

THE RELEVANCE OF VISUAL IMAGERY TO THE PROCESS OF THINKING. III

By F. C. BARTLETT.

(*From the Psychological Laboratory, University of Cambridge.*)

1. *A psychological confession* (pp. 23, 24).
2. *Definitions* (pp. 24, 25).
3. *Some criticisms* (pp. 25, 26).
4. *An outline of a general theory* (pp. 26-29).
5. *Conclusions* (p. 29).

1. *A psychological confession.*

PERHAPS I had better follow the lead of the first two papers and begin by a psychological confession. In my mode of mental work I seem to stand somewhere between Prof. Pear on the one hand and Dr Aveling on the other. I am not dependent for my introspective knowledge of the characters of visual images upon what I can remember of my dreams, but I have nothing like the luxuriance of visualization which Prof. Pear enjoys. When I read the account of the tennis at Wimbledon in the opening paper I was filled with astonishment, admiration and no small amount of envy. I tried to see how I could deal with a like situation, a University cricket match. I found myself with a mass of images, predominantly visual and auditory, but other kinds as well. These were all fragmentary, condensed, of very varying degrees of clearness and vitality, and excessively disorderly in their arrangement. By whatever laws their appearance was governed these seemed to have little to do with the original sequence of events. Order, shape, form and general coherence were obtained only as in between the scatter of images came tracts of words, and thus eventually I got the whole long game back again pretty completely, with a large number of its attendant circumstances.

Maybe it is because, whether for definite recall or for processes of thinking, I normally find that visual images have to come to the help of words, and words have to connect and arrange visual images, that I am far more interested in the functional question involved in our main problem than in the question of introspective description. These questions

have been very clearly differentiated by Dr Aveling, and, as he says, "introspection is necessary, but not sufficient" for the elucidation of the functional significance of the visual image.

2. *Definitions.*

Discussion in the absence of definition is more often than not discussion at cross purposes, and so I will first try to say what I mean when I use the words 'image' and 'process of thinking.' Highly controversial questions may be involved here, but I will state my view with little or no argument.

I take 'imaging' to be the reference to a concrete object or situation in the absence of peripherally aroused stimulation adequate to account for this reference. It is possible that there may always have to be *some* peripheral stimulation¹ but this is not the sole determining factor on the stimulus side of the reaction, and in many cases it cannot be regarded as the most important factor. 'Image' is the name we give to the way in which the concrete object or situation which is then referred to appears to us, when it appears in some sensory (in so far as this discussion goes, in some visual) mode.

'Thinking' is more difficult to characterize satisfactorily, because it is especially hard to frame any definition which cannot be charged with implications concerning the character of what is often called 'a thought,' whereas the definition should mainly or solely be meant to clear up how a term is going to be used. My view is practically identical with that set forth by Sir Henry Head in his recent volumes on *Aphasia and Kindred Disorders of Speech*. There are three outstanding characteristics of thinking: (a) it is a capacity for dealing with situations at a distance, and hence involves the *use* of signs, of which visual images are one sort; (b) it is a capacity for responding to the qualitative and relational features of a situation in their *general* aspect, and hence involves the *formulation* of signs; and (c) in the great majority of cases it is a capacity for utilizing these general qualitative and relational features in reference to a special situation, often of a concrete nature, and having a problematic significance. In other words, thinking is not merely a reference to a past situation; it is a reference to a past situation in such a way as to attempt to solve a present problem. And further, the mode of attempted solution adopted is always, in thinking proper, that of utilizing the general qualitative and relational features of the situations to which reference is more or less openly made. It is the 'problematic' character of the

¹ Cf. G. Dawes Hicks, "The Nature of Images." *This Journal*, xv, 121-48.

thinking process which makes the notion of 'relevance' of great importance at this level of reaction. Anything is relevant to the process of thinking which can aid its attempted solution of problems. Since, as I have said already, thinking *must* use signs, and since visual images are one sort of sign, visual images may be relevant to the process of thinking. But exactly how they may be relevant still remains to be discussed.

3. *Some criticisms.*

Before I deal with this problem I must try to state some difficulties which I find in the earlier papers. It is, for me, excessively hard to understand exactly what Dr Aveling means by 'a thought,' but if I have grasped his meaning aright he and I are certainly not referring to the same sort of thing. He appears to hold that a percept may, as it were, split up into two parts, 'a copy, representation or symbol,' and something else which is veritably the thought. The symbol, or the image is something which the thought can sometimes catch on to. If, however, we refer to a situation which has originally been presented perceptually, and there is no discriminable copy, representation or symbol in image or any other introspective form, we have that situation as 'thought.' Such a view has, of course, been held by others, and I am perfectly prepared to agree that this peculiar mode of reference frequently occurs. In admitting this I am accepting the important evidence cited by Dr Aveling and also a mass of more or less similar evidence which I have myself obtained in experiments extending over a long time past. But of this mode of reference I would prefer to use the word which is most frequently employed by observers when they adopt it, and I would call it *knowing*, not thinking an object or situation. I think it indisputable that we may know that which we do not perceive, or image, or otherwise symbolize. But I cannot see any good reason for calling what we then know 'a thought.'

In his present paper Prof. Pear has left what he regards as thinking to his reader's imagination. But he was more kindly disposed in an earlier discussion¹, and said that thinking involves: (i) Recall of past experiences; (ii) Abstraction of their relevant aspects; (iii) Comparison of those experiences; (iv) Re-comparison with some aim or aims in view; (v) Combination of the results into a novel conclusion; (vi) Expression of the conclusion. Except that (vi) might be ruled out, except that all these terms name a mass of psychological processes, and except that thinking is rarely as tidily articulated as this list of its components—all exceptions

¹ This *Journal*, xi, 72.

which Prof. Pear would probably wish to make himself—I have little to disagree with in all this. But I cannot help wishing that in his present paper Prof. Pear had tried a little more strenuously to say where exactly in regard to all these processes, visual images come in. That they are useful in (i) everybody agrees. That they may be used in (ii), (iii), (iv) and (v) nobody denies. But we want to know just what they can do in regard to all these functions and how they can do it.

4. *An outline of a general theory.*

I will therefore state in outline the view of the relation of processes of imaging to processes of thinking which I wish to adopt. Imaging and thinking possess alike the general function of enabling us to deal with situations at a distance. The biological value of this is too obvious to need detailed statement. In fact, having images and being able to think are further extensions of that process of developing long-distance receptors which is at the basis of the growth of the great brain.

The next step concerns the question of how this process of utilizing situations which are no longer immediately presented is achieved. At a very lowly level indeed we have the phenomena of lowered threshold in reactions, and, perhaps at a somewhat higher level, the growth of what Head calls *schemata*. A new incoming stimulus being presented it is reacted to with a certain acquired readiness, or set into relation with preceding stimuli having the same qualitative character, or with preceding situations having the same ‘instinctive’ significance.

Two things are very important about this level of the organization of reactions. One is that although a present stimulus or situation is reacted to by virtue of its relation to past stimuli and situations, the stimuli and situations of the past tend to operate rather as a whole mass than as individuals. It is unnecessary to assume that any specific bit of past experience is actually taken out of its setting and reacted to as if it were more or less independent of its background. This is the type of reaction of probably about nine-tenths of our daily behaviour, mental and physiological. The other thing is that reactions, and the representations of any objects and situations towards which reactions are made, at this level tend to be organized chronologically. There is a vast amount of experimental evidence for this: chain reflexes and ‘circular’ reactions at a lowly level; many of the phenomena of ‘conditional reflex,’ rote memories, the unwinding of habits, the tendencies towards relatively fixed serial reactions which we all show when we are tired, delirious, slightly intoxicated and the like. It seems as if processes of organic

adjustment are all the time striving to set up serial reactions, and as if, consciousness apart, the series is of greater weight than the elements making it up. Thus if the series fails at any part there is a tendency for complete collapse to set in or else for the whole series to begin over again.

This operation of past situations 'in the mass,' and this over-determination by chronological series are biologically unsound and uneconomical: unsound because they blur the diversity of actual environmental facts, uneconomical because to resume a whole series is often a shocking waste of time. To get out of these difficulties the method of images is evolved. I have no very definite idea as to the exact mechanism of the process; I wish I had, but in general the image is a device for picking bits out of schemes, for increasing the chance of variability in the reconstruction of past stimuli and situations, for surmounting the chronology of presentations. By the aid of the image, and particularly of the visual image—for this, like the visual sense, is the best of all our distance mechanisms of its own type—a man can take out of its setting something that happened a year ago, reinstate it with much if not all of its individuality unimpaired, compare, condense and combine it with something that happened yesterday and use them both to help him to solve a problem with which he is confronted to-day.

It will be apparent from this that I consider that most certainly the image is, in general, relevant to the process of thinking. I would in fact go further and say that in proportion as the *form* of thinking is to be given genuine material to work with so more and more must images be utilized in our thinking processes.

But to say that images are relevant in general to the thinking process is not to say that the latter is simply the utilization of the former. The device of images has its numerous defects which are the price of its peculiar excellencies. To take two of these only: the image, and in particular the visual image, is apt to go farther in the direction of the individualization of situations than is biologically useful, and the principles of the combination of images have their own peculiarities, resulting in constructions which are relatively wild, jerky, and irregular compared with the somewhat orderly march of thought.

Surely it is the first of these 'defects' that Napoleon is indicating in the saying to which Prof. Pear refers, and to nothing connected with horses, aeroplanes or even introverts. I think he means that any commander who approaches a battle with a picture before him of how such and such a fight went on such and such an occasion, or how the present fight is likely to go on this occasion, will find two minutes after the forces

have joined, that something has gone awry. Then his picture is destroyed. He has nothing in reserve except another individual picture, and this too will not serve him for long. Or it may be that he has then so multifarious and pressing a collection of pictures that equally he is at a loss what adjustment of practice to make. In fact we have to go farther than the image goes. We have not only to pick out situations and events from their general setting but we have to analyse the very things which we individualize, so that we may know what parts of them may flow and alter without disturbing their general significance and function. Visualization is rather deficient in its power to do this, and words, whether imaged or not, are relatively efficient exactly in this respect.

Much more important is a study, yet to be made in a thorough manner, of the modes of combination of images of the visual kind. In reference to an original situation a visual image may be of every stage of completeness, from the most fleeting fragment to the most literal reinstatement. It is demonstrable that what determines the 'weighting' of detail within the visual image more than anything else, are those personal factors of the nature of interest or bias to which Prof. Pear refers. Thus images readily combine and condense in one mental life which to another appear remarkably ill-assorted and incoherent. The passage from one image to others in a chain frequently seems to be achieved only by a series of agile leaps. And finally the typical visualizer often seems to have such a wealth of images, and these to have such a variety of characters that he is tempted to stop and describe them—often greatly to his own and others' aesthetic enjoyment—instead of getting on with his problem.

Thinking, if I am right, is biologically subsequent to the functioning of the image-forming processes. It is possible only when a way has been found of breaking up the 'massed' influence of past stimuli and situations, only when a device has been adopted for conquering the sequential tyranny of past reactions. It utilizes the image not because the latter reinstates the specific past, but only in so far as it has bearing upon the challenge without which no effort of thinking would ever be made. This means that in thinking the qualities and relations which find illustration in innumerable images, but whose general function cannot be put into the form of any sensory image, are predominantly important. Those qualities and relations are then somehow *formulated*, not merely illustrated or represented. And that is what makes the thinking process relatively precise, orderly, perhaps somewhat unexciting, and, as compared with images, 'the same for all.'

If I may turn for one moment to the problem of the *content* of images in relation to the aim of the specific process of thinking, it is in every case the thinking itself which determines whether or not the images which are utilized are relevant, and never the images that sporadically occur which determine the relevance of the thinking they may stimulate. Probably every visualist tends to use many more images than he actually needs objectively to put his thinking through. Some of those veritably contribute that concreteness and applicability to real experience without which thinking seems apt to relapse into mere verbalization; some are by-path meadows which he had better not explore; some, apparently useless for the nonce, are really signs that beneath the dilemma which prompts his present thought he is, maybe all unconsciously, stretching out towards some wider problem. By following the last he may go into a new land, and make eventually his most bright discoveries.

5. *Conclusions.*

I have tried to state a large and speculative hypothesis in a small compass. Obviously I have left most unsaid. I have spoken as if there may be a pre-image level, an image level, and a post-image level. But life is an evolution and to talk of 'levels' is to use a device for separating things and reactions which in fact run into one another. In particular, when we pass from one 'stage' to another we take with us the acquirements of the earlier and use most of them, transforming them to meet our enlarged problems. So the chronological method is utilized in imaging, and both it and the image methods are employed in thinking. How, it is for specific research to discover. Broadly I would maintain that those levels do exist, and are as I have stated them. This is a view which has in no wise been manufactured for the present discussion, but which has grown up gradually and in the main on the basis of experiments on imaging and thinking which I have tried to carry out during the past fifteen years. It has then some facts in its support which I hope some day I may be able to state more fully than has been possible here.