Apparently, believing that he was
—	asked to subtract, he subtracted the smaller unit from the larger in
233 (wrong).	each case, even though in the tens and hundreds columns the smaller

number was in the number placed above.

157	It was obvious in this case that the subject believed that he
632	was to subtract. He did so correctly in the units and tens columns,
—	and in the hundreds column subtracted the "6" from a "1"
525 (wrong).	which he read as "11".

345	At this stage, the subject apparently understood for the first
632	time that he was required to add the two numbers. As he added,
—	he repeated the three numbers—"teven", "teven", "nihn"—
977 (correct).	before he wrote them.

734	In this case, the addition was completed and the figures written
235	in silence.

969 (correct).

(b) *One carrying over required.*

372	The "1" was not carried over from the tens to the hundreds
445	column, or written.

717 (wrong).

769 The "1" was carried over from the units column without
126 writing or saying it aloud.

895 (correct).

457 Addition completed in silence and without writing the "1"
239 to be carried over.

696 (correct).

(c) *Carrying over required twice.*

389 In silence and without writing the figures to be carried.

476

865 (correct).

275 The addition in the units column was wrong; the remaining
348 two columns were added correctly, and the "1" correctly carried
 over.

619 (wrong).

587 In silence and without writing the numbers to be carried.

399

986 (correct).

(In every case, the subject worked correctly from right to left.)

(2) *SUBTRACTION.*

(a) *No borrowing required.*

764	895	754
253	562	223
—	—	—
414 (wrong).	333 (correct).	531 (correct).

(b) *One borrowing required.*

728 In two columns the smaller number was subtracted from the
586 larger, in one the lower from the upper, and in the other the upper
 from the lower.

562 (wrong).

639 The same procedure was followed here as in the previous sub-
175 traction, the smaller number being subtracted from the larger, in
 one case the upper from the lower and in two the lower from the
 upper.

544 (wrong).

518 The same procedure was followed as in the previous two cases.

243

335 (wrong).

(c) *Borrowing required twice.*

621 The same procedure was followed as above. The third "5"
476 can probably be explained as a persistence of the number which had
 already appeared twice, in face of the difficulty of changing the
555 (wrong). direction of the subtraction from above down to below up.

734 The same procedure was followed, though the units column was
295 unaccountably incorrect.

564 (wrong).

CONCLUSIONS FROM TEST VIII.

Part (1). No word-sight-blindness for figures. The patient is able to do simple addition sums, even involving carrying-over.

Part (2). He is unable to do simple subtraction sums.

TEST IX: TESTING THE POWER OF DRAWING.

(a) When asked to draw a glass funnel from the model, the subject produced the figure attached. It is a reasonable reproduction of the model (Fig. 1).

FIG. 1

(b) When asked to draw a glass bottle with a stopper from the model he produced the attached sketch. He succeeded in portraying all the outstanding features of the model including the neck and the details of the top of the stopper (Fig. 2).

FIG. 2

(c) When asked to draw an elephant, he produced the attached sketch which bears a recognisable resemblance to the animal. He completed the sketch, looked it over, found that he had left out the tail and hurriedly put it in (Fig. 3).

CONCLUSIONS FROM TEST IX.

No visual agnosia. Visual memory for images and ability to reproduce them, normal.

FIG. 3

COMMENTARY ON THE RESULTS OF EXAMINATION BY HEAD'S METHOD.

The pathological condition of the patient investigated can be considered under two separate headings: (1) On the *receptive* side, a congenital inability to appreciate the significance of words with consequent disturbance of the power to form images; and (2) on the *executive* side, the disturbance of speech. Although Head concluded from his research upon aphasia that the defects of language could not be explained as due to destruction of images, he added a corollary to the effect that 'word-blindness,' 'mind-blindness' and what Hughling Jackson called 'imperception' were all associated with a disturbance of the power to form images, complicated in some cases by certain affections of language. The separation of the pathological condition in the case investigated is based upon this corollary. A further point to discuss in connection with the case is the desirability of considering the findings from the point of view of what the patient has acquired in the form of language and speech, in spite of his primary disability, rather than from the standpoint of the speech defects revealed in the different tests. Most of the investigations on aphasia, including those of Head, have been carried out on individuals who were in full possession of the faculty of speech before the onset of the lesion which gave rise to the aphasia, one exception being a case studied by him—that of a woman of sixty who had suffered from a primary congenital defect of the nature of word-blindness. Instead of a background of normal speech and language, those cases in which the primary defect is congenital word-deafness or congenital word-blindness have a background which is a complete blank. In adult cases in which the aphasia has resulted from vascular, traumatic or other focal lesions, the clinical picture presented and the results of the various tests employed depend upon the extent to which the

mechanism of speech, both 'external' and 'internal,' has been impaired by the lesion, whereas in congenital cases they depend upon the extent to which the speech mechanism has developed in spite of the congenital defect.

(1) *The receptive side—auditory imperception.* That there is a primary and fundamental defect of the nature of congenital word-deafness in the case studied has been deduced from the results of the examination by routine methods, which were described in a previous communication¹. The main defect in auditory perception is one of 'word-meaning-deafness,' while the patient is 'word-sound-deaf' only to a slight degree. This contention is further supported by a detailed consideration of the result of the examination by Head's method. In order to reveal the defect more clearly, the tests used in the latter investigation have been varied slightly from those employed by Head, in that every test which depends upon oral commands has been divided into two parts, viz: one with the observer placed where the patient could not see him, and the other with the observer so placed that the movements of his lips and the changes in his facial expression could be seen by the patient. It was considered that this variation was necessary if the exact nature of the primary defect was to be revealed in the results of the tests by this method, and if confusion was not to result in the interpretation of the findings.

In Test I—naming and recognition of common objects—pointing to an object named verbally by the observer out of sight produced an incorrect response in every case but one. In ten of the tests out of fourteen, the patient repeated the name imperfectly after the observer and even then failed to point out correctly the object named. When, however, the object was named with the observer in sight the response was correct in twelve cases out of the fourteen, a finding which supports the conclusion based upon the previous examination that there is complete 'word-meaning-deafness,' but only a certain degree of 'word-sound-deafness,' as the patient recognises the sounds of words as speech and repeats, although imperfectly, the name of the object heard. The defect revealed, however, is compensated for to some extent by a new field of perception based upon the patient's knowledge of lip-reading.

In Test II—the naming and recognition of colours—the same contrast was not apparent between the responses when the observer was seen and those when he was out of sight. It must be remembered, however, that the patient had received a very imperfect education in lip-reading and it is doubtful if that education included the names of the colours used. In most of the tests of this series he merely repeated the name of the colour as he heard it and probably not as he saw it, before responding to the oral command.

In Test III—the man, the cat and the dog test—the same contrast between the responses to oral commands out of sight and those when the observer was seen was apparent, although not quite to the same extent as in the naming and recognition of common objects.

In Test IV (clock series) and in Test V (coin and bowl series), the oral commands issued depended for their response much more upon the power of 'propositionizing' than did the previous tests and in consequence did not reveal the same contrast between the responses in the two parts of the tests. In the tests as a whole, however, it was obvious that, in those which depended upon the simplest of 'propositionizing' only, there was a decided contrast between the proportion of correct responses to oral commands in the two parts; and that this contrast diminished and disappeared as the 'propositionizing' required increased in complexity.

(2) *The executive side—speech disturbance.* If the nature of the disturbance of speech and language occurring in the patient studied is to be understood clearly, in the interpretation of the clinical picture and the results of the various tests applied allowance must be made for the primary defect from which he has suffered from birth. If the speaking of 'conventional' language be taken as the standard, his word-formation is performed with the greatest difficulty; on the other hand, if the use of 'individual' language—or in the words of earlier writers, 'idioglossia'—be taken as the standard, the patient is almost eloquent. As we have stated elsewhere¹, this individual language was probably constructed from the constant repetition of words as they were heard, without any appreciation of variations in tone and stress, and partly from the imitation of movements performed by others during speech and expression. Under these circumstances, the individual language or idioglossia could be regarded merely as a means of expression based upon the use of mispronounced conventional words, and the patient described as being extremely defective in word-formation. Sometimes he would utter complete sentences, but as a rule his speech was confined to single words. Intonation was imperfect throughout, and enunciation at times slow and halting, though at others several words were spoken fluently in the individual language. He applied correctly an individual word to each object shown (Test I) although, from the conventional standard, the word spoken was so badly pronounced as to be recognisable only by those who had become accustomed to the individual language. The spontaneous use of words was extremely faulty, and in naming letters of the alphabet spontaneously it was apparent that the first sounds that came were seized upon and used as names (Test VII), although in naming objects (Test I) and colours (Test II) the individual names were, as a rule, correctly applied. The patient rarely spoke spontaneously and most of his utterances were in response to questions or to gestures. When attempting to repeat what was said to him, he used many more words than he did spontaneously, but the sounds articulated were imperfect; and as fatigue occurred he either failed to respond or used a strange sound which bore no relation to that spoken by the observer (Test VII). Words were certainly abnormal in structure and, in fact, formed what has been referred to in this communication as an individual language or idioglossia. This individual language was spontaneous enough when occasion demanded, and the idioglossic words were

usually applied correctly. Frequently, however, fatigue or imperfect acquaintance with a word resulted in the production of sounds which could only be termed 'jargon' (Tests II and VII). When the main defect—word-meaning-deafness—was excluded as far as possible by naming an object in his sight or in print, it was chosen with reasonable accuracy, but in both cases some errors were made (Test I). Commands necessitating choice (Tests V and VI) were not carried out correctly.

Writing was possible but exhibited the same errors as articulated speech. Spelling was imperfect, but usually certain combinations of letters or slight variations from such combinations were applied correctly (Tests I, II, and VI). From this it might be concluded that the individual language was applied in writing though somewhat less imperfectly than in speech. Writing from dictation with the speaker seen was better, although even so short a phrase as "the cat and the dog" could not be retained in the memory sufficiently long to be reproduced with success. There was no difficulty in the copying of printed matter; in fact, this was done exactly even to the relative positions of the words to one another.

Reading printed commands aloud before carrying them into execution (Tests V and VI) did not produce better responses than reading the commands silently. The patient exhibited little tendency to read of his own accord either to himself or aloud. He was, however, fond of looking at pictures and apparently enjoyed doing so.

The significance of numerals was apparently appreciated fairly well (Tests IV and V), but the appreciation of their verbal aspect was certainly very deficient (compare (a) and (b), Test V). Simple arithmetical problems were carried out correctly, but when faced with the task of subtracting involving borrowing, the patient had to resort to the device of subtracting the smaller numeral from the larger, irrespective of the numbers of which they formed a part. In one instance an interesting example of 'perseveration' was noted (Test VIII). Drawing, the playing of games and the appreciation of pictures were unimpaired.

It is apparent, therefore, that when considered as far as possible apart from the congenital auditory defect, the patient suffers from a disorder of speech which affects mainly verbal structures and words as part of a phrase, while the appreciation of their nominal value and significance is comparatively good; that is, in Head's nomenclature, he exhibits 'verbal aphasia.' It follows that the 'idioglossia' of Guthrie,³ Hale White,⁴ McCready⁵ and others, the 'individual language' referred to in this communication, and the 'verbal aphasia' of Head are identical as regards the nature of the actual speech defect. As the study of our patient indicates that his idioglossia has developed as a result of congenital auditory imperception or congenital word-deafness, it is probable that cases recorded and described in medical literature as idioglossia have a similar congenital auditory imperception. Guthrie,³ indeed, appears

to have reached the conclusion that his cases of idioglossia depended upon some auditory defect short of actual deafness. This is a subject, however, which we hope to deal with more fully in a further communication.

THE VALUE OF HEAD'S METHOD IN THE INVESTIGATION OF CONGENITAL APHASIA AND THE STANDPOINT FROM WHICH THE RESULTS SHOULD BE INTERPRETED.

Head's method of investigation was applied by him to only one congenital case, that of an individual who by virtue of her age and education had every opportunity of compensating for her defect. Her disabilities in speech and language, therefore, were so much obscured that it required a detailed and careful method of investigation to reveal the essential nature of her disorder. The method has been used comparatively infrequently in adult cases and more rarely, if at all, in congenital cases. On this account, the opportunity has been taken of investigating our patient as far as possible by Head's method, of placing the results on record and of considering the value of the method in such a case. A patient suffering from congenital aphasia is a much more difficult subject to investigate than is the individual who has been afflicted with a speech disorder in adult life. If such congenital cases are to be investigated in childhood—as they must be if the patient's education is to be placed upon a correct foundation and the results used with any prospect of success in the investigation of aphasia—it is possible that it will be found that (1) the means of communication with others is so imperfectly developed that this “searching and subtle” method of examination proves practically useless; (2) that there is a complete blank or at best a very imperfect background of knowledge to draw upon or to serve as a basis for the tests; and (3) that the method of approach, therefore, must be exceedingly simple. In many cases the primary defect is of a gross nature and detailed methods of examination are needed only when investigating the associated speech defects from the scientific point of view. It is true that the individual whose primary and fundamental defect is ‘congenital word-blindness’ often has his auditory impressions to draw upon and can be taught through this channel, and that he whose primary defect is ‘congenital word-deafness’ has his visual impressions to draw upon and can in course of time, though with less success, be educated through that channel; such cases can be, as our patient has been, more or less completely investigated by means of Head's tests. Simplicity, however, is still necessary, at least for clinical purposes, as the interpretation of the results is rendered exceedingly difficult by the need of separating those findings which depend directly upon the primary congenital defect from those which depend upon the affection of speech and language which complicates it. The last named difficulty applies equally to the investigation of such cases from the standpoint of the abnormality itself. There is a further difficulty which has been apparent in the attempt to interpret the results of the investigation in the case reported, viz.: from what standpoint the results should be

considered, whether with the average normal child as the standard—the only standard which can ever be used in a subject which has never been normal—or with a complete absence of both knowledge and speech as the standard ; in other words, whether the abnormality should be judged upon what the subject lacks or upon what he has been able to acquire in spite of his congenital defect. If the former standard be adopted, it is necessary to consider only the patient's errors in the individual tests ; if the latter, it is advisable to attempt to work out the significance of every resemblance and substitution in the patient's responses. In the adult case, it is reasonable enough to accept as the standard either the average normal for the age, mental level and state of education, or the performance of the patient before the onset of the lesion, for he has either been in full possession of his powers of speech before the onset of the aphasia, or had ample opportunities of 'compensating' in at least some measure for his defect. With this standard, the adult case is naturally judged upon his defects in the sphere of language. But the congenital aphasic is in quite a different position ; his background is a complete blank ; his defects are not what he has lost because of a lesion, but what he has started life with ; he has whatever speech he exhibits because he has been able to acquire it in spite of his primary defect, and not as in the adult, because he has something left after part of his speech mechanism has been destroyed ; he has no standard upon which to be judged, and he might more properly be discussed upon the basis of the speech he has been able to acquire than upon the mistakes he makes when compared with a varying normal of the same age.

The application of Head's method to the case of 'congenital auditory imperception' discloses rather more than does the ordinary routine method. Also, it emphasizes the salient features of the disorder on both the receptive and the executive sides. The word-meaning-deafness is apparent and a greater degree of word-sound-deafness is shown to exist than was suspected. The tests demonstrate that the only form of visual agnosia present is some degree of word-meaning-blindness, which is greater for conventional written language than for the individual written language. The complete absence of word-sight-blindness and of tactile agnosia is shown. The method demonstrates an almost total agraphia as regards spontaneous written-speech for conventional language, but only partial agraphia for the individual language. With perfect 'word-sight,' the patient is able to copy correctly written language and symbols. Nevertheless, as regards some of the tests, we must agree with Kinnier Wilson⁶ in his criticism that the ingenious scheme devised by Head for the study of aphasic patients consists of tests for the wider disturbances of 'apraxia' and 'agnosia' which are included as tests for speech defects only by unduly enlarging our conception as to what the term should connote. At the same time it should be pointed out that Head² has stated definitely that the disorders of language resulting from a unilateral cerebral lesion are never exclusively affections of speech, reading or writing, for not only may the power to carry out one of these be partial, but the disturbance may extend beyond their limits and affect other mental activities.

SUMMARY AND CONCLUSIONS.

(1). The investigation of a case of congenital auditory imperception by Head's method is described in detail. In a previous communication describing the case, word-meaning-deafness was shown to be the most important element of the defect, but some degree of word-blindness and agraphia was demonstrated as well as a pronounced speech defect of the nature of so-called idiosglossia.

(2). In order to distinguish between the patient's actual word-hearing and his ability to lip-read, the method has been varied in one particular from that employed by Head for the investigation of cases of aphasia.

(3). Each test of the series is shown in tabular form with comments on the results obtained, and a summary of conclusions added.

(4). As regards the capacity and defects of the patient, both on the 'receptive' and 'executive' sides, the final conclusions from the series of tests may be summarised as follows :

A. RECEPTIVE CAPACITY.

I. Auditory Perception.

- (1) Word-meaning-deafness is absolute (Tests I, 3 ; II, 3 ; III, 5 ; IV, 3 ; VI, 6 ; VII, 3 and 5) but there is some appreciation of spoken numbers (Test V, (a) 2 and (b) 2).
- (2) Word-sound-deafness is only partial. The patient distinguishes word-sounds from other sounds, but repeats only imperfectly the words he hears spoken in conventional language (Tests I, 3 ; III, 6). Even letter-sounds are not repeated perfectly (Test VII, 2).

II. Visual Perception.

- (1) No evidence of visual agnosia, e.g., for common objects (Test I, 1), for colours (Test II, 1) ; he can imitate the positions of the hands of a clock (Test IV, 1) and can draw objects seen (Test IX, a and b).
- (2) Visual-memory for images is normal, e.g., for common objects (Test I, 1), for colours (Test II) ; and he can draw from memory, e.g., animals (Test IX, c).
- (3) Word-meaning-blindness : (a) There is some degree of alexia in the sense of word-meaning-blindness for conventional language, e.g., for printed or written commands (Tests V, (b), 3 and VI, 7 and 8) ; imperfect interpretation of printed names of objects (Test I, 4) and colours (Test II, 4). There is, however, no such alexia for letters (Test VII, 6) and only to a very slight extent for numerals (Tests IV, 4 ; V (a), 4 ; VIII, 1).
- (b) For the idiosglossic symbols written by himself, there is only slight word-meaning-blindness (Test II, 7) but he uses idiosglossic terms in reading them aloud.

- (4) Word-sight-blindness : (a) There is no word-sight-blindness for conventional language ; he copies printed (or written) language perfectly (Test III, 8) ; nor for numbers (Test IV, 5 and 6 ; Test V, (a) 4).
 (b) No word-form-blindness for idioglossic symbols (Test III, 7), which he reads in idioglossic language.
- (5) Lip-reading : Lip-reading is moderately good, but by no means perfect, e.g., he is good at interpreting names of common objects (Test I, 2) ; moderate at simple numerals (Test V (a) 1) and letters (Test VII, 4) ; imperfect at less common names (Tests II, 2 ; III, 4 ; and V (b) 1) and very imperfect at commands (Test IV, 2 ; V, 6).

III. *Tactile Perception.*

There is no tactile agnosia ; stereognostic sense with consequent image formation and correlation with that of visual memory is normal (Test I, 5).

B. EXECUTIVE CAPACITY.

- I. *Speech.* The patient exhibits idioglossia. He has an idioglossic term for almost every letter of the alphabet (Test VIII, 1) and for each number (Test V, (a) 4) ; an idioglossic name for each common object (Test I, 6) and for each colour (Test II, 5) ; he uses an idioglossic term consistently for the same word (Test III, 1 and 2) ; interprets the time from a clock in idioglossic language (Test IV, 5) ; and attempts to read written conventional language by using idioglossic terms (imperfectly) (Test V (b) 4).
- II. *Writing.* (a) For conventional language, expressive agraphia is almost complete. (Tests I, 7 and II, 6). No total agraphia, since he can copy written language perfectly.
 (b) There is slight expressive agraphia for idioglossic language (Tests I, 7 ; II, 6 ; VI, 9).
- III. *Imitation of Actions.*
- (1) Imitation of movements involving positions of the arms—when facing the examiner all movements correctly performed, but transposed, e.g., right for left and vice versa (Test VI, 1), also when represented pictorially (Test VI, 7). Absence of *innerspracht* necessary to translate right into left.
 - (2) Imitation of the movements seen in mirror—all correctly performed (Test VI, 2), also when represented pictorially (Test VI, 4).
- IV. *Arithmetical ability.*
- (1) Addition : The patient is able to do simple addition sums even involving carrying over (Test VIII, 1).
 - (2) Subtraction : He is able to do simple subtraction sums, but not involving borrowing (Test VIII, 2).

(5). The general results of the examination by Head's method are described and the deficient background of congenital aphasia contrasted with that of acquired aphasia.

(6). The findings, therefore, are further considered from the point of view of what the patient has been able to acquire in the form of language, in spite of his primary disability, rather than from the standpoint of what is defective.

(7). The application of Head's method to our case of congenital auditory imperception disclosed rather more than the ordinary routine method and emphasised more definitely the salient features of the disorder, on both the receptive and the executive sides.

(8). It is doubtful if Head's method of investigation will prove of value in congenital aphasia, as in the majority of such cases means of communication with other individuals is so imperfect and the background of knowledge so deficient that any method of approach has of necessity to be very simple.

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