

ORDER OF DOMINANCE IN CUTANEOUS PERCEPTION

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On simultaneous stimulation of the face and the hand with cutaneous stimuli a consistent pattern of response has been observed in which errors in perception are more frequent on the hand than on the face. In this test situation the face is said to be dominant over the hand. The pattern of face dominance can be found in normal and schizophrenic adults but is particularly evident in patients with organic mental syndrome and in children 3 to 6 years of age. The pattern was so conspicuous that it prompted us to study different stimulus combinations in order to determine whether consistent patterns occur for body parts other than the face and hand.

The method of testing in the present study was similar to that described previously. The subject was requested to close his eyes and two parts of the body were touched simultaneously. He was asked what he felt and to localize the stimuli.

Twenty patients with organic mental syndrome due to diffuse disease of the brain formed the main group of subjects. The following parts of the body were studied: face, shoulder, hand, back, breast, abdomen, genital region, buttock, thigh and foot. All 45 possible combinations between these body parts were tested so that each of the areas was tested in combination with every other area. Ten tests of each combination were done in every patient in a randomized order. These included testing the body areas in both heterologous and homolateral relationships. Five hundred and forty tests of simultaneous stimulation were done on each patient.

A second group of 1784 subjects consisting of 660 normal adults, 584 schizophrenic adults and 540 patients with organic mental syndrome

were also studied. The subjects in these groups were tested with simultaneous stimuli but not in as many combinations as was done in the previous group. Only 13 of the 45 possible body combinations were studied and different groups of patients were used for each combination. At least 10 tests were done on every patient. Particular attention was directed to the initial response.

The responses on simultaneous testing in all subjects fell into two general groups. The subject either reported both stimuli correctly or reported only one stimulus correctly and either did not perceive the second stimulus (extinction) or mislocalized it (displacement). The total number of errors in perception over one part of the body as compared to the other part of the body in each combination were analyzed by statistical methods.

In the first group of 20 patients with organic brain disease tested by the method of multiple trials there were 27 combinations in which the difference in the frequency of extinction and displacement in the two body parts tested was statistically significant. This occurred in all combinations in which one of the two parts was the face, the genital zone (male and female), or the hand. In the combinations involving the face or the genital zone errors in perception were more frequent in parts of the body other than these body areas. The face and the genital zone may be said to be dominant to all other areas of the body. In combinations involving the hand there were more errors in perception of the hand stimulus than in any other paired part of the body. The hand may be said to be the least dominant area of the body. There were four additional combinations in which dominance was manifested. The buttock was dominant over the back and shoulder, the breast was dominant over the back, and the back was dominant over the thigh.

An analysis of the responses of the second group of patients with organic mental syndrome who were tested in a single body combination rather than in multiple combinations showed a similar pattern. There were a few important exceptions however. The face was found to be strongly dominant over the genital zone, the foot dominant over the thigh and the buttock dominant over the foot. These relationships were not apparent in the group of patients tested by the method of multiple trials.

The foregoing results show that on tests of double simultaneous stimulation in patients with organic mental syndrome, the various parts of the body exhibit a definite relationship to one another. This is manifested by varying degree of dominance which may be considered as a gradient of sensation. At the top of the gradient is the face. The genital zone is slightly less dominant than the face but is dominant over all other parts of the body and is thereby the next body area in the order of dominance. At the other end of the gradient is the hand. The remaining areas of the body fall between the face and genital zone and the hand. These body parts tested in combination with each other failed, for the most part, to yield differences in dominance among each other. The combinations in which dominance was manifested showed a tendency for the buttock, abdomen, breast, and foot to be the more dominant parts and the back, shoulder, and thigh to be the least dominant parts within this group.

In the series of normal and schizophrenic adults there were only two combinations in which the difference in the number of errors between the two parts stimulated was statistically significant. The face was dominant over the breast and the breast was dominant over the hand. In both instances the pattern of dominance was similar to that seen in patients with organic mental syndrome.

The order of dominance demonstrated by simultaneous testing in which the face and the hand form the extremes of a gradient among the body parts has also been demonstrated in subjects other than those with organic disease of the brain. These include normal children 3 to 6 years of age, normal adults with transient dysfunction of the brain due to anesthesia, intravenous sodium amytal, or electric-shock therapy, and mental defective adults with mental age under 7 years. Not all the possible body combinations have been tested in these several groups. However, of those combinations that have been studied a pattern is apparent in which the face is the most dominant area and the hand the least dominant.

As for a theory as to why such an order of dominance exists, none is available. It appears to be an inherent pattern of organization within the normal organism which is exaggerated in patients with disease of the brain.