

work cause a diminution in the volume of the arm. "Whenever the stimulation (odor) occasions an increase in the volume of the arm, as sometimes happens, it seems to be due to acceleration of the heart rate, which, of course, tends also to increase supply of blood to the brain." But no support is afforded to the view "that pleasant sensations are accompanied by a diminution of the blood supply to the brain and unpleasant sensations by the reverse effect." In the statement of these conclusions and throughout the dissertation, there is a cautious tone which in no way lessens the value of the work.

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Attention: Experimental and Critical. By FRANK DREW.
American Journal of Psychology, VII., 533-573. 1896.

The experimental part of Dr. Drew's study consists of three distinct lines of work: *A*, measurements of reaction and association times of various degrees of complexity under various conditions of distraction; *B*, a qualitative study of association by Galton's method (*Human Faculty*, pp. 185 ff.) with concentrated and distracted attention; and *C*, a study of the recognition of the order of nearly simultaneous stimuli with voluntarily directed attention.

Though many reactions were taken for *A* and the general results were in substantial agreement with those of other observers, they were not regarded as satisfactory and no use is made of them here except as they furnished introspective and other casual observations.

In *B* the question was: What effect, if any, is produced in the normal run of association by distraction? Tests were made in parallel series: in one the experimenter looked at the stimulus word and then gave himself up to securing as many associations as possible within a fixed interval, at the end of which those gotten were noted; in the other he tried to do the same thing while adding a number of digits requiring an approximately equal time. Four sets of 100 stimulus words each were used and each set was gone over twice at intervals of a month, the repetitions being sometimes arranged to duplicate the first conditions and sometimes to alter them, as shown in the following little table.

First time.	Second time.
1st Set: Distraction	Distraction
2nd Set: Concentration	Concentration
3rd Set: Distraction	Concentration
4th Set: Concentration	Distraction

In this way over 3,000 associations were collected and treated statistically. The most striking result is the relatively small effect produced by the adding.¹ There is a somewhat larger proportion of fresh associations in the second trial of sets first gone over with distracted attention than in those first gone over with concentrated attention; the sets with concentrated attention show more associations from the last three-fifths of life (excluding the immediate past); there is an indication that word jingles and purely verbal associations are interfered with by the adding, probably because the language apparatus is partially taken up by that activity; but in almost every case the percentage of difference is small. This result, though at first surprising, is not so strange when the conditions of the experiment are regarded. It seems likely, on the one hand, that the haste of getting the greatest number of associations in a limited time and from a single word is a distraction in itself, and on the other that many associations in the series with adding are secured in momentary wavering from that task. Two incidental observations are of some interest, namely, that the first thing to follow the sight of the stimulus word (when the novelty of the experiment had worn off) was almost always a mental pronunciation of it which furnished the nucleus from which the associations developed; and second, that almost all associations were given a 'spatial setting' or localization in motor or visual-motor terms. This latter was often the first thing to come and was tardily followed by the other elements of the association.

The third line of experiments had to do with the time order of nearly simultaneous stimuli, and the question took this form, namely: Given a pair of stimuli (two clicks, for example, addressed one to each ear) so near together that their order can just be recognized, will any change be produced by voluntarily attending to one or the other? A very little work on this matter had already been done by Dr. Alice J. Hamlin (*American Journal of Psychology*, VI.), but with negative results. The stimuli used by Dr. Drew were telephone clicks (one to each ear), electric shocks (one to each hand) and a click and shock to ear and hand; the interval for the first two pairs was 0.024 sec. and for the click and shock 0.031 sec. Parallel series with balanced attention and attention concentrated on one side or the other were taken in considerable variety, chiefly upon two subjects. The

¹This experiment was made by Drew on himself. A similar series under slightly varied conditions was undertaken by the writer at the same time and the statistics partially worked up. Drew's general negative result is supported by them.

following are the most important results: With two clicks concentration of attention is a positive hindrance, fewer right judgments being made on the average, and still fewer (relatively) when the stimulus arrived first on the side to which attention was directed, due possibly to an unconscious change in the manner of judging. To test whether the criterion by which the order was judged was one of intensity, experiments were made with loud and faint clicks, and it was found that both subjects tended to call the fainter the earlier. With shocks it was found (contrary to the click results) that attention to one side or the other favored the stimulus received on that side. With strong and weak shocks the fainter again seemed earlier, but the tests on this point are few and not fully accordant. When the subject was distracted from both shocks by being required to read aloud, there was in no case a decrease in accuracy and sometimes a decided gain. The experiments with disparate senses (ear and hand) show, with balanced attention, a strong bias in favor of the order shock-click, which renders difficult the interpretation of the results with directed attention. Both subjects show gain with directed attention, but disagree as to whether it is more advantageous when directed toward the leading stimulus or the other. Such biases were also found at other stages of the work and add greatly to the laboriousness of the experiments and the complexity of the results, especially as they were not constant, but underwent slow changes as the research continued. Introspection under the conditions of the experiment was also singularly difficult and threw little light upon its real nature.

To make a generalization which shall unify these varying results is hardly possible until further experiments have established more fully the effects of several of the factors involved. While not undertaking to do this, Dr. Drew makes many suggestions and presents a theory of perception, apperception and attention which was developed in considerable part by these experiments. It is an extreme example of those that would reduce mind almost or quite to kinæsthetic terms. For the detail of it the reader must consult the paper itself, though with the warning that in parts the thought suffers much from obscurity of presentation.

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ANTHROPOLOGY AND CRIMINOLOGY.

Psychologie der Naturvölker. Ethnographische Parallelen.

JACOB ROBINSOHN. Leipzig, Friedrich, 1896. Pp. i + 176.

This is a very comprehensive title for a rather contracted work.