

A BRIEF NOTE ON EXTRAVERSION AND PERFORMANCE

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An experiment by Cohen and Horn purporting to test Eysenck's theory of extraversion is criticized on the following grounds: (a) unsuitable sample, (b) lack of proper experimental control, (c) failure to choose appropriate parameter values, and (d) improper theoretical formulation. It is argued that the results throw little light on the nature of extraversion-introversion nor on the theory of cortical inhibition.

The report by Cohen and Horn (1974) testing Eysenck's theory of extraversion raises several questions which must cast doubts on any interpretation of the results. The first doubt relates to the sample tested. There is a high negative correlation of around .4 between Neuroticism and Extraversion on the Maudsley Personality Inventory (MPI); this correlation is greatly in excess of that which is usually found. Impulsivity correlates negatively with Neuroticism; this is opposite in sign to the correlations usually found. Given that the MPI has been used very widely on many thousands of subjects, including both student and nonstudent samples, one would have to conclude that Cohen and Horn's sample was quite unlike those on which the scale was standardized, either in the United Kingdom or the United States, and also unlike other non-clinical samples on which experimenters had reported in the literature. It is not clear how results might be influenced by any possible process of selection that might have taken place, but if the intrainventory correlations are quite unlike those reported by other investigators, one cannot have too much confidence in the correlations found between the scales and outside tests.

Cohen and Horn elected to test an early form of my theory (Eysenck, 1955), which was considerably changed in a later book (Eysenck, 1967), and they selected tests which have not stood up too well to critical evaluation. Both the Necker cube reversal and the Archimedes spiral aftereffect are affected by eye movements, blinks, and other artifacts (Holland, 1965). A proper test of the theory would have to control or eliminate such artifacts that are not unconnected with personality (Franks, 1963). Furthermore, theories that used to be current in the early 50s about the nature and causation of these

phenomena are not favored any longer; therefore, a new theoretical analysis about the relevance of these phenomena to any concept of "inhibition" or "arousal" is required. It seems possible, for instance, to explain the Archimedes spiral aftereffect in terms of Hubel and Wiesel's perceptual analysis (Masland, 1969). If this were so, then Cohen and Horn would have to demonstrate just what kind of deduction (if any) could be made in relation to personality.

It certainly does not now seem likely that a theory of inhibition can give an adequate explanation of these phenomena. In a similar way, the explanation of reminiscence in terms of inhibition and the dissipation of inhibition during rest has been abandoned, and a theory of consolidation substituted (Eysenck, 1965). As it turned out, the new theory made the same prediction as the old regarding the correlation between extraversion and reminiscence for *short* rests; however, it made quite contrary predictions for *long* rest periods, so that we now have evidence for both types of rest pauses (Eysenck, 1974), confirming the consolidation theory and in part contradicting the inhibition theory. All predictions from personality theory are mediated by additional theories regarding the explanation of the particular experimental phenomena in question. If the test used by Cohen and Horn could still be regarded as measures of inhibition, then their conclusion that "the theory that extraversion . . . is based on cortical inhibition is not supported by the data [p. 304]" would follow (provided that the other criticisms enumerated in this note could be disregarded). But while the truth of this minor premise is now very much in doubt, these tests cannot be used to establish the truth or failure of the major premise, that is, the general theory of personality.

The term *distraction*, too, cannot any longer be left undifferentiated when the personality dimension of extraversion is conceptualized in terms of cortical arousal, rather than of Hullian inhibition. Certain types of stimuli can be re-

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garded as either "distractors" or "arousers"; white noise, for instance, can be regarded as either. The recent article by Shigehisa and Symons (1973) indicated both the theoretical complexity of the problem and the need for careful experimental control; proper theoretical formulation and experimental control are both required to produce meaningful and significant results. These authors measured auditory thresholds under 10 conditions of varying light intensities. Their prediction was that for extraverts, increasing intensity of light would produce a lowering of auditory thresholds; for introverts, only the lowest intensities would have this effect, with a reversal for higher intensities. For ambiverts a reversal was predicted at an intermediate level of light intensity. All these predictions were verified. In terms of distractors and arousers one might say that the light acted as an arouser for extraverts under all conditions but acted as a distractor for introverts under all but the least intense conditions, with ambiverts intermediate. Thus proper theoretical analysis must precede meaningful experimentation, and quantitative measures of stimulus strength are mandatory.

The work just described was done in properly controlled conditions, that is, in a soundproof experimental room at a stated ambient noise level. Cohen and Horn gave no information of the conditions under which their experiments were conducted. It seems likely that there were many uncontrolled sources of sound, and possibly sight, that might have quite unpredictable distracting (or arousing) effects on the course of the experiment. If anything has become quite clear in the development of experimental work on extraversion-introversion and its relation to the traditional fields of experimental psychology (memory, perception, conditioning, learning, etc.), it is that experimental controls must be very strict, and theoretical formulation of the problem very precise, in order to obtain replicable results (Eysenck, 1971). Furthermore, control of parameters, preferably in line with theoretical prediction, has become mandatory. The Shigehisa and Symons (1973) experiment is one example of this and the Eysenck and Levey (1972) experiment on eye blink conditioning another. It was shown in the latter experiment that the correlation between introversion and eye blink conditioning was affected in a predictable manner by varying such parameters as the conditioned stimulus-unconditioned stimulus interval, unconditioned stimulus strength, and partial versus 100% reinforcement. It even

proved possible to invert the sign of the correlation by suitable choice of parameter. Cohen and Horn presented no rationale for their choice of parameters (e.g., duration of rotation of spiral, length of exposure of Necker cube) nor did they present results for different parameter values. It is unlikely that by sheer chance they would have hit on the optimal value for these and other parameters.

The literature suggests that while some authors have found significant correlations between extraversion and the variables studied by Cohen and Horn, others have failed to do so. This suggests that parameter values are crucial in determining the outcome of any experiment. It is possible, in the experiments on reminiscence, conditioning, and auditory thresholds quoted, to make a choice of parameter values which would give a positive, negative, or zero correlation between introversion-extraversion and the experimental variable in question. This may account for the bewildering variety of results reported in the older literature. When such a situation is found, it is clearly not adequate to select a parameter value at random; what is required is a careful formulation of the theory in such a way that the parameter values form part of the theory. The three examples given illustrate how this can be done. In the absence of such theoretical considerations, none of the investigators in question would have been in a position to arrive at positive results and also explain the occurrence of negative results in past experiments.

In summary, it would seem that this experiment is of little relevance to the most recent form of the personality model the authors set out to test; that the population tested is unlike most other populations tested and, hence, quite unrepresentative; that the amount of experimental control exercised was minimal and well below acceptable limits; that parameter values were chosen at random and that no attempt was made to discover optimal parameter values; and that the formulation of the theoretical position was incomplete and left out recent theoretical developments. It is difficult, for these reasons, to regard the experiment as relevant to the theory of extraversion-introversion.

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