

(return to [Bartlett index](#))

# Remembering: A Study in Experimental and Social Psychology

---

**Citation:** Bartlett, F.C. (1932). *Remembering: A Study in Experimental and Social Psychology*. Cambridge University Press.

---

## CHAPTER X

### A THEORY OF REMEMBERING

#### 1. THE METHOD OF APPROACH

THE most persistent problems of recall all concern the ways in which past experiences and past reactions are utilised when anything is remembered. From a general point of view it looks as if the simplest explanation available is to suppose that when any specific event occurs some trace, or some group of traces, is made and stored up in the organism or in the mind. Later, an immediate stimulus re-excites the trace, or group of traces, and, provided a further assumption is made to the effect that the trace somehow carries with it a temporal sign, the re-excitement appears to be equivalent to recall. There is, of course, no direct evidence for such traces, but the assumption at first sight seems to be a very simple one, and so it has commonly been made.

Yet there are obvious difficulties. The traces are generally supposed to be of individual and specific events. Hence, every normal individual must carry about with him an incalculable number of individual traces. Since these are all stored in a single organism, they are in fact bound to be related one to another, and this gives to recall its inevitably associative character; but all the time each trace retains its essential individuality, and remembering, in the ideal case, is simple re-excitation, or pure reproduction.

Now we have seen that a study of the actual facts of perceiving and recognising suggests strongly that, in all relatively simple cases of determination by past experiences and reactions, the past operates as an organised mass rather than as a group of elements each of which retains its specific character. If we are to treat remembering as a biological function, it looks as if a sound rule of method would compel us to approach its problems through a study of these relatively less complex cases of determination of present reactions by the past. At any rate, this is the line of approach to which the argument of the preceding chapter has committed us, for it was there indicated that vary probably the outstanding characteristics of remembering all follow from a change of attitude towards those masses of organised past [198] experiences and reactions which function in all high-level mental processes.

If this be admitted, there is an exceedingly interesting way of approach to the problems of recall along a line of studies which would often, no doubt, be called neurological rather than psychological, and this I propose to explore. During many years Sir Henry Head carried out systematic observations on the nature and functions of afferent sensibility, that is to say, of those sensations which are set up by the stimulation of peripheral nerves. He was particularly interested in the functions and character of the sensations which can be aroused by the stimulation of nerve endings in the skin and the underlying tissues, and in those which are initiated by the contraction and relaxation of muscles. He wished to find out exactly what part is played by the cortex in interpreting and relating these sensations, or the nerve impulses of which the sensations may be regarded as a sign. One of the most important and interesting of these groups of impulses consists of those which underly the recognition of bodily posture and of passive movement.

Every day each normal individual carries out a large number of perfectly well-adapted and co-ordinated movements. Whenever these are arranged in a series, each successive movement is made as if it were under the control and direction of the preceding movements in the same series. Yet, as a rule, the adaptive mechanisms of the body do not demand any definite awareness, so far as change of posture or change of movement is concerned. In every skilled bodily performance, for example, a large number of movements are made in succession, and every movement is carried out as if the position reached by the moving limbs in the last preceding stage were somehow recorded and still functioning, though the particular preceding movement itself is past and over. This obvious fact has given rise to many speculations concerning the ways in which the movements which are past nevertheless still retain their regulative functions.

Munk, the physiologist, writing in 1890 (1), said that they did this because the brain must be regarded as a storehouse of images of movement, and he was unreflectingly followed by a great many other writers. It is supposed that a preceding movement produces a cortical image, or trace, which, being somehow re-excited at the moment of the next succeeding movement, controls the latter. [199]

Head showed definitely and finally that this cannot be the explanation. For images may persist perfectly when all appreciation of relative movement carried out in this unwitting manner is totally lost. A patient with a certain cortical lesion may be able to image accurately the position of his outstretched arm and hand on the counterpane of a bed. He can equally image his arm and hand in any of the possible positions which it might occupy. Now let him close his eyes and let the hand be picked up and the hand and arm moved. He may be able to localise the spot touched on the skin surface perfectly well, but he refers it to the position in which the hand was, because he has entirely lost the capacity to relate serial movements. Images may be intact; appreciation of relative movement lost. Conversely, as everybody knows, appreciation of movement may be as perfect as ever it can be without any appearance of images. It is futile to say that in these cases the images are so slight, or so fleeting, that we do not notice them. The truth is that with all the effort in the world we cannot notice them; and since the evidence for their absence is similar in source and character to that cited for their presence on other occasions, it is most unjustifiable to accept the latter and to reject the former.

Accordingly, Head justly discarded the notion of individual images, or traces, and proposed in its place a different solution—one which is certainly speculative, offers difficulties of its own, and has never yet been properly worked out; but one which seems to me to have great advantages when we are dealing with these somewhat elementary instances of the persistent effects of past reactions. I believe, also, that it points the way to a satisfactory solution of the phenomena of remembering in the full sense.

At this point I must quote Head's own words: "Every recognisable (postural) change enters into consciousness already charged with its relation to something that has gone before, just as on a taximeter the distance is presented to us already transformed into shillings and pence. So the final product of the tests for the appreciation of posture, or of passive movement, rises into consciousness as a measured postural change.

For this combined standard, against which all subsequent changes of posture are measured before they enter consciousness, we propose the word 'schema'. By means of perpetual alterations in position we are always building up a postural model of ourselves which constantly changes. Every new posture of movement is recorded on this plastic [200] schema, and the activity of the cortex brings every fresh group of sensations evoked by altered posture into relation with it. Immediate postural recognition follows as soon as the relation is complete " (2).

And again: "The sensory cortex is the storehouse of past impressions. They may rise into consciousness as images, but more often, as in the case of special impressions, remain outside central consciousness. Here they form organised models of ourselves which may be called schemata. Such schemata modify the impressions produced by incoming sensory impulses in such a way that the final sensations of position or of locality rise into consciousness charged with a relation to something that has gone before " (3).

Although I am going to utilise these notions in developing a theory of remembering, I must claim the prerogative of a psychologist of objecting to the terminology of another writer. There are several points in the brief descriptions I have quoted that seem to me to present difficulty.

First, Head gives away far too much to earlier investigators when he speaks of the cortex as "a storehouse of past impressions". All that his experiments show is that certain processes cannot be carried out unless the brain is playing its normal part. But equally those very reactions could be cut out by injuries to peripheral nerves or to muscular functions. One might almost as well say that because nobody who is suffering from a raging toothache could calmly recite "Oh, my love's like a red, red rose", the teeth are a repository of lyric poetry. In any case, a storehouse is a place where things are put in the hope that they may be found again when they are wanted exactly as they were when first stored away. The schemata are, we are told, living, constantly developing, affected by every bit of incoming sensational experience of a given kind. The storehouse notion is as far removed from this as it well could be.

Secondly, Head constantly uses the perplexing phrase "rising into consciousness". It may be the case that in exceptional circumstances an unwitting alteration of position is actually known as a "measured" postural change. But this is not the rule. Every day, many times over, we make accurate motor adjustments in which, if Head is right, the schemata are active, without any awareness at all, so far as the measure of the changing postures is concerned.

Thirdly, and perhaps most important, I strongly dislike the term [201] 'schema'. It is at once too definite and too sketchy. The word is already widely used in controversial psychological writing to refer generally to any rather vaguely outlined theory. It suggests some persistent, but fragmentary, 'form of arrangement', and it does not indicate what is very essential to the whole notion, that the organised mass results of past changes of position and posture are actively doing something all the time; are, so to speak, carried along with us, complete, though developing, from moment to moment. Yet it is certainly very difficult to think of any better single descriptive word to cover the facts involved. It would probably be best to speak of 'active, developing patterns'; but the word 'pattern', too, being now very widely and variously employed, has its own difficulties; and it, like 'schema', suggests a greater articulation of detail than is normally found. I think probably the term 'organised setting' approximates most closely and clearly to the notion required. I shall, however, continue to use the term 'schema' when it seems best to do so, but I will attempt to define its application more narrowly.

'Schema' refers to an active organisation of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response. That is, whenever there is any order or regularity of behaviour, a particular response is possible only because it is related to other similar responses which have been serially organised, yet which operate, not simply as individual members coming one after another, but as a unitary mass. Determination by schemata is the most fundamental of all the ways in which we can, be influenced by reactions and experiences which occurred some time in the past. All incoming impulses of a certain kind, or mode, go together to build up an active, organised setting: visual, auditory, various types of cutaneous impulses and the like, at a relatively low level; all the experiences connected by a common interest: in sport, in literature, history, art, science, philosophy and so on, on a higher level. There is not the slightest reason, however, to suppose that each set of incoming impulses, each new group of experiences persists as an isolated member of some passive patchwork. They have to be regarded as constituents of living, momentary settings belonging to the organism, or to whatever parts of the organism are concerned in making a response of a given kind, and not as a number of individual events somehow string together and stored within the organism.

Suppose I am making a stroke in a quick game, such as tennis or cricket. How I make the stroke depends on the relating of certain [202] new experiences, most of them visual, to other immediately preceding visual experiences and to my posture, or balance of postures, at the moment. The latter, the balance of postures, is a result of a whole series of earlier movements, in which the last movement before the stroke is played has a predominant function. When I make the stroke I do not, as a matter of fact, produce something absolutely

new, and I never merely repeat something old. The stroke is literally manufactured out of the living visual and postural 'schemata' of the moment and their interrelations. I may say, I may think that I reproduce exactly a series of text-book movements, but demonstrably I do not; just as, under other circumstances, I may say and think that I reproduce exactly some isolated event which I want to remember, and again demonstrably I do not.

## 2. REMEMBERING AND SCHEMATIC DETERMINATION

Remembering obviously involves determination by the past. The influence of 'schemata' is influence by the past. But the differences are at first sight profound. In its schematic form the past operates *en masse*, or, strictly, not quite *en masse*, because the latest incoming constituents which go to build up a 'schema' have a predominant influence. In remembering, we appear to be dominated by particular past events which are more or less dated, or placed, in relation to other associated particular events. Thus the active organised setting looks as if it has somehow undergone a change, making it possible for parts of it which are remote in time to have a leading role to play. If only the organism could hit upon a way of turning round upon its own 'schemata' and making them the objects of its reactions, something of the sort might perhaps become possible. An organism which had discovered how to do this might be able, not exactly to analyse the settings, for the individual details that have built them up have disappeared, but somehow to construct or to infer from what is present the probable constituents and their order which went to build them up. It would then be the case that the organism would say, if it were able to express itself: "This and this and this must have occurred, in order that my present state should be what it is". And, in fact, I believe this is precisely and accurately just what does happen in by far the greatest number of instances of remembering, and it is to the development of a theory along these lines that the evidence which I have marshalled in the preceding chapters seems to point.

Before we consider this further, there is one special detail that ought [203] to be mentioned. If Head is right, 'schemata' are built up chronologically. Every incoming change contributes its part to the total 'schema' of the moment in the order in which it occurs. That is to say, when we have movements *a, b, c, d*, in this order, our "plastic postural model" of ourselves at the moment *d* is made depends, not merely upon the direction, extent and intensity of *a, b, c, d*, but also upon the chronological order in which they have occurred. Suppose, for the moment, that a "model", to continue to use this picturesque phraseology, is completed, and all that is needed is its maintenance. Since its nature is not that of a passive framework, or patchwork, but of an activity, it can be maintained only if something is being done all the time. So in order to maintain the 'schema' as it is—though this is rather inaccurate language—*a, b, c, d* must continue to be done, and must continue to be done in the same order. There are many cases in real life which approximate to this state of affairs. There is the old man whose adventures are over, whose model is full-grown and completed, who shuns or ignores the spur of a new environment, and who maintains himself comfortably by constant, almost word-perfect reminiscence. There is the low-level mental life which, being cut off from all but a few often-repeated environmental stimuli, shows unusual rote memory. All of us, in reference to some of our 'schemata', have probably completed the model and now merely maintain it by repetition. All relatively low-level remembering tends, in fact, to be rote remembering, and rote memory is nothing but the repetition of a series of reactions in the order in which they originally occurred. In Head's terminology this is the most natural way of maintaining a completed 'schema' as far as possible undisturbed. In more conventional psychological language, perhaps, it is an organism's or an individual's way of keeping up an attitude towards the environment which it finds or feels to be adequate and satisfactory.

Now it is obvious that this determination by the massed momentary effect of a series of past reactions in their chronological character, with the last preceding reaction playing a dominant part, has certain biological drawbacks. An organism which possesses so many avenues of sensory response as man's, and which lives in intimate social relationship with numberless other organisms of the same kind, must find some way in which it can break up this chronological order and move more or less at will in any order over the events which have built up its present momentary 'schemata'. It must find a way of being dominantly determined, not by the

immediately preceding reaction, [2004] or experience, but by some reaction or experience more remote. If it did not, it would waste a vast amount of time going over and over again various chronological series; just as a man or a group always does when he or it is cut off from effective contact with a varying physical and social environment. If we could only understand how an organism achieves this, we should have advanced some way towards solving certain of the problems of memory, for in remembering we are being determined by events out of their precise order in a chronological series, and we are free from over-determination by the immediately preceding event.

### 3. THE CONSTRUCTIVE CHARACTER OF REMEMBERING

We must, then, consider what does actually happen more often than not when we say that we remember. The first notion to get rid of is that memory is primarily or literally reduplicative, or reproductive. In a world of constantly changing environment, literal recall is extraordinarily unimportant. It is with remembering as it is with the stroke in a skilled game. We may fancy that we are repeating a series of movements learned a long time before from a text-book or from a teacher. But motion study shows that in fact we build up the stroke afresh on a basis of the immediately preceding balance of postures and the momentary needs of the game. Every time we make it, it has its own characteristics.

The long series of experiments which I have described were directed to the observation of normal processes of remembering. I discarded nonsense material because, among other difficulties, its use almost always weights the evidence in favour of mere rote recapitulation, and for the most part I used exactly the type of material that we have to deal with in daily life. In the many thousands of cases of remembering which I collected, a considerable number of which I have recorded here, literal recall was very rare. With few exceptions, the significance of which I will discuss shortly, re-excitement of individual traces did not look to be in the least what was happening. Consider particularly the case in which a subject was remembering a story which he heard, say, five years previously, in comparison with the case in which he was given certain outline materials and constructs what he calls a new story. I have tried the latter experiment repeatedly, and not only the actual form and content of the results, but what is of more significance for the moment, the attitudes of the subject in these two cases were strikingly similar. In both cases, it was common to find the preliminary [205] check, the struggle to get somewhere, the varying play of doubt, hesitation, satisfaction and the like, and the eventual building up of the complete story accompanied by the more and more confident advance in a certain direction. In fact, if we consider evidence rather than presupposition, remembering appears to be far more decisively an affair of construction rather than one of mere reproduction. The difference between the two cases, if it were put in Head's terminology, seems to be that in remembering a man constructs on the basis of one 'schema', whereas in what is commonly called imaging he more or less freely builds together events, incidents and experiences that have gone to the making of several different 'schemata' which, for the purposes of automatic reaction, are not normally in connexion with one another. Even this difference is largely only a general one, for as has been shown again and again, condensation, elaboration and invention are common features of ordinary remembering, and those all very often involve the mingling of materials belonging originally to different 'schemata'.

### 4. A THEORY OF REMEMBERING

In attempting to develop a theory of the whole matter, so far as I can see it, we must begin with an organism which has only a few sense avenues of connexion with its environment, and only a few correlated series of movements, but is devoid of all the so-called higher mental functions. To this organism Head's notions, derived from a mass of experimental observations, have the most perfect applicability. Any reaction of such an organism which has more than a mere momentary significance is determined by the activity of a 'schema' in relation to some new incoming impulse set up by an immediately presented stimulus. Since its sensory equipment and the correlated movements are very limited in range, and since the mode of organisation of the 'schema' follows a direct chronological sequence, circularity of reaction, the repetition over and over again of a series of reactions, is very prominent. Habits, moreover, are relatively easily formed, as is witnessed by a

great amount of research of an experimental nature upon the lower animals. From the outside, all this may look like the continual re-excitement of well-established traces; but it is not. It is simply the maintenance of a few 'schemata', each of which has its natural and essential time order.

However, in the course of development the special sense avenues increase in number and range, and concurrently there is an increase [206] in number and variety of reactions. With this, and a matter of vital importance, as my experiments repeatedly show, goes a great growth of social life, and the development of means of communication. Then the 'schema' determined reactions of one organism are repeatedly checked, as well as constantly facilitated, by those of others. All this growth of complexity makes circularity of reaction, mere rote recapitulation and habit behaviour often both wasteful and inefficient. A new incoming impulse must become not merely a cue setting up a series of reactions all carried out in a fixed temporal order, but a stimulus which enables us to go direct to that portion of the organised setting of past responses which is most relevant to the needs of the moment.

There is one way in which an organism could learn how to do this. It may be the only way. At any rate, it is the way that has been discovered and it is continually used. An organism has somehow to acquire the capacity to turn round upon its own 'schemata' and to construct them afresh. This is a crucial step in organic development. It is where and why consciousness comes in; it is what gives consciousness its most prominent function. I wish I knew exactly how it was done. On the basis of my experiments I can make one suggestion, although I do so with some hesitation.

Suppose an individual to be confronted by a complex situation. This is the case with which I began the whole series of experiments, the case in which an observer is perceiving, and is saying immediately what it is that he has perceived. We saw that in this case an individual does not normally take such a situation detail by detail and meticulously build up the whole. In all ordinary instances he has an over-mastering tendency simply to get a general impression of the whole; and, on the basis of this, he constructs the probable detail. Very little of his construction is literally observed and often, as was easily demonstrated experimentally, a lot of it is distorted or wrong so far as the actual facts are concerned. But it is the sort of construction which serves to justify his general impression. Ask the observer to characterise this general impression psychologically, and the word that is always cropping up is 'attitude'. I have shown how this 'attitude' factor came into nearly every series of experiments that was carried out. The construction that is effected is the sort of construction that would justify the observer's 'attitude'. Attitude names a complex psychological state or process which it is very hard to describe in more elementary psychological terms. It is, however, as I have [207] often indicated, very largely a matter of feeling, or affect. We say that it is characterised by doubt, hesitation, surprise, astonishment, confidence, dislike, repulsion and so on. Here is the significance of the fact, often reported in the preceding pages, that when a subject is being asked to remember, very often the first thing that emerges is something of the nature of attitude. The recall is then a construction, made largely on the basis of this attitude, and its general effect is that of a justification of the attitude (4).

A rapid survey of the experimental results will show this factor at work in different subjects and with diverse materials and methods, in the case of every one of my experimental series. In the Perception Series the subjects got their general impression, 'felt the material presented to be regular, or exciting, or familiar and so on, and built up their results by the aid of that and a little definitely observed detail. In the Imaging Series, I have recorded a number of cases where, particularly in the case of the subjects prone to personal reminiscence, an attitude developed into a concrete and detailed imaginal construction. With *The Method of Description* the affective attitude openly influenced the recall. *Repeated Reproduction* yielded many cases in which the stories or other material were first characterised as 'exciting', 'adventurous', 'like what I read when I was a boy', labelled in some way or other, and then built up or 'remembered'. The instance in which *The War of the Ghosts* was constructed gradually from a little general starting-point, after a very long interval, is a brilliant, but by no means isolated, illustration of this constructive character of recall. Serial Reproduction showed the same features in the readiness with which material assumed established conventional forms, and

*The Picture Sign Method* also brought out the same point repeatedly. I have attempted to observe as closely as possible the behaviour of young children when they remember. So far as it is valid to guess from this what are the processes actually going on, here also, in very many instances, there comes first an attitude and then the recall of the material in such a way as to satisfy, or fortify, the attitude. The constant rationalisation which remembering effects is a special case of the functioning of this constructive character upon which memory is largely based.

What, precisely, does the 'schema' do? Together with the immediately preceding incoming impulse it renders a specific adaptive reaction possible. It is, therefore, producing an orientation of the [208] organism towards whatever it is directed to at the moment. But that orientation must be dominated by the immediately preceding reaction or experiences. To break away from this the 'schema' must become, not merely something that works the organism, but something with which the organism can work. As I will show later, its constituents may perhaps begin to be reshuffled on a basis of purely physical and physiological determinants. This method is not radical enough. So the organism discovers how to turn round upon its own 'schemata', or, in other words, it becomes conscious. It may be that what then emerges is an *attitude* towards the massed effects of a series of past reactions. Remembering is a constructive justification of this attitude; and, because all that goes to the building of a 'schema' has a chronological, as well as a qualitative, significance, what is remembered has its temporal mark; while the fact that it is operating with a diverse organised mass, and not with single undiversified events or units, gives to remembering its inevitable associative character. Whether or not the attitude is a genetically primitive characteristic possessing this function in recall is, of course, a speculative matter. I think it is, but nothing is served by dogmatism at this point. The experiments do, however, appear to demonstrate that, at the level of human remembering, the attitude functions in the way I have suggested.

There is, however, an obvious objection to all this. So far as the 'schema' is directly responsible for the attitude, it looks as if the latter must itself be predominantly determined by the last incoming incident of the mass of past reactions. But remembering often pretends to be of an incident remote in time, and that incident is not, as in the rote recapitulation method, now reconstructed by going through a whole chronological series in order. If 'schemata' are to be reconstructed after the fashion that seems to be demanded by the phenomena of recall, somehow we have to find a way of individualising some of the characteristics of the total functioning mass of the moment.

## 5. IMAGES AND 'SCHEMATA'

In order that we may understand how this is done, we must consider that apparent exception to the normal constructive process of remembering which I mentioned some time ago. I may first repeat an illustration. In the spring of 1917, as I have already recorded, one of my subjects first read the story entitled *The War of the Ghosts*. She [209] repeated it half an hour later. She left Cambridge shortly after this, but returned in two years. In the summer of 1919 she saw me cycling along King's Parade, in the town of Cambridge. She at once became aware of that puzzled, searching sort of attitude we experience when we see somebody we think we ought to know, but are not able to identify him. A moment later she found herself muttering "Egulac", "Kalama", the two proper names belonging to the story. In the summer of 1927 (the subject having in the meantime been absent from Cambridge), I asked her to repeat the story again. She at once wrote "Egulac" and "Calama", but then stopped and said she could do no more. Soon, however, she built around these names an incident or two which, though they contained some invention and transformation, seemed clearly to be derived from some of the events of the original story. That proper names should be recalled in this immediate and almost correct manner is, as I have shown, a most unusual case. But the immediate return of certain detail is common enough and it certainly looks very much like the direct re-excitation of certain traces. The need to remember becomes active, an attitude is setup; in the form of sensory images, or, just as often, of isolated words, some part of the event which has to be remembered recurs, and the event is then reconstructed on the basis of the relation of this specific bit of material to the general mass of relevant past

experience or reactions, the latter functioning, after the manner of the 'schema', as an active organised setting.

This must at once remind us of another very constant feature of the experimental data which I have collected. In the experiments on perceiving, or imaging, and on all the various modes of recall, while there was a sense in which subjects could accurately be said to have reacted to whatever material was presented 'as a whole', yet in that whole some special features were invariably dominant. In many cases, when the material had to be dealt with at a distance, as in remembering, the dominant features were the first to appear, either in image form, or descriptively through the use of language. In fact, this is one of the great functions of images in mental life: to pick items out of 'schemata', and to rid the organism of over-determination by the last preceding member of a given series. I would like to hold that this, too, could not occur except through the medium of consciousness. Again I wish I knew precisely how it is brought about and again I can make only a few tentative suggestions.

We have to attempt to explain how other members than the latest, in a series of reactions, may have predominance. There may well be [210] some basis for this laid down at a pre-conscious stage of development. If we have stimuli *a, b, c, d*, of which *c* is more intense, or lasts longer, or is more voluminous than the rest, it may be that these physical characters tend to break up the strict chronological construction of the 'schema', and give to *c* a more dominant function than *d* acquires. But it is obvious that these physical factors have comparatively little weight in the life of the higher animals and of man. The enormous diversity of images at the human level is such that nobody can make a single descriptive statement about them that is not immediately contradicted by somebody else. This clearly means that we must seek their explanation along the lines of individual differences.

When any series of events occur which go to build up that sort of organised mass of experiences which Head calls a 'schema', what is it that gives to certain of these events, other than the last, a predominant function, and at the same time tends to individualise them in the mass? It is appetite, instinct, interests and ideals, the first two being much the more important in early stages of organic development, and the last two advancing to positions of great, and very likely of chief, importance at the human level. These are all factors which are peculiarly easily transmitted, and so the human infant begins with, or rapidly acquires, certain predisposing tendencies which at once cut across the strict chronological mode of organising past experience.

In point of fact, the strict chronological principle is rarely, perhaps never, the only principle which operates in building up these active patterns. For example, the phenomena of 'conditioned reflex' have been much used in psychological discussions. If a dog is fed he reflexly produces saliva, and if several times, under appropriate conditions, another stimulus, say an auditory stimulus, is presented during, or just before, the feeding, the saliva may come to be reflexly produced by that alone. The response is then said to be 'conditioned', and the auditory stimulus is a 'conditioned' stimulus. But it is with great difficulty, if at all, that the reflex reactions can be conditioned when the sound, or whatever other stimulus is used, follows the feeding. What ties the two together is never mere sequence in time but a food appetite; and, when the latter is satisfied, anything that comes after belongs to a different order of 'schemata'. Moreover, it seems certain enough that conduct may be directly determined by remote stimuli even when we have no real justification for positing the presence of sensorial images of any kind. Prof. W. S. Hunter (6), by [211] his important experiments on what he called the 'delayed reaction, showed how rats, dogs, racoons and young children can react directly to a light stimulus after a short interval, even though, in the case of the dogs, the racoons and the children, the interval is filled with other stimuli and other movements. His work has been confirmed and extended by the observations of Yerkes, Köhler and a number of others on the behaviour of monkeys and chimpanzees.

In all these cases it is legitimate and helpful to say that an "image function" (7) is at work, when by that we mean no more than that conduct is being directly determined by specific stimuli or situations other than those immediately preceding the critical reaction. But it is significant that as soon as we come to the human infant the period of possible maximum delay leaps up at once, and that, when once an early age in human development is passed, the delay period can again be extended rapidly until it becomes almost indefinitely

long. The possibility of being directly determined by really remote stimuli seems to be coincident with the development of specialised and widely ranging interests. And this, again, appears to demand a reshuffling and reorganisation of material which naturally falls into diverse organised patterns. Thus things seen, heard, touched, tasted, events connected with the intake of food, with escape from danger, are all taken out of their natural special sense, appetite and instinctive 'schemata', and organised together by a persistent interest in a vocation, or in a sport, or in a particular department of human knowledge.

Such interests are very persistent, and their materials are collected from all sorts of sources. Consequently, striking features of a presented whole may, by the interest, be carried along in an individualised fashion and, in the form of sensorial images, or of language, may directly influence reactions, long after their original stimulus occurred. Now this reshuffling of the mass of organised experience and reactions which the growth of interests demands is dependent upon that very same capacity to turn round upon one's own 'schemata' required by the constructive character of remembering. In this way, the work of the interest-determined image is also dependent upon the appearance, or if we prefer to put it so, the discovery of consciousness.

It now becomes possible to see that, though we may still talk of traces, there is no reason in the world for regarding these as made [212] complete at one moment, stored up somewhere, and then re-excited at some much later moment. The traces that our evidence allows us to speak of are interest-determined, interest-carried traces. They live with our interests and with them they change. Well may Philippe write of our living, vital, constantly changing images. Even in such simple cases as that of my subject with the proper names, a "K" has changed to a "C", an auditory 'schema' mingling with a visual one, and, in a way, overthrowing it in this one respect. Generally, as I have shown again and again, far more radical changes are found, even if we confine ourselves to striking and apparently individualised items in what is remembered.

## 6. THE DEVELOPMENT OF 'SCHEMATA'

Considerations of this kind raise a point which is vital in any psychological discussion of the ways in which we remember. Let us ask again, How are our active organised settings, our 'schemata', developed? If Head is right, as I think in this case he indubitably is, they often follow the lines of demarcation of the special senses. But the special senses are all, in any given case, senses of one organism. Material that is touched is generally also seen, and it may be heard, smelt, tasted simultaneously. So the same material goes, from the point of view of experience, or of reaction, into different 'schemata'. Again, what is now explored cutaneously may be studied by vision, or by hearing on another occasion, once more with the same result, so far as the organisation of 'schemata' is concerned. Suppose appetites, or instinctive tendencies, set the lines of organisation. Different appetites and different instinctive tendencies are not isolated. Their ranges of operation overlap continually. In the search for food, for instance, danger may be met and may have to be overcome. When interests and ideals develop, the same characteristic is yet more markedly present. If, then, we have to treat the traces as somehow living and carried along with these active factors of 'schematic' organisation, it is no wonder that they change, that they display invention, condensation, elaboration, simplification and all the other alterations which my experiments constantly illustrated. Moreover, because there is this notable overlap of material dealt with by different 'schemata', the latter themselves are normally interconnected, organised together and display, just as do the appetites, instinctive tendencies, interests and ideals which build them up, an order of predominance among themselves. This order of predominance of tendencies, in so far as it is innate, is precisely what the psychologist means by 'temperament'; in so far as it is developed during the course of life subsequent to birth, it is what he means by 'character'. Thus what we remember, belonging more particularly to some special active pattern, is always normally checked by the reconstructed or the striking material of other active settings. It is, accordingly, apt to take on a peculiarity of some kind which, in any given case, expresses the temperament, or the character, of the person who effects the recall. This may be why, in almost all psychological descriptions of memory processes, memory is said to have a characteristically *personal* flavour. If this view is correct, however, memory is personal, not because of some intangible and hypothetical persisting 'self', which receives and maintains innumerable traces,

re-stimulating them whenever it needs; but because the mechanism of adult human memory demands an organisation of 'schemata' depending upon an interplay of appetites, instincts, interests and ideals peculiar to any given subject. Thus if, as in some pathological cases, these active organising sources of the 'schemata' get cut off from one another, the peculiar personal attributes of what is remembered fail to appear.

However, I propose to come back to this point of the discussion later on, for perhaps a study of the social factors in recall may throw further light upon it (8); so for the present I will simply restate the outline of the theory, and leave the matter there.

## 7. A SUMMARY

Remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction or construction, built out of the relation of our attitude towards a whole active mass of organised past reactions or experience, and to a little outstanding detail which commonly appears in image or in language form. It is thus hardly ever really exact, even in the most rudimentary cases of rote recapitulation, and it is not at all important that it should be so. The attitude is literally an effect of the organism's capacity to turn round upon its own 'schemata', and is directly a function of consciousness. The outstanding detail is the result of that valuation of items in an organised mass which begins with the functioning of appetite and instinct, and goes much further with the growth of interests and ideals. Even apart from their appearance in the form of censorial images, or as language forms, some of the items of a mass [214] may stand out by virtue of their possession of certain physical characteristics. But there is no evidence that these can operate in determining a specific reaction, except after relatively short periods of delay. The active settings which are chiefly important at the level of human remembering are mainly 'interest' settings; and, since an interest has both a definite direction and a wide range, the development of these settings involves much reorganisation of the 'schemata' that follow the more primitive lines of special sense differences, of appetite and of instinct. So, since many 'schemata' are built of common materials, the images and words that mark some of their salient features are in constant, but explicable, change. They, too, are a device made possible by the appearance, or discovery, of consciousness, and without them no genuine long-distance remembering would be possible.

It may be said that this theory after all does very little. It merely jumbles together innumerable traces and calls them 'schemata', and then it picks out a few and calls them images. But I think this would be hardly fair criticism. All conventional theories of memory as reduplicative try to treat traces as somehow stored up like so many definite impressions, fixed and having only the capacity of being reexcited. The active settings, which are involved in the way of looking at the matter developed in the present chapter, are living and developing, are a complex expression of the life of the moment, and help to determine our daily modes of conduct. The theory brings remembering into line with imagining, an expression of the same activities; it has very different implications in regard to forgetting from those of the ordinary trace view; it gives to consciousness a definite function other than the mere fact of being aware. This last point is not entirely unimportant. There is an active school in current psychological controversy which would banish all reference to consciousness. It is common to try to refute this school by asserting vigorously that of course we know that we are conscious. But this is futile, for what they are really saying is that consciousness cannot effect anything that could not equally well be done without it. That is a position less easy to demolish. If I am right, however, they are wrong.

---

### Endnotes:

- (1) Ueber die Functionen der Grosshirnrinde: Gesammelte Mitteilungen mit Anmerkungen, Berlin 1890.
- (2) Studies in Neurology, Oxford 1920, pp. 605-6.

(3) *idem*, p. 607.

(4) Cf. H. Sturt, *Principles of Understanding*, Ch. III, Cambridge 1915

(6) W. S. Hunter, *Behav. Monog.* 1913, 2, *Psychol. Rev.* 1915, xxii, 479-89.

(7) Cf. MacCurdy, *Common Principles in Psychology and Physiology*, Cambridge, 1928, pp. 11-12.

(8) Cf. pp. 308-11.

---

Copyright note: Posted with permission of Cambridge University Press.