Modern Investigations of Mental Imagery.¹

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IT is necessary to distinguish at the outset between several types of revived experience. First there is the *after-sensation* (sometimes called the *after-image*), which is probably not revived at all but a persistence of the effect of the original stimulus. In vision this phenomenon is familiar to us as the positive after-sensation which reproduces the colour and brightness of the original stimulus, and the negative after-sensation in which the colour and brightness are complementary to those of the stimulus. Equally well-known phenomena are the memory images proper; those revivals of experience which may occur in the form of visual, auditory and other images; in fact there are probably as many types of such imagery as there are types of sensation.

Intermediate between these is the type of image which is the subject of this paper. In the last century it was described by Fechner and called by him the *memory after-image*. Until recently it has been called either by this name or the *primary memory image*. Only lately, however, has it been specially studied and in rather special circumstances.

These studies have been chiefly carried on at Marburg under the direction of C. R. Jaensch. These researches claim to have found certain unique and hitherto unrecognised characteristics of imagery in children. Some of the work has been repeated and the conclusions carefully checked by G. W. Allport of Cambridge. From his article on "Eidetic Imagery" (*British Journal of Psychology*, 15, 1924, 99-120) much of the present summary has been taken.

The modern investigators call the image which they are describing an "eidetic image." It differs from an ordinary visual memory image in many ways. Most common among these is that while in the case of a visual image a former visual perception is merely imagined, in the eidetic image the original object is actually "seen" projected in space. It can be seen particularly well when the eyes are closed in a dark room.

Results show that approximately 60 per cent. of all children between the ages of 10 and 15 are able to produce eidetic images. During adolescence this ability retreats. There seems, however, a considerable probability that a large number of poets and artists are in this respect "grown-up children." If this be true, it explains several puzzling points in con-

nexion with poets' and artists' description of their own imagery.

Characteristics of the eidetic image may be summarised thus:

It is literally and truly "seen."

Attention when observing it is directed outwards.

It is usually localised against any background and is never entirely unlocalised.

Though possessed of an outer character like a true perception, it is always recognised as a distinctly subjective phenomenon. It differs both from the memory image and the after-image by its extraordinary richness in detail. This richness in detail is much less dependent upon the structuration in its contents. (The structuration is observable in an ordinary memory image, when a detail particularly interesting to the observer, acting as a nucleus, tends to collect around itself characteristics depending upon it.) In the eidetic image details are frequently observed which do not appear to have this dependence upon the observer's interest. Children have reported details with extraordinary fidelity; e.g. the length and direction of the lines of shading in a stretch of roadway, details unrelated to any "nucleus" in the original picture.

The eidetic image is unusually persistent and often returns. When it does return its details are often extraordinarily accurate. It may be that the so-called hypnagogic images which appear to many normal people just before falling asleep are of the eidetic type. But apparently the exclusion of borderline and pathological phenomena from this conception of the eidetic image makes it impossible at present to discuss this connexion.

There appears to be little doubt of the importance of the study of this eidetic image both for an understanding of the mentality of the developing individual and for a better comprehension of certain questions connected with literature and art. In the realm of applied art it is not impossible that a knowledge of this type of imagery and its occurrence among adults might be of use in the work of the poster artist. For many posters are seen while the observer is in motion, and their details, therefore, are possibly apprehended after the poster has disappeared from the visual field.

The relation of this work to psychopathology, more particularly to the question of pseudo-hallucinations and the type of mentality subject to them, is of the first importance.

¹ Summary of paper read before the Manchester Literary and Philosophical Society, April 28.

Periodicity in Weather and Solar Phenomena.¹

ALMOST any series of numbers when plotted shows indications of more or less regular sequences; meteorological statistics are no exception to this rule. These recurrences can be investigated by some method of periodogram analysis, and the result is a periodicity or cycle. There exist, however, certain mathematical criteria which can be applied to the results, and when this is done, it is found that the greater number of meteorological periodicities either vanish or at least become highly suspect. According to orthodox views, a cycle should remain constant in length; if it breaks down for a time, it should reappear at the correct phase, and meteorological periodicities do not often behave in the orthodox fashion. Even solar periodicities suffer from this defect, the well-known eleven-

year sunspot cycle undergoing marked variations in length.

Mr. H. W. Clough attempts to get over the difficulty by considering the wave-length of a periodicity as itself a periodic function. In 1905 he found that the length of the sunspot cycle has a periodicity of about 36 years, the "Brückner cycle"; this 36-year periodicity, however, is itself not constant, its length varying during a longer cycle, estimated at 300 years. He has now investigated a shorter periodicity in sunspots, pressure and temperature, to which various investigators have assigned lengths ranging from 2.5 to 3.5 years, and he finds that it behaves in the same way, its length averaging 2.33 years and varying from 1.5 to 3.5 years according to its position both in the 11-year cycle and in the 36-year cycle. The material which he employs consists of composite series of temperature (1730-1924) and pressure (1743-1924) in

¹ "A Systematically Varying Period with an Average Length of 28 Months in Weather and Solar Phenomena," Washington, *Monthly Weather Review*, vol. 52, 1924, pp. 421-441.