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Part I.—Original Articles.

PSYCHOLOGY OF DEMENTIA.*

By E. D. WIERSMA, M.D.,
Professor of Psychiatry and Director of the University Psychiatric Clinic, Groningen.

Lecture I.

[IT was a great honour for me to receive an invitation from the Senate of the University of London to speak on a psychological subject. I had, however, some diffidence about accepting it, since I have to speak in a foreign language. I feel greatly relieved by the assurance that there is to be no discussion after the lecture. Furthermore, I have brought some lantern-slides with me, to render my lecture more intelligible.]

NATURE OF DEMENTIA.

What is really to be understood by dementia is not an easy question to answer, and yet a decision on this point is often demanded of the medical man. We speak of dementia when anyone, in consequence of intellectual abnormalities, is unable to maintain himself. It is impossible to describe all the forms of dementia.

We distinguish the congenital forms, the oligophrenias, which differ widely from each other, both somatically and psychically, and the acquired dementias, some of which, for instance, are especially characterized by defective memory, while in others all the psychical functions are simultaneously affected. The explanation of this great diversity has been sought in differences of anatomical localization.

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It is true that lately, in some forms of dementia, certain anatomical abnormalities have been found. Yet these cannot give us an insight into the widely divergent psychical abnormalities, so that, at any rate for the moment, anatomy and physiology fail us. It not seldom happens that hardly any psychical defect is found after a great loss of cerebral substance, while in other cases of severe dementia little or no anatomical changes are found.

The question now arises whether psychology can give us a better insight into the nature of dementia. The question is a legitimate one, since there is a physical correlation in the brain, whether normal or morbid, for every psychical phenomenon. This constant concomitance makes it our duty, as scientists, to study the psychology of every psychosis, even when the physical investigation appears to have given us all the information we require. In this way we get a wider view, for what cannot be found in the one way is sometimes shown immediately by the other investigation.

Is there, we ask, in the psychological examination of dementia one symptom which is never absent, which is present from the beginning, and which can always be shown, however the many other phenomena may vary? The answer must be in the affirmative, for in all forms of congenital and acquired dementia, however these may vary in outward form, a lessened degree of consciousness can always be shown. By "lessened degree of consciousness" we understand a state in which external impressions, or even the subject's own thoughts, either cannot cross the threshold of consciousness, or do so only with difficulty, associations being formed, if at all, only imperfectly, so that the formation of syntheses is hampered; in other words, a state in which the accuracy, the distinctness and the rapidity of conception of the contents of consciousness are decreased.

It is evident that this decrease exists in severe forms of dementia; the powers of observation, the taking in and assimilation of impressions are slow, difficult, and frequently inexact. Questions are not answered, or only after several repetitions; defects of memory, disorientation and often confusion exist. In the slighter cases the patients complain of difficulty in understanding and following a conversation, that they forget appointments, and that they are becoming useless. It depends on the form of the dementia whether the patient realizes his abnormalities.

If it is true that this dulling of consciousness underlies the symptoms of dementia, then thinking will be at a lower level; and in low-level mental functions generally, symptoms of dementia, even if only in a rudimentary form, will occur.

As Heymans has said, for the intellectual processes, for productive thinking, for the formation of correct views and opinions, there are required, not only knowledge and level-headedness, but also interest, which makes concentration possible, a normal amount of phantasy, which stimulates divergent data, and lastly psychical after-effect, by means of which all experiences, even the unconscious ones, may cooperate in the formation of a judgment. There is not always a harmonious development of these fundamental qualities which are essential to thought; and on this basis Heymans distinguishes his intelligence-types, which vary with the varied development of the psychical after-effect, the phantasy or the interest. In pathology we do not find these types so distinct, as in most cases of dementia all three functions are deranged, although not always to the same extent. This is not surprising, since the three mental qualities mentioned have a great influence on one another. Considerable derangements in the psychical after-effect, for instance, will modify the nature of the phantasy and the duration of the concentration of interest. A poor imagination and interest will impress themselves on the form of the dementia.

Interest is undoubtedly one of the most important functions for the building-up of the intellect. By its means the attention is concentrated on the environment, and by the impressions from without the intellect must be built up. Without this interest development would be impossible. The child, which at first is only interested in the absorption of food, very soon receives sense-impressions which demand its entire attention. It begins to follow visual impressions, distinguishes sounds, and notices its own movements, which are at first performed involuntarily, but later voluntarily. In this way the intellect is slowly built up.

The rapidity and the degree of general development differ with the individual, so that within the normal latitude considerable differences exists at the same age. When this development remains below the average, we speak of mental defectives. These are the oligophrenes, who show widely differing degrees of deficiency. They are deficient in aptitude, in power of concentration, they have an innate deficiency of interest, in consequence of which the entire psychical level remains on a lower plane. It may also happen that this deficiency of aptitude is acquired during the subject's lifetime. This is the case with the dementing psychoses.

It is of importance here to call attention to states which externally show sometimes great resemblance to acquired dementia. These include the cases in which interest is temporarily inhibited by preoccupation, which is generally of a highly emotional character. There is then, as we saw, side by side with a partially increased

degree of consciousness, a great general decrease. This is normal temporarily in cases of grief and worry, pathologically of longer duration in cases of melancholia, hysteria, etc. It is not always easy to exclude these emotional preoccupations. For this purpose the patients must be examined in a calm, quiet, sober condition, so that the influence of hallucinations, delusions, emotions, etc., is excluded. The only results of any value in such cases are those of an examination "*à froid.*"

Still other states can be confounded with dementia, *viz.*, the dulling of consciousness of long duration, such as occurs in cases of mental exhaustion, acute confusion, poisoning, etc. These closely resemble the lower degrees of consciousness of normal life—drowsiness, fatigue, dullness, sleep, certain kinds of intoxication, etc. In both cases, but in the pathological condition to a much greater extent, the process of thought is disturbed, there is a loss of ordered psychical after-effect, activity is lessened, and there is, above all, a great lack of interest. The hallucinations and confusion in dreams point to a similarity with the morbid states of confusion. There is, however, a resemblance not only to the normal reduction, but also to some forms of dementia, which is sometimes so great that it is impossible to point to any essential difference other than that the former are transitory, the latter permanent, generally progressive, sometimes stationary.

It is, however, not unimportant to point out that in paralytic, in senile and in arterio-sclerotic dementias remissions are met with which sometimes border on a *restitutio ad integrum*. It is obvious that here, too, as everywhere in pathology, gradual transitions are found between disease and health, and that the psychical phenomena of normal individuals differ only quantitatively from the mental abnormalities of psychotics, and in this case of the dements.

And now the second question must be answered, *viz.*, whether, in the case of other forms of mental reduction, symptoms are to be found such as occur in cases of dementia. It has already been shown that states of mental exhaustion, acute mental disorder, etc., may show such a great resemblance to chronic dementia that they can hardly be distinguished from it. Some of these cases have been called acute dementia. But apart from these pathological reductions there are also in normal life, besides fatigue, somnolence, periodical fluctuations of sleep, etc., lasting differences of mental level. Some persons observe everything accurately, nothing escapes them, they display great interest, while others allow a great many impressions to pass by them unobserved and show much less interest in their environment. The former live in a higher degree of consciousness, and a great many of the latter in a lower. If now we

were able to determine accurately the psychological characteristics of these two groups separately, the latter group should show symptoms which are also found, although to a much greater extent, in demented patients.

A division between these two groups can easily be made by means of the data of an inquiry which was instituted by my colleague Heymans and myself in 1905, with the purpose of studying psychical heredity. Questionnaires were sent to every doctor in the Netherlands, with the request that they would answer the questions contained therein with respect to a father, a mother, and one or more children. The 90 questions were with regard to the temperament, the intellect and the character. This inquiry put us in possession of about 2,600 psychograms.

In 1908 a second inquiry was made, as it appeared to us desirable to become better acquainted with the mental development of the children, in addition to the hereditary factors. The information was obtained through the voluntary assistance of a number of teachers of high schools and grammar schools. Lists were sent round, which, like those of the first inquiry, contained questions about qualities of temperament, intellect and character. The first inquiry we call the heredity inquiry, the second the school inquiry.

In Question 40 of the heredity inquiry and in Question 44 of the school inquiry we asked whether the subject was a good observer, whether he observed all kinds of trifles in the environment which were overlooked by others, or whether he was a poor observer, so that many things right before his nose escaped his notice. By means of these questions, therefore, two groups were selected from the material of the inquiry, *viz.*, good observers, with whom the external impressions had a higher degree of consciousness, and poor observers, with whom these impressions have a low degree of consciousness. This latter state might arise in the case of adults from two causes—in the first place from preoccupation, during which consciousness is engrossed in some other way, and secondly, in consequence of a lowered level. The inquiry enables us to separate the preoccupied, these being characterized by a stronger psychical after-effect. Further investigations convinced me that this division is neither desirable nor necessary—not desirable, since it splits up the material too much, and not necessary, since poor observers, even when the preoccupied are not separated, possess a much weaker psychical after-effect than the average. The characteristics of the subjects with a lower degree of consciousness are not levelled down, even when a few preoccupied subjects are present among them.

For the school inquiry it is not necessary to ask, in the case of poor observers, about the extent of the secondary function, since children are predominantly primary functioners, so that it is certain that preoccupation can in this case very seldom be the cause of low power of observation.

What are the psychical correlations of the low power of observation according to both inquiries? Let us determine the psychogram of poor observers, first according to the heredity inquiry and then according to the school inquiry. Low power of observation can, as we have seen, be identified with the low level of consciousness, high power with the high level. The psychical phenomena of the two states of consciousness diverge in opposite senses from the average, as is clearly shown by all the tables given below. The qualities of temperament, the intellect, the talents and the tendencies, or the character in the narrower sense of the term, were more particularly inquired into, since thereby the personality is formed. A person's personality finds expression in his actions. He is as he shows himself, as he feels, thinks and acts, as he reacts to the external world. This thinking, feeling and acting varies individually so much by reason of the great diversity of the qualities of temperament, gifts, talents and aptitudes.

The *temperamental qualities* indicate in what way the psychical phenomena react and work. They have relation to the rapidity of the progress, the permanence and the emotional manifestations of the mental processes. These include the activity, the emotionality, and the degree of psychical after-effect.

Activity and emotionality are abstractions which require little explanation. Activity is the greater or lesser impulse and desire for work, emotionality the degree of susceptibility to emotions, the degree to which one is attracted by things. For the psychical after-effect a short explanation is necessary. We distinguish for each content of consciousness a primary and a secondary function. The primary function is the working during the time that it remains in consciousness: the excitation of images, the formation of associations, the supersession of other contents of consciousness, the emotion which arises simultaneously, etc. The secondary function is the after-effect, that is, the effect on the consciousness when it is no longer above the threshold. Without this after-effect it would be impossible to follow a demonstration, to understand the contents of a book, or to solve a problem. For in consequence of the conception of the problem on the background of the consciousness images arise, which may be of service in solving it, even if the conception of the problem is not actually the subject of thought. The phenomena of hypnosis, of hysteria, of

psycho-analysis, etc., point to the existence of psychical contents which are non-conscious, but none the less produce after-effect.

The following tables show the percentages numbers for the poor and for the good observers in comparison with the average persons.

Heredity Inquiry.

The *activity* of poor observers is far below the average; they are active by fits and starts, they take it easy, they are lazy and inclined to delay, neglect obligatory work, are more easily discomfited, are more impulsive and more undecided.

Non-Activity.

	Observers.		
	Poor.	Average.	Good.
By fits and starts	24	16	14
Easy	45	29	23
Lazy	13	5	4
Delay	18	12	12
Neglect work	18	12	12
Easily discomfited	44	25	22
More impulsive	50	38	37
,, undecided	45	28	23
	257	165	147
Average	32	21	18

The *emotionality* is stronger, they are more violent, more irritable, more gloomy and more unstable. They are furthermore more fearful in danger, more afraid in cases of sickness, impatient, and quickly call in medical assistance.

Emotionality.

	Observers.		
	Poor.	Average.	Good.
Emotional	62	53	53
Violent	53	42	44
Irritable	54	43	44
Gloomy	7	6	5
Unstable	43	33	34
Fearful	48	32	29
Afraid in sickness	37	25	24
Impatient	34	21	22
Quickly call in medical assistance	39	32	33
	377	287	288
Average	42	32	32

The *psychical after-effect* is weaker, the primary function stronger. They are sooner consoled after a loss, more quickly reconciled, variable in their sympathies, susceptible to new impressions and new views, easy to talk round, fond of change. They have many

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great plans, which are not realized or not carried out, their activities are directed rather to obtaining immediate results than to the future, and their thinking and acting are contradictory.

Primary Function.

	Observers.		
	Poor.	Average.	Good.
Sooner consoled	50	37	39
Quickly reconciled	45	42	43
Variable in sympathy	27	19	17
Susceptible to new impressions	31	25	28
,, to new views	32	49	60
To be talked round	24	13	10
Fond of change	35	34	38
Great plans	20	13	17
Immediate results	42	29	30
Contradictory	26	13	13
	332	274	295
Average	33	27	30

The *intellect* of poor observers is far below that of good observers and that of the average. They are less teachable and sensible; they lack the aptitude for development in different directions. They have a poor knowledge of human nature, are narrow-minded, unpractical and clumsy. The mathematical, musical and other talents are defective; they are not witty, but prolix, and their memory is bad.

The *intellectual* qualities of the poor observers are diminished.

Intellect.

	Observers.		
	Poor.	Average.	Good.
Less teachable	44	20	12
,, sensible	68	26	16
Small knowledge of human nature	70	26	16
Unpractical	52	16	8
Narrow-minded	50	21	14
Not witty	58	32	25
Prolix	42	19	14
Unhandy	41	15	10
Bad memory	18	7	5
	443	182	120
Average	49	20	13

There are also very distinct differences with regard to the *tendencies*—much more than the vital tendencies, which do not vary to any notable extent from the average; some egotistical ones occur in poor observers in the foreground and some altruistic ones in the background. They are vain, self-satisfied, greedy,

extravagant, domineering, not kind to their subordinates, egotistical, not philanthropic or fond of children or animals. They are also forced and affected in their deportment, uncommunicative, inclined to embellish and exaggerate, and more mendacious.

Tendencies.

	Observers.		
	Poor.	Average.	Good.
Self-satisfied	45	33	34
Vain	20	18	22
Greedy	7	3	3
Extravagant	9	6	6
Domineering	26	22	25
Unkind to subordinates	13	7	6
Egotistical	22	14	15
Little philanthropic	21	12	11
Not fond of children	25	12	11
,, ,, animals	28	22	23
Forced	28	19	17
Affected	12	8	7
Uncommunicative	38	32	35
Embellishing	14	12	13
Exaggerating	27	21	21
Mendacious	6	3	2
	341	244	251
Average	21	15	16

A review of the results of the heredity inquiry shows us that poor observers, with their lower level of consciousness, are far inferior in several respects to good observers in their mental development.

School Inquiry.

Just as shown by the heredity inquiry, the *activity* of poor observers is not up to the mark. They are lazier, more easily distracted, playful, and occupy themselves more with other things. They dawdle away more time before beginning their work, and finish much later.

Non-Activity.

	Observers.		
	Poor.	Average.	Good.
Lazy	29	13	9
Playful	23	16	19
Distracted	34	21	19
Dawdle	35	9	6
Finish later	58	25	19
	179	84	72
Average	36	17	14

The *emotionality* is much greater than the average, and than that of good observers. They are sooner angry, more susceptible

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to a reprimand, more nervous, timid in danger, more depressed and gloomy, and also more changeable, and they are more easily discouraged.

Emotionality.

	Observers.		
	Poor.	Average.	Good.
Sooner angry	23	14	15
Susceptible to reprimand	44	19	17
Nervous	45	25	30
Timid in danger	27	7	3
More depressed	17	7	3
Gloomy	36	15	19
Changeable	26	16	26
Easily discouraged	31	13	11
	249	116	124
Average	31	15	16

The *psychical after-effect* is below the average. They are less persevering and more impulsive.

Primary Function.

	Observers.		
	Poor.	Average.	Good.
Non-persevering	74	23	6
Impulsive	21	15	30
	95	38	36
Average	48	19	18

As is the case with the heredity inquiry, all questions about the *intellect* show the poor observers to be deficient. In intelligence and accuracy, aptitude for mathematics, natural history, language and drawing, they are inferior to good observers and to the average. They are much poorer and slower judges of their work, and are therefore not so clever at solving problems and doing exercises.

Intellect.

	Observers.		
	Poor.	Average.	Good.
Intellectual	13	35	82
Accurate	10	30	68
Apt in mathematics	6	8	11
,, natural history	3	5	13
,, language	2	10	17
,, drawing	2	3	4
Clever at solving problems	1	8	19
,, at doing exercises	5	10	20
	42	109	234
Average	5	14	29

The inquiry by means of questionnaires showed that a poor observer, in consequence of a generally low level of consciousness,

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is inferior in mental development to the good observer and the average person. More especially in respect of intellect, but also in respect of morality, they have remained on a lower level for the intensive voluntary concentration of the attention and the wide interest in the outside world are present to a smaller degree. This difference in the level of consciousness of the material of the inquiry is still within the bounds of the normal healthy latitude, but it may assume greater proportions so that the threshold of sanity is crossed, and gradually the slighter and the more severe pathological states arise.

The oligophrenes are individuals with a very low power of concentration of the attention. Interest is in the worst cases so far decreased that we can hardly speak of mental development at all. They are then able to do no more than satisfy their physical needs, such as eating and drinking, or make known a few wishes by means of defective gestures, emotional expressions, or by means of a few sounds or hardly intelligible words. At a higher level they are clean, they learn to walk, they speak more distinctly and possess a larger vocabulary. There is thus a very gradual transition to the normal human being. Idiots in the narrower sense of the term have no command of language, or only a very poor one. They remain unclean, and are only to a very small extent capable of development. Imbeciles are a trifle better. They speak, they are clean, and are capable of a certain measure of education, so that the best of them are capable of profiting by schoolwork, and even by technical training, if given by teachers trained in that sort of educational work. The feeble-minded attain a still higher development, and the best of them differ but little from the lowest of the normal class. The personal initiative and the general interest necessary for complete development leave in these cases too much to be desired. So we have here a very gradual transition between pathology and sanity. The greater or lesser capability of development of the sane and the oligophrenes may be determined quantitatively by the Binet-Simon method.

This method, which is employed in the original or in a slightly modified form all over the world for testing the intellect, is, as Binet considered, not only serviceable for normal and feeble-minded children, but can also be used for determining the degree of acquired dementia in adults. Before introducing this method of judging dementia in my clinic, I wished to form an opinion as to its value from my own experience. Immediately on the publication of the Binet-Simon method of 1911, an improvement of that of 1908, I tested by it 141 children from an elementary school in Groningen. I will not say much about the technique and calculation of the

results. Binet and Simon started from the fact that the development of the intellect gradually increases with the age. They thought out a number of tests, the answering of which makes slowly increasing demands from the easiest to the most difficult. This enabled them to divide their tests into groups, the answering of which gradually increased in difficulty. Some questions, for instance, could be answered at the age of 7 years and over, but not at the age of 6. This investigation enabled them to find out whether a child of 5, 6, etc., up to 12 years of age is intellectually at the level of his age, above it, or below it.

The great practical value of this method for school and clinic is obvious. The questions were chosen so that the answering of them depended as little as possible on instruction and education. So the tests could be made without laboratories or instruments. It did not take long to eliminate the influence of fatigue and boredom. In this way a standard could be found for the intellectual development. The modifications introduced in 1911 proved to be of great advantage. The questions relate to the memory—impression and retention, to the psychical after-affect, to judgment, phantasy and adroitness.

By means of these intelligence tests, as I have said, 141 children were tested. Of these children 53·9% answered the questions for their age well; about half are therefore normal children, about a quarter are intellectually inferior, and the remaining quarter intellectually superior. There are therefore about 75% of the children who answer the tests for their age correctly. It is worthy of note that nearly all investigators in all countries came to about the same results under very different circumstances.

Investigation of 141 *Children.*

Age.	Number.	Percentage. −	=	+
6	25	4	76	20
7	21	14	52	33
8	26	12	54	35
9	17	35	47	18
10	30	37	47	17
11, 12	22	45	45	9
		147	321	132
Average		25	54	22

Are the results of this intelligence inquiry in agreement with other performances—for instance, with the school work—of which we know for certain that they are connected with the intellect? This investigation may be tested by means of the school work in two

ways. In the first place a certain number of children were not regularly promoted to a higher class. They were in a class which was too low for their age. In the second place I had at my disposal the report marks of part of the pupils.

Of the 141 children, 21 were not promoted, and of these, 15, or 71·4%, were intellectually inferior. Only 3, or 14·3%, were intellectually superior, but among these were two bargee's children who had not often attended school, and one with a serious impediment in his speech.

Children not Promoted.

	−	=	+
Absolute	15	3	3
Percentage	72	14	14

I have the report marks of 49 children with reference to their promotion. The marks run from 1 to 5; 3 is on the borderline, higher marks are amply satisfactory, lower decidedly unsatisfactory. Of the 49 children 32 were amply satisfactory, 16 unsatisfactory. Of the satisfactory pupils 18·7%, of the unsatisfactory 31·2%, were intellectually inferior, whilst of the satisfactory ones 55·1% and of the unsatisfactory only 43·7% were at the level of their age.

Satisfactory and Unsatisfactory Children.

	Percentage.		
	-	=	+
Satisfactory	19	58	28
Unsatisfactory	31	44	25

With regard to the difference in sex the following can be stated: There were 68 boys and 73 girls. Of the girls 58·9% and of the boys 48·5% were normal children. From this we see that the girls showed better results than the boys. It should be added that the greatest intellectual superiority and also the greatest intellectual inferiority were found among the boys. This would agree with the opinion already expressed, that the highest and lowest intellectual performances are more often found in men than in women.

Difference in Sex.

	Boys.			Girls.		
	-	=	+	-	=	+
Percentage	27	49	25	22	59	19

The results above obtained prove that we must attach great value to the method of Binet-Simon. Every one who has worked with it is convinced of its utility, but no one will deny that a great deal of improvement is still required. Many have pointed out in

detail that many other tests are required, which will serve as parallel tests. This demand has been met in the last few years by many investigators. In the domain of attention and phantasy which are of such great importance for intellectual work, I have tried to find a few parallel tests.

The concentration of attention was determined by means of the dotting apparatus. The person to be tested has the task of pricking with the point of a needle in small circles, drawn irregularly on a strip of paper, which passes across the field of vision at a speed which can be varied at will and can be accurately measured for a period of 10 seconds. When the speed with which the circles pass has become so great that three of them are not properly hit, the boundary line of concentration of attention has been crossed. The speed is measured by the number of circles passing the eye in one minute. It was found that the concentration of attention increases each year between the ages of 6 and 12. The intelligence scale of the 59 children, tested in this way, was also determined by the Binet-Simon method. It was found that the normal children always possess a greater power of concentration of the attention than the children of inferior intelligence, and a smaller one than the children of superior intelligence.

Dotting Apparatus.

Age.	Number.	Average of concentration.
6	10	69
7	3	83
8	20	88
9	12	93
10	5	99
11, 12	9	110

The phantasy investigation is also suitable, on account of its simplicity, to the determination of the intellect. The subjects were required to make as many words as possible, within two minutes, from the Dutch word "droom." This test, which was carried out on 157 children, approximately equally divided over the years between 6 and 12, showed clearly that the increase in the number of words, which showed the power of the phantasy, is connected with the age. It was found that making three words is a good test for children of 10, and four words for children of 11. Of these children 62 were at the same time tested by the Binet-Simon method. A comparison shows that the number of words made increases with the increase of intelligence. Children of inferior intelligence make fewer, those of superior intelligence more words than the normal children.

Words from "Droom."

Age.	Number.	Average number of words.
6	15	0
7	20	1
8	25	1·8
9	20	1·8
10	24	3·8
11	29	4·4
12	24	4·41

The very simple test with picture puzzles also gives good results. The parts of a horse or of a dog have to be joined together within a fixed time. This power also increases with the age. Furthermore, there is also in this case a close agreement with the results obtained by the Binet-Simon method. Normal children can put these cards together better than the children of inferior intelligence, but not so well as those of superior intelligence.

There is still another method which is of great value in determining the intelligence of normal persons and patients. This is the test with the so-called hazy photographs. Photographs of a number of objects are taken; these are of gradually increasing distinctness, the objects having been focused with varying sharpness. The most indistinct ones cannot be recognized, but gradually they get plainer. It is not only of importance to determine at what point the object is recognized, but also to find out what object is named from the unrecognizable photographs. We have thus a means at our disposal of determining both the active and the passive imagination. This method is regularly employed in our clinic.

It is necessary to say a word about the technique of the Binet-Simon method. I will not go into the subject of the manner in which each individual question is put. Information on this point is given by Binet and Simon and many others. I will only point out that the test must take place in a quiet room, where the subject's attention will not be distracted. The person carrying out the test must be alone with the child or the patient, or with at the most a third person, who notes down accurately all that is said. No influence should be exerted on the answers. It is not enough to put down a plus or minus sign after the answer given. Everything, including the behaviour of the child or patient, should be accurately noted. All these notes are of importance for the final conclusion.

This test is very suitable for determining the degree of intelligence of normal persons and patients. In the case of normal children it is of importance to determine whether their level of intelligence corresponds to their age. By this means they can be placed in the proper class at school. The possibility of development can be determined for imbeciles and the feeble-minded. The

deficiency in intelligence can be expressed in terms of the age. This test is of importance in determining in which class and at what kind of school the children should be placed. This method is also of service in the determination of acquired dementia in the clinic, as it gives us a clear measure of the mental decay.

The above shows clearly that all the phenomena of dementia are dependent on lowering of consciousness. There is slight interest, lack of imagination, and decreased psychical after-effect. The stock of knowledge is also small, and the power of judgment is limited, because voluntary concentration and voluntary transference of the attention are reduced. These effects are connected with aptitude and interest, which must be regarded as innate functions, by means of which the development may take place in particular directions, and by means of which, therefore, intellectual possession may also be acquired. The quantity of knowledge acquired in a particular field may, therefore, be regarded as a measure of the aptitude for development in that direction.

In judging as to dementia it is therefore of importance to investigate the knowledge and, at the same time, the judgment of the patient. The school knowledge of normal persons varies so widely that it can scarcely be taken to be a measure of the intellect. The circumstances under which different people receive their schooling and the use they make of it after their school-days in social intercourse varies so widely, that a deficient school knowledge cannot be considered a proof of a poor intellect. Only when a recent rapid loss of school knowledge can be noted, as is frequently the case with acquired dementias, or when the result of the teaching is far from corresponding to the effort made, as with oligophrenes, can one postulate in the first case mental decay, in the second inferior aptitude. A better estimate of the intellect may be formed by means of an inquiry into the knowledge of experiences in everyday life. In very serious cases the names of the months, the length of the year and of a leap year, the points of the compass, the place where the sun rises and sets, the times for sowing and reaping, etc., have been forgotten. It is easy to modify these questions at will, according to their difficulty, and to adapt them to the social circumstances of the person to be examined.

When, however, this examination shows that the stock is still sufficient for social intercourse, this is not a proof of the integrity of the intellect of the person in question. For with great intellectual development the remaining reserves may be quite sufficient for social needs, although, in comparison with formerly, a distinct deterioration must be assumed. And, conversely, a number of investigations, for instance the intellect investigation of recruits

by Roderwaldt, show that a normal person requires extraordinarily little knowledge to maintain himself in simple conditions of life.

This shows that whilst the amount of knowledge acquired can give us a good insight into the decreased power of development of oligophrenes and into the mental decay in cases of acquired dementia, we should be cautious in concluding the presence or absence of dementia from the stock of knowledge alone. And this is not surprising, since, as we have seen, the building up of the intellect depends on the aptitude and the concentrated interest. Through these not only the stock of knowledge, but also the rapidity and the completeness of development are determined. I shall shortly have to revert to this development in connection with a few experiments.

In addition to the importance of the investigation of the knowledge possessed and the capacity for development, in which the memory and the judgment play an important part, it is also of importance to test the judgment by special experiments. I will mention a few of these in passing, without going into detail about the results thereby obtained. The method of giving definitions, the explanation of proverbs, the comprehension of witticisms, the explanation of the connection between pictures in a series, the comprehension of absurd drawings, and especially the combination method of Ebbinghaus, etc., are very suitable for this purpose.

Besides the fact that the symptoms of dementia are dependent on the sinking-in of consciousness, the above shows clearly that there is a very gradual transition between the various degrees of this condition. This is proved by the differences which can be found between normal children. The children found normal on the Binet-Simon scale occupy not only intellectually, but also with respect to their concentration of attention and imagination, a place between the children of superior intelligence and those of inferior intelligence. It is further found that the pathological acute lowering of consciousness after exhaustion or sickness or after poisoning forms the link which connects the normal lowerings and the dementias. They are often so difficult to distinguish from dements that acute dementia has in some cases been spoken of. Moreover the examination of the poor observers has shown that these deviate in the same sense from the normal individual as the dementias, so that we must assume that within the limits of sanity human types occur which display in rudimentary form the symptoms of dementia.

And now something about experimental investigation. By means of this the slow transition between the lower and the higher degrees of consciousness can be demonstrated. The former are characterized by a diminished voluntary attention, the latter by a heightened one. There are very many good methods of measuring

voluntary attention. I have made use of two of these, namely, æsthesiometry, which was first used by Griesbach for the determination of exhaustion, and Bourdon's method.

For æsthesiometry the method employed was that indicated by Binet. The subjects of the experiment are touched on the back of the hand with the blunt ends of two needles of a certain thickness. The needles are affixed to pieces of cardboard at various distances from each other. The distance between the needles is 0 (only one needle), 1·5, 2, 2·5 and 3 cm. The needles must be placed on the skin simultaneously and always with the same pressure. The hand rests quietly on a table, a screen hiding it from the subject's sight.

The test is carried out by placing the needles in irregular sequence of distances, but at regular intervals and each distance the same number of times, namely five, on a given part of the skin. The subject has then to state whether he has felt one or two points. These investigations were repeated on five successive days at the same time of the day. To judge the attention I made use of the criterion that contact with one needle should always be felt as one point, contact with two needles at distances of 2·5 and 3 cm. should always be felt as two points. In a long-continued experiment with a great number of normal persons this invariably proved to be the case. When mistakes are made they are, as a general rule, to be regarded as evidence of a disturbance in the power of attention. When the patients are so demented that they do not understand the question, this method is, of course, useless. The investigation very quickly shows whether this is so. The concentration of attention is seen by this method to be much worse in the case of the dements than with normal persons. Normal persons give 96·9% correct replies, the dements only 76·9%. Among normal persons there is also a great difference in the concentration of attention, but never as great as between the normal and the dements.

The second test is made by the Bourdon method. By means of this the rapidity and accuracy are measured with which the subject can mark certain figures in a test. The normal ones mark on the average 86 figures a minute, the dements only 54·8. The normal persons make practically no mistakes, whereas the dements mark very inaccurately.

These two methods give us an impression of the degree of consciousness. The lower level determined in this way in the case of school-children is accompanied by slower progress.

The amount of knowledge may, as we have seen, be a measure of the capacity for development. For this reason an investigation must be carried out for the purpose of judging the degree of dementia.

But the interest and the disposition have still another function. They also fix the rapidity and the completeness of the development. An increased interest will thus be accompanied by a deficient capacity for training. We may therefore expect that this capacity will be much weaker with a low degree of consciousness than with a higher one. This is clearly shown in the tests on the Bourdon method. Children at a lower level are much less easily trained in marking the figures than average children.

Great differences in training capacity are also evident in the psychological investigations among students. Efficiency tests were carried out with students in many ways. I will only mention one

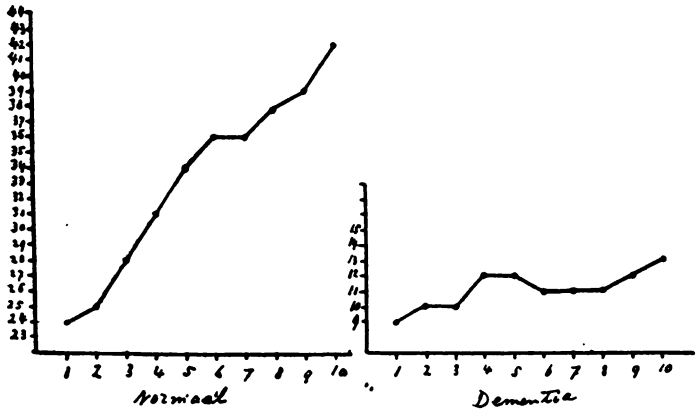

FIG. 1.—Abscissæ = days; ordinates = number of objects seen.

of them, the so-called light-box test. This apparatus consists of a small box in which a light can burn. There is an opening in one side, in front of which a plate with figures can be placed. The subject sits before the box in a dark room. If the light in the box is lit, the figures on the plate become clearly visible. Each plate contains ten figures, and ten plates are shown to each subject. These experiments are repeated on five successive days. After each experiment the subject has to state what figures he has seen. The "training capacity" is expressed in the appended table in terms of the difference in the number of objects seen on the first and last days.

A . . 12	D . . 15	G . . 14
B . . 8	E . . 7	H . . 7
C . . 5	F . . 2	I . . 13

This small number shows sufficiently well that there are great differences in training capacity amongst normal persons. An

arbitrary number were taken from a large stock of experiments. The correlation with the degree of consciousness was not determined in these cases.

Much greater still than the difference between normal persons is that between normal and demented persons. Tests with the light-box described above were made for ten days with six normal and eight demented persons (paralytics, senile dements and arterio-sclerotics). The difference in training capacity is shown by the following curves, in which the average results of each day are expressed.

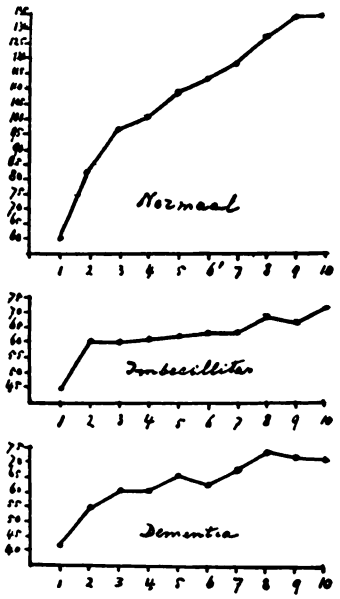

FIG. 2.

The following test was made with ten normal persons, ten imbeciles and ten dements. Their instructions were to seek and mark as quickly as possible particular figures in a list. The curve shows that the normal persons do much more and that they improve regularly with training. The dements and the feeble-minded improve much less.

The improvement in the power of memorizing was determined in the following manner: Three rows of five numbers of two digits were dictated successively to the subject. He had, after each experiment, to reproduce as many numbers as possible. Those numbers were counted as correct which in the reproduction were given in the right order. The experiments, which lasted for four

days, were made with ten normal persons, ten imbeciles and ten dements. The number of correct reproductions is expressed in the following curve:

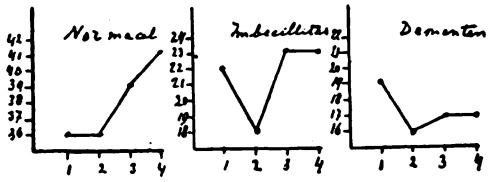

FIG. 3.

Normal persons are seen to improve distinctly with training, whereas with imbeciles and dements this is not the case.

An improvement also takes place in simple movements. This is shown by the following curve. The instructions were to write

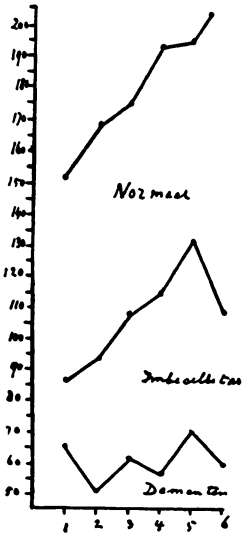

FIG. 4.

down as quickly as possible two vertical and one horizontal line (| | —). The experiments were repeated on six successive days.

This curve points to a great improvement with training on the part of the normal persons and an absence of improvement on the part of the dements. The imbeciles carry out the movements less rapidly, but, if we disregard the last day, they, too, show a considerable improvement.

This test shows that a decrease in training capacity goes with a low degree of consciousness. In the case of imbeciles the remarkable phenomenon is seen that there is no improvement with training when demands are made on the intellect, but if no more than a mechanical writing down of marks is required there is an improvement. This would appear to agree with the view that in the case of imbeciles the intellectual training capacity is diminished, but that automatic training capacity remains.

I hope I have made clear that dementia can also be considered from the psychological point of view, and that there is not an essential, but only a gradual difference between the normal and the pathological lowerings of consciousness.

I believe that these results are in agreement with those obtained by Prof. Spearman and Dr. Hart in their very important investigations on "The Mental Tests of Dementia." For the "diminution of the cortex functions," to which they refer in their conclusions, is the same as the "lowering" of consciousness which I have found.

Lecture II.

FORMS OF DEMENTIA.

In order to determine whether there is a general lowering of consciousness, the patient, as I have already stated, must be judged *à froid*. The reduced mental performance in consequence of emotions, hallucinations, delusions, etc., is secondary, and not dementia. Nor can the transitory lowering of consciousness in consequence of poisoning be counted as such. The permanent lowering of consciousness which remains after the departure of these disturbances, and in which a decrease of aptitude in various directions exists, may be counted as dementia. Amongst such cases we have in the first place the oligophrenes, who only differ in degree from the normal persons, the dull, the half-witted, and the "*bornés*." In the second place there are the acquired dementias, which may show themselves in widely varying forms. The nature of the dementia is at first determined by the disease process. Later there is such a mental decay that the forms can hardly be distinguished from one another. The difference in the forms of the dementia is easy to understand, when we consider that the mental make-up varies very greatly in different individuals. Some, for instance, have an aptitude for scientific work, others for art. This innate difference in disposition of the psychical functions is accompanied

by a difference in resistance. A stronger disposition will offer a longer resistance to the destructive effect of pathological processes than a weaker one, and so it is easy to understand that not all the psychical functions disappear at the same rate. The same social influences or influences of age or disease will be easily tolerated where there is a greater power of resistance, and will give rise to disease where the disposition is weaker. Living in an intellectually inferior *milieu* may have a degenerating effect; old age and lues may be accompanied by dementia if the resistance is weak. With a sufficient power of resistance these detrimental influences are of no effect. This difference in resistance also explains the fact that the same pathological process does not run exactly the same course in different cases, so that both senile dementia and paralysis may occur in different forms. But in spite of this we can always see a greater agreement among the senile as a class and the paralytic as a class than between the senile and the paralytic.

The explanation must be sought in the fact that the resistance of the psychical qualities to particular harmful influences is not the same in all people. Some, for instance, show a weaker resistance to luetic infection, so that it is easy to understand that various forms of dementia occur. I would call attention to a few of these forms here.

Senile Dementia.

Senile dementia has from time immemorial been counted amongst the organic psychoses. A number of anatomical changes are found, which under the microscope are at once seen to be atrophy of the gyri, which are narrow, whilst the sulci are deep. The cortex is narrow and atrophied. To this correspond microscopic changes, which also point to destruction of the ganglion cells. But the clinical phenomena cannot be entirely explained in this way, so that it is desirable to examine the dementia from a psychological point of view also.

The mental aberrations of the senile dements are closely connected with normal old age. We see the pathological conditions slowly developing from the symptoms of the still healthy aged person. This transition is here easier to determine than in any other disease, since the process goes on so extremely slowly. To a very old age the intellect may be unimpaired. Apparently nothing has been lost. The memory is excellent and accurate, everything is thought of; the judgment of everyday affairs, difficult scientific, political and religious questions is as good as ever. Especially in the case of people who in earlier life were gifted with a lively and many-sided interest in things do the mental functions

remain unimpaired to a very old age. It is difficult, however, especially with persons of all-round education, to show the beginning of mental debilitation. They have collected in the course of their life such great reserves, with which they can maintain themselves in social life for a long time, even with a slight degree of insufficiency, that no one notices anything abnormal. And yet there is often a subjective feeling of deterioration, and comparison with former conditions also points to a slight deterioration. This is often most evident when one compares the time and effort now required for their work with that of a former period of their life. The activity is reduced. They have a feeling of physical deterioration, of being more quickly tired, and of less strength for severe efforts.

Psychically, too, there is less ambition. They have so often experienced the fact that there are many failures in life, and besides this the charm of novelty has disappeared as a result of many experiences. This latter points to a diminution of emotionality, in consequence of which the great interest of earlier days grows fainter. They have greater difficulty in adapting themselves to circumstances, have less sympathy with new ideas and views, and are bound by old habits of thought. The slighter degree of interest is accompanied by a diminished impressionability, which may be aggravated by a readier mental fatigue. Changes in character also not infrequently occur. The tendency to isolate oneself gains ground, and in consequence of this decrease in altruism the childish egotism grows stronger. These symptoms, which are still within the bounds of health, may become more marked, and then senile dementia begins. Where health ceases and disease begins it is impossible to say, and this point is not on the same psychical level in all cases.

Just as in old age the lowering of consciousness first shows itself in disturbances of memory, so the beginning of dementia is also to be found first in diminished impressionability and retentiveness. The course of these deviations, which follow Ribot's law, has already been dealt with. Childhood memories may still remain unimpaired for a long time, whilst long periods of later life have already completely disappeared. An old woman of 86 with very marked derangement of memory had lost all recollections of the last fifty years, whilst she could accurately relate events of her younger days. She did not recognize her own portrait at various times of her later life, but she at once recognized a portrait taken in her youth (twenty years of age).

This systematic demolition of the mental powers, which shows itself very soon in disturbances of memory, gives a curious

impress to this form of dementia. In the end all the other psychical functions diminish in strength. The judgment deteriorates and finally disappears. The patients then live entirely in the distant past, and are back again in the years of their childhood. They play with dolls, behave like children, fancy themselves with their mother, and so on. The qualities of character also share this retrogression in the same way. The altruistic tendencies, which are formed latest, are the first to weaken; the egotistical ones come into the foreground to a much greater extent than in normal old age. The physical needs are felt very strongly (eating, drinking, etc.). Lack of inhibition is also the explanation of the increased sexual tendencies, which occur especially in the case of senile dementia in men. Interest in the surroundings is diminished and thereby concentrated on the patient himself. There is thus a relapse, both intellectually and affectively, to the age of childhood. With this is also connected great irritability, often impulsive behaviour, obstinacy in some cases, greatly increased suggestibility in others, and not infrequently these qualities are represented in the same person.

The regression of the expressions of will also follows the course above described. The activity decreases more and more. The patients do not translate their thoughts into acts. They are extremely undecided. The tendency to this is already plain in normal old age. But these patients remain correct in their behaviour for a period much longer than other dements. In demeanour and conversation they are irreproachable. At first sight one does not take them for abnormal. The old woman just mentioned, for instance, was very polite to the doctor, and found fault when another patient behaved less respectfully. When asked for an explanation of the reproof, she was unable to give a clear one. Her conduct was obviously determined intuitively.

Derangements of judgment are absent, or present to a small extent only, at the beginning of the disease, and to this must be ascribed the fact that the patients observe their own deterioration. This is also the case in normal old age, but with these patients to a much greater degree. They frequently look forward to the future with great fear and uneasiness. Later on, when the intellect is further broken down, this feeling of insufficiency disappears.

Senile dementia is not always, even at the beginning, so strongly localized in defects of memory. There are other forms which are most probably connected with the character in a state of health. Well known are firstly those patients who, by their bad temper, irritability and distrust, become unsuited for social intercourse; secondly, the patients who come into conflict with the law, in

consequence of serious moral defects such as outrages on children or exhibitionism; and thirdly, those who cannot possibly remain in their home surroundings on account of their nocturnal unrest, which entirely disappears in the daytime.

Besides these we have *senile melancholia*, which is accompanied by severe attacks of fear, which are to be considered as aggravated forms of normal affect-conditions. Here especially the feeling of mental and physical decay comes to the fore. They feel useless, and no longer able to do anything. Delusions of illness, sin and poverty with a strong tendency towards suicide are often the results of these ideas. Derangements of the intellect are often clearly visible.

In the *paranoid states* the mistrust, the jealousy, the suspicion and the irritability give rise to persecutory delusions. These states are distinguished from real paranoia by the small amount of systematization, or by the complete lack of this, as a result of intellectual dementia. These states, too, develop gradually from the normal disposition of the character.

The *presbyophrenia* of Kahlbaum is contrasted with hebephrenia. This disease is characterized by distinctly retrograde amnesia, the derangements of impressionability and retentiveness; further, by the severe disorientation for time and place, the patients being ignorant of the day, hour and month, and unable to find their way about their own house; and finally by confabulation, which often occurs in ordinary conversation, but if not can easily be stimulated by suggestion. These states are also often accompanied by nocturnal confusion and unrest.

Arterio-Sclerotic Dementia.

Closely related to senile dementia is the *arterio-sclerotic* form. Vascular changes are seldom lacking in old age, so that in autopsies of senile dements one generally finds arterio-sclerosis also. The pure forms of arterio-sclerotic dementia differ from the senile. They are above all characterized by neurasthenic symptoms. Complaints of physical and mental fatigue, diminution of working power and need for rest are accompanied by increased irritability, together with insomnia. The weakness of memory, the inability to think of names, the forgetting of appointments, etc., which accompany this neurasthenic picture are keenly felt. The patients get uneasy, and are even more upset over these deficiencies than the senile dements. A very frequent aberration is severe depression, which may continue during the entire course of the disease. They seek medical aid, and frequently allow themselves to be reassured for a time. But the depression and inhibition are frequently so great that this state assumes altogether the

appearance of melancholia and can hardly be distinguished from it. The accompanying disturbances of memory which also exist in less depressive states, may then serve as a guide. Moreover genuine melancholic attacks seldom occur for the first time at such an advanced age. There are also distinct disturbances in the patient's actions. The coordination of finer movements is lessened, and it is to be expected that these disturbances will first occur in the two functions which rest on accurate coordination. These two functions are speaking and writing. Speech becomes slower, more laborious, less articulated, clumsy; the consonants are no longer pronounced distinctly, and very often there are also slight aphasic disturbances. The patients can only with difficulty find the right word. The writing is indistinct, and when the patient writes for a considerable time without interruption, fatigue sets in, the letters become smaller, and less pressure is applied. These states run a progressive course, and very often there are sudden aggravations, in consequence of slight hæmorrhages or of thrombosis. Vertigo, aphasic disturbances, etc., which for the most part disappear again, but of which there generally remains some trace, make the course irregular. Very frequently there also suddenly occur more severe hæmorrhages, which are then accompanied by hemiplegia, and which aggravate the entire situation. It may also happen that this entire preliminary state with its slow retrogression is absent, but that a sudden apoplexy occurs, which leaves behind it a distinct dementia after recovery from the acute stage. This is the so-called apoplectic dementia. One of the most conspicuous symptoms is emotional incontinence. When addressed the patients begin to cry, or in some cases to laugh. They can control themselves no longer. Of course, in consequence of the attack all kinds of other serious symptoms, for instance aphasias, may occur, which give a peculiar cachet to the dementia.

General Paralysis.

Dementia paralytica has quite a different aspect from senile dementia. Whilst in that form of the disease the disturbance is at first limited more particularly to the memory, giving us the right to speak of a systemic aberration, in the case of paralysis all the psychical functions are affected from the beginning. We therefore speak of a global dementia, which extends to the memory, the judgment, the emotional life, and the expressions of the will, which are all affected at the same time, but not all to the same extent. This diffuse character is the reason why paralytics, in contrast with senile dements and arterio-sclerotics, generally lose

at an early stage their insight into the disease. They do not become uneasy and do not seek medical assistance. If they do so, on the advice of their relations for instance, they attach no importance to the advice given. With regard to the sequence of the symptoms of regression—Ribot's law—they agree with the senile dements. In both cases the most recently acquired functions are lost first, though in paralysis this is not always easy to note, as the progress of the disease is more rapid. I do not propose to enter into the various forms—simple dementia, the depressive, the hypochondriacal, and the expansive forms; they come into the province of special psychiatry.

In addition to the global character, which, especially in the early stages, distinguishes paralysis from senile dementia, there is another important difference. Senile dementia is characterized by loss of memory and by a more difficult functioning; the mental stock constantly decreases. In paralysis this is also the case in the long run, but at first another disturbance is more especially noticeable, namely, a loss in the interconnection of the psychical functions. The apprehension, the memory, the intellect, the judgment, the character, the phenomena of the will have developed under the constant formation of associations. Now it is these associations that in the case of paralysis are deranged first of all and most strongly. The beginning of paralysis is thus not so much in the first place to be sought for in a destruction of the stock, but rather in a loss of connection between the mental activities. In consequence of this the power of conception is disturbed. External impressions are recognized more slowly and with greater difficulty. This can easily be demonstrated by means of the light-box. A plate with ten objects is shown for one second. Immediately after, the objects which have been seen must be noted down. This test is applied ten times every day for ten successive days, each time with a different plate. A paralytic gave 25% correct and 28% incorrect reproductions, a normal person 33% correct and no incorrect ones. This shows that the correct memory images required for recognition are not so easily called up by external impressions in the case of a paralytic, whilst, far more than is normally the case, objects are mentioned which have little or no connection with the images shown. This is a disturbance in association. Like Gregor, I have repeatedly been able to convince myself that the impressionability in the earlier stages of paralysis is not much affected.

This limitation of the power of association is also the cause of disturbance of the power of recollection. Many associations have arisen through simultaneity and similarity in connection with time and place, and it is therefore possible that one and the same

recollection may crop up in various ways. The recollection, for instance, of a particular person may be prompted by the presence of others who are connected with him, by the surroundings in which we have seen him—in short, by many circumstances which form a link between him and ourselves. When, therefore, associations are lost, as in paralysis, recollection will be brought about with greater difficulty. The most recently formed associations disappear first. The disturbances of paralysis begin in the same way in every other field.

The changes in character, such as irritability, sensuality, criminality (offences against property and morality), point to a return to the primitive infantile character, in which egotistical and vital tendencies are very prominent. The altruistic tendencies, the sense of duty, the feeling for ideals, for the fate of others and the community, which have gradually and slowly arisen during the development of the child, and have brought about the building up of the character, are no longer called up. There is with paralysis a gradual relapse in inverse order of the awakening of the qualities of character.

These aberrations of character show themselves quite early, often when other aberrations are scarcely noticeable. This is in accordance with the fact that the character develops later than the other psychical functions.

Disturbances of judgment occur, as is known, in many forms in the case of paralysis. The insight into the disease is lacking, or is only present to a very slight extent. Not infrequently the patients are full of complaints about some disturbance of no moment—for instance, about a small furuncle—whilst nothing is said of much more serious symptoms, which directly or indirectly threaten their very existence, such as disturbances of speech, hemiplegia, ataxia, etc. The associations proper to these deviations are not called up. The same is the case with the delusions which occur in many forms. The patient who believes himself to be a king or an emperor occupies himself with the work of a servant. The idea that a royal personage has people to wait on him does not occur to him. Another of my patients can do everything; nothing is too difficult for him; he is emperor, king, czar, lord of the universe, God, even above God; yet he asks humbly for a cigarette. The simultaneous megalomaniacal ideas are contradictory, and no single one of them calls up the appropriate associations. The interconnection is destroyed.

The important motor disturbances, which first show themselves in the finer and most complicated movements, are not due to palsy, but to a lack of coordination. Each muscle separately is

properly contracted. The most recently learnt movements, which through long training occur in an accurately coordinated form, are first deranged. Speaking becomes ataxic, the patient stumbles over the words, the lips quiver, the writing is irregular, the movements of the hands are clumsy, the finer movements, such as threading a needle, are no longer possible. This can be demonstrated by drawing over a circle with a drawing pencil. Fig. 5 shows how the pencil should be used. In Fig. 6 the drawing on the right is by a normal person; that in the centre is by a paralytic; the one on the left is by the same paralytic after malarial treatment.

An important feature of paralytic dementia is the occurrence of paralytic attacks. These may have an epileptiform or an apoplectiform character; fits with tonic and clonic convulsions may occur, but the patients may also suddenly fall down and awake again

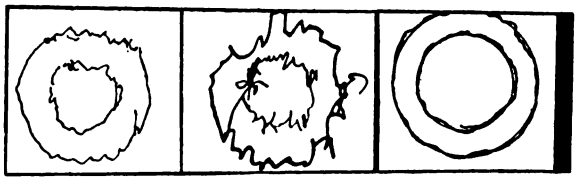

FIG. 6.

with a hemiplegia, sometimes with an aphasia as well, which in a longer or shorter time may be partly or entirely cured. Alzheimer considers the attacks as acute aggravations of the disease-process, and is supported in this view by pathological researches. In 1925 D. Wiersma pointed out that, if this view is correct, the psychical disturbances must be aggravated during a paralytic attack. More especially the disturbance of association, which we have seen to be the primary symptom of paralysis, must become aggravated. In the publication mentioned good reasons are given for thinking that we must consider the motor aphasia which so often occurs with a paralytic attack to be such an aggravation of the disturbance of association, especially of the association between the conceptions of speech movements and the conceptions of the things themselves. The epileptiform attacks, on the other hand, are to be regarded as sudden lowerings of the degree of consciousness, which agrees very well with our psychological view of the entire disease.

There is seen to be a remarkable agreement between all paralytic disturbances. Apprehension, memory, judgment, the character, the expression of the will are simultaneously, although not to the

same degree, affected, and the cause of the aberration of all these functions must be sought in defective association. This is accompanied by a reduced psychical after-effect—that is, a slighter secondary function. Apprehension is deranged because the after-effect is too slight to complete the observations; the memory is deranged, because some connections are idle, owing to defective secondary function; delusions are mutually contradictory or in contradiction with the patient's acts, because the appropriate ideas have too weak an after-effect, and are therefore not called up; the after-effect of the altruistic thoughts is too slight to oust the egotistical ones. Everything shows that weakening of the psychical after-effect is responsible for the aberrations of paralytic dementia, and that this must be regarded as the primary psychical disturbance.

And now the question must be answered whether there exists a predisposition for paralysis—in other words, whether there is a pre-paralytic character.

It is well known that a particular pre-psychotic character is present in the functional psychoses, such as melancholia, mania and paranoia. The symptoms of the disease can be distinctly shown in tendency in a state of health. A gradual transition from normal old age to senile dementia has been pointed out. We have also been able to discover the rudimentary symptoms of the epileptic character within the bounds of health. The fact that not every luetic patient gets paralysis may have various grounds. According to some the nature of the virus, according to others predisposition is of importance in this connection. It is not unlikely that both arguments have something in them. The presence of this predisposition is conceivable in two ways, namely, as a consequence of unfavourable external influences (trauma, over-exertion, poisoning), and as a result of heredity. In both cases the resistance against the luetic virus is diminished. If this diminution exists on the physical plane, it must be present on the psychical plane also. The investigation into the mental predisposition of paralytics is, therefore, of scientific importance. I possess pre-psychotic psychograms of eighty-nine paralytics, which I have compared with the material of the heredity inquiry, with the following results:

The *activity* of the pre-paralytics deviates but little from the average activity of the subjects of the inquiry, except in a few qualities. As the annexed table shows, they are much more vivacious, considerably more impulsive and resolute. These last-mentioned deviations are doubtless to be largely attributed to the strength of the primary function.

Activity.

	Pre-paralytics. %	Average. %
Vivacious	63	41
Diligent	75	76
Always busy	60	63
Quickly seizing	69	57
Persevering	49	47
Impulsive	54	39
Resolute	65	52
Average	62	54

The *emotionality* is decidedly greater. This is especially true of violence and irritability (see table). These functions also, as is well known, are very strongly promoted by the primary function.

Emotionality.

	Pre-paralytics. %	Average. %
Emotional	64	53
Violent	52	42
Irritable	61	44
Gloomy	10	6
Unstable	30	33
Average	43	35

The *psychical after-effect* is very greatly reduced. This is shown by practically every question. We must therefore assume that pre-paralytics have strong primary functions and weak secondaries.

Primary Function.

	Pre-paralytics. %	Average. %
Sooner consoled	75	37
Quickly reconciled	74	42
Variable in sympathy	30	19
Susceptible to new impressions	42	25
Great plans	39	13
Immediate results	39	29
Contradictory	32	13
Average	47	25

The *intellect* of pre-paralytics does not deviate from that of the average person.

Of the *qualities of character* the lower tendencies are seen to be much stronger. The vital and the egotistical are stronger, the altruistic and supra-social are weaker than the average.

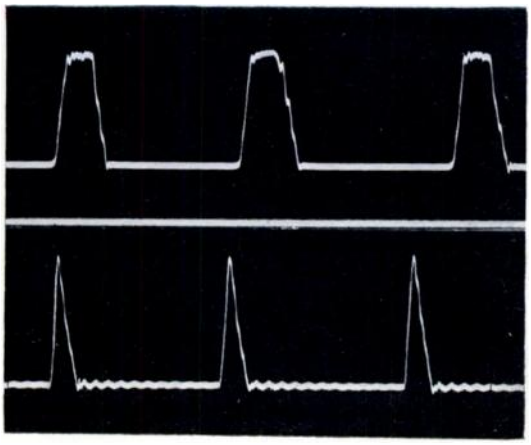

FIG. 8.

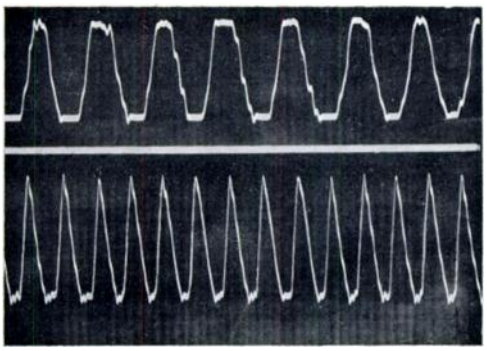

FIG. 9.

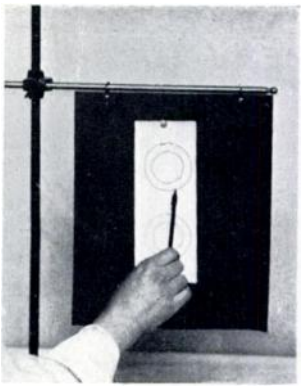

FIG. 5.

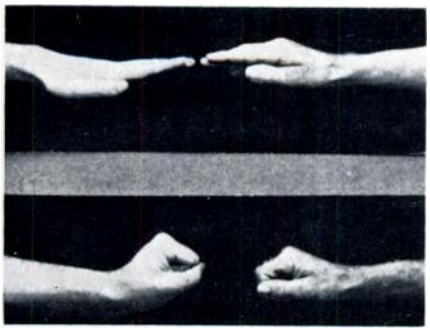

FIG. 10.

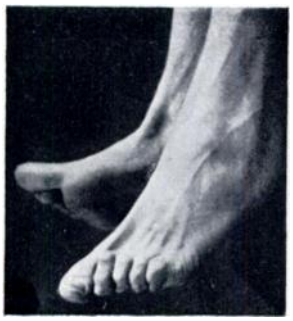

FIG. 7.

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FIG. 11.

FIG. 12.

FIG. 13.

FIG. 14.

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Tendencies.

	Pre-paralytics. %	Average. %
Fond of eating and drinking	63	39
Licentious	37	5
Self-satisfied	72	31
Vain	47	20
Ambitious	40	33
Avaricious	44	18
Greedy	8	3
Domineering	30	22
Talk about themselves	20	11
Average	40	20

Summing up, we may say that the pre-paralytic differs from the average person in the weaker psychical after-effect and in the strengthening of the lower tendencies.

What resemblance is there now between the pre-paralytic and the paralytic states? From the above we have already seen that the character deviates in both cases in the same sense from that of the average person. The egotistical tendencies, instability in thinking and acting, lack of balance, impulsiveness, violence and irritability, while on the other hand the subject may be excessively manageable and suggestible—these are found in the disposition of pre-paralytics also, and are therefore, just as in the case of paralysis itself, to a large extent dependent on deficient psychical after-effect. It must not be overlooked that the greater emotionality, the stronger primary function, the lack of inhibition, the stronger vital and egotistical tendencies of pre-paralytics might also be the cause of a greater chance of luetic infection. From an investigation of fifty luetics who have not been attacked by paralysis, it was found that these patients showed a somewhat greater emotionality and less psychical after-effect, but that this difference was only slight, and did not correspond to the great deviation of pre-paralytics. I therefore think that there is reason to seek the primary psychological predisposition to paralytic dementia in a morbid decrease of the psychical after-effect.

Epileptic Dementia.

An investigation made years ago into the psychology of epilepsy showed that the symptoms of epilepsy are to a great extent dependent on lability of the attention. The constant occurrence of this lowering, in spite of the variation of all the other symptoms, makes it probable that the sinking-in of consciousness is primary, and that all the other symptoms are dependent on it. Is, then, epileptic dementia, which is accompanied by divergences in temperament, intellect and morality, also dependent on the greater

lability of the attention? These divergences are frequently so characteristic that one can immediately recognize the epileptic from them.

The aberrations of temperament reveal themselves in an exceptional slowness in thinking, speaking, and acting, in a great degree of obstinacy, changeable mood and irritability. The intellectual aberrations are characterized by a great degree of dullness, narrow-mindedness, prolixity, verbosity and inferior memory. On the moral plane the patients show exceptional egocentric tendencies. They are vain, egotistical, self-satisfied, suspicious, exaggeratedly polite.

Now if the lability of the attention is the cause of these aberrations, then the same symptoms, if only in a rudimentary form, should be found in normal persons with a greater lability. The lability of the attention may show itself in two ways: firstly by greater absent-mindedness, and secondly by less activity. In the severer forms of epilepsy both these phenomena can be noted in ordinary conversation. The patients wander in speech and answer slowly. In slight cases this may be easily determined by experiment, by the reaction to scarcely appreciable stimuli.

Now if this absent-mindedness and lessened activity are of such importance for the qualities of character in epileptics, it is to be expected that within the bounds of health the absent-minded, non-active people will possess in a greater or less degree epileptic qualities of character. This question can be answered from the heredity inquiry.

For this purpose we need only segregate the absent-minded, non-active persons. Furthermore, I have at my disposal psychograms of fifty epileptics taken at an early stage of their disease. This investigation shows that the absent-minded, non-actives come, in respect of all psychical functions, the intellectual, the moral and the emotional qualities, between epileptics and normal persons.

For the intellectual function this is clear. The power of comprehension, the practical actions, the power of observation and the memory deviate in the same sense from the normal in the case of both epileptics and absent-minded, non-active persons, and the narrow-mindedness, the tendency to talk as others do, the lack of wittiness, the long-windedness and the repetition of the same stories are present in both.

With the moral qualities this is also the case. This is shown by the conflict between thought and action, the self-satisfaction, the vanity, the selfishness, the affectation, the untruthfulness, the tendency to talk of themselves and the excessive politeness.

This is also seen in the emotional qualities, such as obstinacy, irritability, variability of mood and peevish behaviour.

Schizophrenic Dementia.

It has been doubted whether this may be called dementia. Very often there can be no question of an intellectual loss. The memory remains good for a long time, and orientation is unimpaired. Nevertheless there are curious disturbances in thinking, feeling, and acting. The disjunction, the blocking, the autochthonous thoughts, the feeling of withdrawal of ideas, the neologisms and paralogy are signs of a lower kind of thinking, which we find to some extent in normal life. In the lower degree of consciousness in dreams, for instance, disjunction, neologisms and paralogy are not unknown phenomena. The schizophrenic patients are also in a state of lowered consciousness. They are autistic, they take no notice of anybody. They are indifferent to their surroundings. All their thoughts and actions arise independently of the conscious will-motives. The forms in which this weak-willed conduct may manifest itself are very different, as the following disturbances show.

In *stupor* the will and thought functions have practically disappeared. Voluntary movements, such as walking, speaking, shaking hands, etc., are no longer made. The patients lie quite still, are incontinent and have to be artificially fed. A limb, if lifted up, falls down limply. There is a general relaxation of the muscles. Schizophrenic stupor may also be accompanied by muscular rigidity and negativism.

Catalepsy is the tendency of a part of the body to remain in any attitude into which it has been put. A raised arm remains in that position until the muscles are exhausted. The patient can be made to perform all kinds of movements, little resistance being observable. This is called *flexibilitas cerea.* The cataleptic phenomena are due to a heightened suggestibility.

Echo phenomena consist in the blind imitation of movements, in the repetition of words or sentences, or in the imitation of noises (coughing, sneezing, etc.). The impressions are accepted without control. The conscious will-impulses, which normally work inhibitorily, are not of a sufficient degree of consciousness.

Automatic movements.—An arm, for instance, set moving in a circle, does not come to a stop, or not for a long time.

Bizarre and mannered movements may occur in many forms. They agree with the bizarre habits of thought and the curious expressions. The actions manifest themselves in unintelligible expressions of the face and in strange attitudes.

Stereotypies.—A distinction is made between stereotypies of attitude and of movement. In stereotypies of attitude the patients remain for a long time in the same curious position. The head or

the body is bent, they stand on one leg, sometimes with the hands in the air, etc. To these belong also the mask-like face, the compression of the lips, the hebephrenic laugh, etc.

The stereotypies of movement are actions which constantly recur in the same way; upward and downward movements of the body, twitching of the mouth, the making of noises with the tongue and the lips, clapping the hands, running round in a circle. These stereotypies also occur in writing and speaking. The same words, sentences and letters are repeated again and again. For this, too, the lowering of consciousness and in particular the sinking-in of the will-function is responsible.

In *suggestibility*, far the greater part of the abnormal actions mentioned come about without control. The conscious will-function is relaxed; there is no sober reflection, no deliberation; there is no weighing of motives. When external influences are accepted without control, and the counter-motives, which should normally crop up, are missing, we speak of a heightened suggestibility.

Negativism shows itself in opposition to external influences, for which likewise there is no motive. The patients withdraw from all approaches. They do not answer questions. They resist feeding. When urged to eat they refuse food. When alone, they begin to eat. They will not have their own food, but often want that of a neighbour. They dirty themselves and refuse help. They often answer in the sense of paralogy—that is to say, the answer shows that the question has been understood, but the answer is wrong. Remains of food are retained in the mouth.

These disturbances of the will, to which many others might be added, may be divided into two groups. Catalepsy, echo-phenomena and automatic movements are brought about by external influences. The stereotypies, the bizarre and mannered movements come from the subconscious mental life of the patient. The first arise from hetero-suggestion, the latter from auto-suggestion. Both forms are frequently found in the same patient. The auto-suggestions are movement-expressions which are lying ready in the subconsciousness, and now come up unchecked.

The low level of consciousness must be considered as the primary cause of this schizophrenic thinking and willing, since these disturbances are also found in other diseases with lowered consciousness. The oligophrenes, the cases of acquired dementia, the alcoholics, the dull patients suffering from increased intracranial pressure (tumour) are in a high degree susceptible to suggestion. We must therefore assume that in schizophrenia the hetero-suggestive symptoms, etc., as well as the auto-suggestive symptoms, arise owing to the weakening

of the conscious will-expressions. The automatism is here greatly heightened. We might speak of a hyper-automatism. The vital expressions reveal themselves in the mechanism lying ready in the subconsciousness, or in suggestion accepted without control. The patient's own volitional life, the personality, recedes altogether into the background.

Parkinsonianism.

It has frequently been pointed out that there is a great resemblance between the schizophrene, katatonic phenomena and the after-stage of encephalitis lethargica known as Parkinsonianism. The chronic after-stage of this disease may appear in the form of hyperkinesis or of hypokinesis. The hyperkineses show themselves in the form of choreic, athetotic and myoclonic movements.

It is well known that these disturbances are especially localized in the basal ganglia, and probably most distinctly in the putamen and the nucleus caudatus. It does not come within the scope of this lecture to discuss more in detail the anatomy of these disturbances. I will only point out that in other hyperkinetic aberrations of movement, such as the chorea of Huntington and choreic movements after affection of the brain and lues, and probably also in chorea minor, changes in the basal ganglia must be assumed.

Much more frequently than the hyperkinetic after-stage, the hypokinetic state, or Parkinsonianism, develops. This state is characterized by a general rigidity of the muscles, which is plainly to be seen in the attitude and in the fixed expression of the face.

Attitudes once assumed continue for a long time unaltered. The head and the arms remain raised for a long time without support.

The movements become slower, the contractions of the muscles occur later and last longer than normally, as is to be seen in this figure in the remaining contraction of the tibialis anterior, the so-called tibialis phenomenon when the foot is brought into dorsal flexion. This can also be demonstrated by registering the squeezing movements in an air-balloon. By squeezing the balloon, air is driven out of it, which sets in motion a pen writing on a drum.

In Fig. 8 the squeezing movements of a patient with Parkinsonianism and of a normal person have been photographed. The difference in movement and relaxation is evident.

Successive movements cannot be carried out rapidly. There is a disturbance in diadochokinesis. The hand is opened and closed slowly.

In Fig. 9 the squeezing movements in the balloon, in as quick succession as possible, of a Parkinsonian and of a normal person have been registered.

A third disturbance is the loss of associated movements, which normally arise automatically. In clenching the fist the normal stretching movements are lacking. By means of these stretching movements the points of insertion of the flexors are brought farther apart, so that the closing can be performed with more power.

In stretching the fingers, flexion of the hand is lacking. This flexion has the effect of separating the points of insertion of the tensors more widely, by which means the stretching can be carried out with more strength.

Vigorous opening of the mouth is normally accompanied by a simultaneous raising of the head, a raising of the eyeballs, and a drawing up of the eyebrows. These associated movements are nearly or absolutely absent.

In agreement with these disturbances in the volitional expressions are the psychical deviations. The patients think slowly, they complain of thinking with difficulty, they cannot transfer their thoughts, and they can only occupy themselves with one thing at a time. It is as if their thoughts were held fast. Conversation drags; thoughts will not occur to them. It was possible experimentally to note considerable deviations in an investigation of forty patients. As this table shows, the reaction-times are lengthened. The number of words spoken and the number of additions of units in a given time is very greatly reduced. The extent of consciousness is reduced. The number of objects that can be noticed at a time is much smaller. Patients cannot get rid of their thoughts. One patient, in praying, could not get beyond the first line. Times out of number they have to repeat the same words. By association tests these deviations may easily be noted.

Investigation of 10 *Encephalitics and* 10 *Normal Persons.*

	Average reaction-times.	
	Encephalitics. (Secs.)	Normal. (Secs.)
50 word-stimuli	3·2	1·6
50 light-stimuli	0·540	0·296
	(Number.)	(Number.)
Words spoken in 3 min.	22	50
Objects simultaneously seen in 1 sec.	1·6	3·5
Additions of units in 1 min.	22	44

Repetitions in the free association-test on the stimulus-word *horse*: Cow—ass—sheep—goat—pig—dog—hare—cat —*pig—goat—sheep*.

These statements, which were necessarily short and incomplete, show that there is, in many respects, a similarity between Parkinsonian and schizophrenic thinking and acting. The poverty of movement and thought, the rigid exterior, remind one of stupor.

The rigidity might be confounded with that of negativism. The holding of the head and of the extremities without support may be mistaken for catalepsy. When we add further that in both morbid conditions there may be an excessive secretion of sebum, sweat and saliva, there are seen to be considerable resemblances. But on the other hand there is a difference of such importance that there can be no question of identity.

The schizophrenic disturbances in thinking and acting are, as we have seen, expressions of mechanisms, lying ready or suggested, which come into the consciousness and on which the will-impulse has little or no influence. The intellectual stock is present, but the regulative action of the higher mental function is absent. The influence of the will has been suspended.

The encephalitic motor disturbances are of quite a different nature. They occur in two different forms. In the one case the patients can only with difficulty concentrate their attention. Their attention is spread over a great many will-impulses, and then come the spontaneous movements of chorea and athetosis, with a variety of other movements. In the other case the attention is too sharply directed to a few will-impulses. There is then no energy left for the associated movements or automatisms. There is thus a poverty of movement, a narrowed motor consciousness. Two movements cannot be carried out simultaneously. The same poverty is noticeable in thinking. The power of imagination is slight; the patient can only think of one thing at a time, etc.

These two disturbances are the result of a demolition by the encephalitic disease process. The question is, therefore, justified whether there are not also stages in the building up of the volitional function, which, if not altogether, then at any rate very nearly, agree with the above-mentioned abnormal motor phenomena. The answer to this question must be in the affirmative.

The newly-born child shows general rigidity. The muscles of the legs, of the pelvis, of the neck, of the face, etc., are stiff. They can hardly be moved at all passively, and the active movements take place slowly. This stiffness corresponds to the stiffness of Parkinsonianism (Fig. 11).

At the same time the child makes involuntary spontaneous movements, which spread all over the body (Fig. 12).

These movements of a normal child are exactly like the movements of athetosis and chorea. The analogies of these hyperkineses of encephalitis are therefore found in normal life.

The voluntary movements develop slowly from the spontaneous ones. The movements become more and more differentiated. In place of stiffness come suppleness and flexibility, in place of the

spontaneous movements come voluntary, accurately measured movements, with the normal associated movements and automatisms. In Figs. 13 and 14 the gait of a little boy of 16 months is still stiff and clumsy, without automatic associated movements. The gait of the girl of 2 years and 7 months, on the other hand, already shows distinct automatic associated movements of the arms.

We thus see that the building up in the case of a child takes place in the inverse order to the breaking down in encephalitis. With the child the mechanized automatisms, which arise through training, are not yet developed; with the Parkinsonian, on the other hand, they have disappeared. They are, however, not lost, for it is often possible, by great pressure or through emotion, to make the will-impulse so strong that movements, with their accompanying automatisms, are performed quickly and smoothly. When running at command, when strongly urged to eat, when running away from danger, when speaking under excitement, the accessory associated movements appear distinctly for a short time. Why should these automatisms disappear in Parkinsonianism? In normal persons they are lost when the entire attention is claimed for the movement to be performed. When walking on ice or over a narrow plank the normal associated movements of the arms disappear. Piano-playing is easier at home than in public. In the same way the Parkinsonian's entire attention is claimed for his voluntary movements. In this way the poverty of movement, the narrowing of the motor consciousness are brought about.

In this second lecture it has been my intention to show that the symptoms of the different forms of dementia can be found, although only in a rudimentary form, within the boundaries of the normal, and that this is also the case with the disturbances of the will in schizophrenia and encephalitis. The primary affection is to be sought, from a psychological point of view, in the lowering of consciousness.

I agree, therefore, with Prof. Spearman and Dr. Hart that it is very difficult to differentiate the several forms of dementia, but I believe that by a comparison of the various forms of dementia with normal persons this differentiation can be made. For we must assume that there is not an essential difference, but only one of degree, between sane and insane.

The normal and abnormal psychical functions are dominated by just the same laws. It is therefore an undeniable advantage for every psychologist to take notice of the so-called psycho-pathological phenomena.