

extent to which we possess the abstract feature of its extension ; still, up to a certain point at least, the extension which we have psychically present is the same as that which qualifies nature. The objection that if psychical states are extended they will collide with one another or with other extended things, is groundless. Spatial things need not be related spatially at all. The soul contains many disparate extensions. Is, then, the soul extended? In respect of certain of its states, the answer must be as given ; but in itself, and as a whole, the answer is emphatically, No. For extension is for it not an all-pervasive, but only a particular and subordinate quality ; whereas in the physical world it is taken as primary and predominant.

By way of appendix, Mr. Bradley formulates his doubts respecting the 'extensity' regarded by James and Ward as lying at the basis of our perceptions of space. These writers, he says, unite in what are perhaps two errors : claiming to observe extensity as a fact and denying in effect all non-extensive volume. Volume, he finds, indeed, everywhere, but either as implying space outright or as involving something less than extensity. By extensity he apparently understands the quality of 'side-by-sideness.' Nevertheless, while declining to identify volume with extensity, he goes on to mention two aspects of volume—viz., 'its intensiveness and its extent' as present and given, but not distinguished and developed, even in *mere* volume. But is not this undistinguished and undeveloped aspect of extent present, as Mr. Bradley implies, in all sensations, precisely what Ward, wrongly, perhaps, denying plurality to the intensive aspect, means by that 'latent or merged plurality' by which he defines 'extensity?' Whether extensity, in this sense, can be now observed is a separate question. Mr. Bradley admits that some such quality must be postulated.

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EXPERIMENTAL.

Ueber die Beeinflussung einfacher psychischer Vorgänge durch körperliche und geistige Arbeit. SIEGFRIED BETTMANN. Psychol. Arbeiten, I, 152-208. 1895.

Herr Bettmann's paper is a study of the mental fatigue effect of physical and psychical work. To secure uniform conditions, the experiments were all made immediately after awaking, the duration of sleep being carefully regulated. The subject (the author himself) arranged his mode of life methodically, avoiding any excite-

ment or labor outside of that required for the tests, and abstaining from tea, coffee and stimulants during the entire period covered by the experiments. The mental labor consisted in adding columns of figures for an hour; the physical labor chosen was to walk rapidly for two hours. The two tasks were performed on different days; at the close of the exercises a series of Choice Reactions were made. To furnish material for comparison, a reaction series was made on other days at the same hour without preliminary exercise. The subject had already reduced his reaction-time by weeks of preliminary practice. The results show: (1) for normal days (*i. e.*, without exercise) a slight reduction of the average time during the first sixty reactions, then a gradual increase to about 300σ at the end of 300 reactions; (2) for the days of mental exercise, a very constant average of about 380σ during the entire series of 300 reactions; and (3) for days of bodily exercise, a steady *decrease* of the times from about 300σ to 230σ —some of the figures running as low as 190σ . On the other hand, the last case shows about 25 per cent. of anticipations to 1 per cent. for the tests following mental exercise, and 2.5 per cent. for normal days.

The results indicate that mental impairment follows from physical as well as from psychical labor; in the latter case the reaction-times are shorter, but the enormous number of anticipations neutralize any gain from this source. Some further experiments, in which the tests were word-reactions and the facility of learning twelve-place numbers respectively, serve to accentuate this effect: as the difficulty of the tests was increased, the apparent advantage of the physical exercise was rapidly lost.

The author criticises the results of Mosso and Vintschgau, on the ground that their conditions of experimentation were too complex to admit of discrimination between various affecting influences; in his own experiments the conditions were as simple and uniform as it seems possible to make them.

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Minor Studies from the Psychological Laboratory of Clark University: under the direction of E. C. SANDFORD. VIII. *A Study of Individual Psychology*, CAROLINE MILES. IX. *The Memory After-Image and Attention*, A. H. DANIELS. X. *On the Least Observable Interval between Stimuli Addressed to Disparate Senses, and to Different Organs of the same Sense*. XI. *Notes on New Apparatus*, E. C. SANDFORD. *Am. Jour. Psych.*, VI, 534-584. Jan., 1895.

VIII. The psychologist cannot hope to solve all his problems by