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BARRIER AND PENETRATION SCORES IN RELATION TO SOME OBJECTIVE AND SUBJECTIVE SOMESTHETIC MEASURES[1]

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Summary.—Barrier and Penetration scores in relation to some variables, such as muscular tone at rest, sensitivity to tickle, and body perception were studied in a group of 35 female subjects. While no correlations appear within the whole group of subjects between Barrier scores and the other variables, an inverse relation emerges between Penetration scores and muscular tone on the left side of the body. Dividing subjects on the basis of Barrier scores, three groups with different characteristics appear: 12 subjects with high Barrier scores show an inverse relation of Barrier scores with sensitivity to tickle on the right side of the body; 12 subjects with middle Barrier scores show a direct relation of Barrier scores with muscular tone and an inverse one with both latency of tickle on the right half of the body and body perception; 11 subjects with low Barrier scores show an inverse relation of Barrier scores with durations of tickle on both sides of the body.

Research (Fisher & Cleveland, 1968; Fisher, 1970) has been done to verify the role played by experience of bodily boundaries on the building of the body image and on the interaction with the environment. About this matter, Fisher and Cleveland (1968) have pointed out that the subject with definite boundaries attaches importance in his body schema to the boundary regions of his body (particularly muscles and skin), regions which play a prominent role in the interaction with the environment. This person has a bent for contacting and actively coping with the outside environment.

The study of definiteness of boundaries was carried out by Fisher and Cleveland (1968) using Barrier and Penetration scores which are obtained "from the qualities ascribed to imaginative images evoked by inkblot stimuli" (p. 146). The Barrier and Penetration scores were related by these authors to both physiological indices (muscular tone, cutaneous sensitivity, autonomic variables) and indices of body awareness. They found that the subjects with high Barrier scores, that is, subjects with well-defined boundaries, showed higher reactivity in muscles and skin and lower reactivity in inner parts of the body. The opposite occurs for the subjects with low Barrier scores. Moreover, they found for women Barrier scores were positively correlated with body awareness as measured by the Body Prominence Test.

In our previous research (Ruggieri, *et al.*, 1983) we reported a negative correlation between muscular tone at rest and body perception which, in its turn, is negatively correlated with resistance to the perception of pleasurable

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tactile stimuli (latency of tickle) on the left half of the body. We recall that, in this research, the body perception was studied by our Body Perception Test which measures the intensity of conscious self-perception of parts of the body in conditions of rest. In this way body awareness is evaluated through the role that the single parts of the body play in the mechanism of bodily perception.

From these results it can be inferred that somesthetic experience plays an important role in the process of formation of body image. We must study how the Barrier and Penetration scores are related to the level of muscle tone at rest and tactile sensitivity to tickle and also to body perception as measured by our Body Perception Test (Ruggieri, *et al.*, 1983).

METHOD

Subjects

Subjects were 35 right-handed female undergraduates in psychology, aged between 20 and 30 yr., with a mean age of 25 yr.

Procedure

Four different measures were made in random order: muscular tone at rest, tickle sensitivity, body perception, and boundary definiteness.

Muscle tone at rest was measured by electromyographic equipment using surface bipolar electrodes. The electrodes were tin cups 8.5 mm in diameter and spaced one every 7 mm. They were filled with electrode jelly and strapped on with adhesive plaster. The changes in frequencies of the EMG potential, amplified by an amplifier with band passing between 60 and 1200 Hz, were transferred into a digitalized signal by means of zero-crossing apparatus. The digitalized signal was converted into a tension-signal by an integrator, expressing a difference in potential as proportional to the EMG potential frequency. The tension signal was sent to a tension-frequency converter and then to a decoding counter. The decoding counter showed the mean integrated frequencies appearing in 1 sec. The method of zero-crossing used by us is based on the literature describing measurement of relaxed muscles (Budzinsky & Stoyva, 1973).

Left and right myographic scores of zygomatic, sternocleidomastoid, pectoral, rectus of the abdomen, adductor, and brachio-radialis muscles were taken in random order. For the zygomatic muscle the electrodes were placed both on the right and left cheeks immediately under the zygomatic bone; for the sternocleidomastoid muscle both on the right and left midway between the mastoid apophysis and the sternum; for the pectoral muscle both on the right and left hemiclavear linea about 10 cm from the clavicle; for the rectus muscle both on the right and left planes passing through the umbilicus about 3 cm from the umbilicus itself; for the adductor muscle both on the right

and left medial faces of thigh about 5 cm from pubic symphisis; for the brachio-radialis muscle both on the right and left two-thirds superior of the forearm. The ground was placed on the right wrist. For each muscle a mean score based on five measures was obtained, each measure lasted 1 sec. Electromyographic recordings were taken after a 5-min. relaxation.

Tickle sensitivity was measured by vertical stimulation of the body parts corresponding to the examined muscular areas along about 5 cm, with a wad of cotton weighing 3 mg. The frequency of stimulation was 1 skim a second for a maximum of 120 sec. Each subject was instructed to signal by the word "yes" the appearing of the tickle sensation as pleasurable, different from simple touch, causing "goose pimple" and slight disquiet, and by the word "no" the disappearance of the tickle sensation which was replaced by a simple tactile sensation. Two scores were obtained: a latency score from the beginning of stimulation to the beginning of tickle perception, and a duration of tickle score from the beginning of tickle to its modification. When the tickle perception did not occur, we assigned a time of 130 sec. as the maximum latency. If the tickle perception was not replaced by other sensations, either negative or neutral, we assigned a maximum duration of tickle of 130 sec.

Body perception was evaluated by presenting a drawing of a nude human figure to the subject. This figure was depicted in full, in anterior and posterior perspective, with such adequate particularities to be identified as a figure of the same sex as the subject. Moreover, in the figure the right and the left halves of the body and, transversely, several body parts in the cephalocadual direction were identified by hatch marks. The subject was given the following instructions: "After you have relaxed and taken a position as comfortable as possible, pay attention to the way you perceive your body and those parts of which you are aware. Indicate on the drawing by a score from 1 to 10 the degree of intensity of the perception of the parts of your body, no matter if in a pleasurable or painful way. You can indicate by zero the parts you do not perceive."

The measures of boundary-definiteness (Barrier and Penetration scores; Fisher, 1970) were obtained on the Holtzman Inkblot Technique.

All the measures were made in the morning and in random order on different days by three different female experimenters. For the myographic and tickle sensitivity measures, the subjects, individually tested, lay on a medical-type cot in a laboratory room wherein the temperature was always 26° C.

RESULTS

Barrier Score, Muscular Tone at Rest and Sensitivity to Tickle

The mean scores for each of the examined variables are indicated in

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR ALL VARIABLES ($N = 35$)

Measure	*M*	*SD*
Myographic score		
Right	88.13	17.36
Left	88.47	18.78
Latency (sec.)		
Right	6.01	8.74
Left	15.03	14.27
Duration (sec.)		
Right	48.82	40.36
Left	45.01	38.77
Total body perception	165.80	102.56
Barrier score	6.91	2.97
Penetration score	4.00	1.91

Table 1. Within the whole group of subjects there are no Pearson correlations of Barrier scores for muscular tone, latency, or duration of tickle.

Dividing subjects on the basis of Barrier scores, we have obtained three groups: middle Barrier group ($n = 12$), whose Barrier scores correspond to the statistical mode and mean value (from 6 to 7), high Barrier group ($n = 11$) with Barrier scores from 8 to 14, and low Barrier group ($n = 12$) with Barrier scores from 1 to 5.

Pearson's correlations among Barrier scores, muscular tone, and sensitivity to tickle (latency and duration of tickle) within each group are indicated in Table 2. For middle Barrier subjects a correlation of Barrier scores is positive with the muscular tone significant for the left half of the body ($p < 0.05$) and borderline for the right half ($p < 0.10$), and significant and negative with the latency for the right half of the body ($p < 0.05$). In the high Barrier group, the significant correlation of Barrier scores is negative with duration of tickle and positive with latency for the right half of the body ($p < 0.05$). In the low Barrier subjects negative and significant correlations between Barrier scores and duration of tickle for both sides of the body appear ($p < 0.05$).

Barrier Scores and Body Perception

Within the whole group of subjects the Barrier scores are not correlated statistically significantly with the body perception scores. Considering the high, middle, and low Barrier groups, the middle Barrier scorers show a higher mean body perception score than those of the other two groups, even if the difference is not statistically significant. Moreover, in this group, different from the other two groups, there is a significant negative correlation between Barrier and body perception scores ($p < 0.05$), as can be seen in Table 2.

TABLE 2

MEANS AND STANDARD DEVIATIONS OF ALL VARIABLES FOR HIGH, MIDDLE, AND LOW BARRIER SCORERS, PEARSON'S CORRELATIONS BETWEEN BARRIER SCORES AND OTHER VARIABLES FOR EACH GROUP

Myographic Score				Latency				Duration				Total Body Perception	
Right		Left		Right		Left		Right		Left			
M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low Barrier Scorers ($n = 12$, $M = 4.08$, $SD = 1.44$)													
86.79	17.97	92.14	15.65	5.35	9.43	19.71	16.33	46.45	40.14	39.02	35.67	128.67	98.89
−0.04		0.09		0.24		0.41		−0.72*		−0.85*		−0.24	
Middle Barrier Scorers ($n = 12$, $M = 6.50$, $SD = 0.52$)													
85.84	15.16	86.72	22.25	7.80	9.80	11.50	14.34	51.55	43.24	50.28	41.30	207.83	106.5
0.47		0.57*		−0.59*		−0.19		0.10		0.15		−0.51*	
High Barrier Scorers ($n = 11$, $M = 10.45$, $SD = 1.96$)													
92.09	19.77	86.39	18.99	4.58	7.08	13.77	11.39	48.45	41.16	45.80	41.92	161.05	94.42
−0.18		0.21		0.60*		−0.10		−0.65*		−0.36		0.09	

*$p < 0.05$.

Penetration Scores

Within the whole group of subjects a significant and negative correlation between Penetration scores and level of muscular tone on the left side of the body appears ($r = -0.38$, $df = 33$, $p < 0.05$).

Discussion

Barrier Scores, Muscular Tone at Rest and Sensitivity to Tickle

We can conclude that within the whole group examined there are no significant correlations between Barrier scores and the other considered variables (muscular tone, latency and duration of tickle, body perception). On the contrary, interesting data appear if we consider different levels of Barrier scores.

We can hypothesize that the psychological meaning of the Barrier score is very different if its value is high, middle, or low. For us, a particularly high Barrier score probably indicates a condition of defense, rigid demarcation from the external environment. On the contrary, a middle level of Barrier scores indicates a boundary that at the same time delimits the body and forms a surface favoring the contact with the environment. Low levels of Barrier scores suggest poor differentiation with respect to what is outside the body and what is inside.

We think that this subdivision enriches the model of Fisher (1970) which divides subjects only into those with high and low Barrier scores. Our results seem to confirm the interest of our subdivision. In fact, the subjects with middle Barrier scores have shown a positive statistically significant correlation between Barrier scores and muscular tone. In our previous research (Ruggieri, *et al.*, 1983) we have pointed out that also the myographic scores acquire a different functional meaning in relation to their magnitude. If low levels indicate ipotonicity or relative inactivity, middle or high levels can indicate a state of activation, defined as preparedness for overt action (Pribram & McGuinness, 1975). Very high levels, near to that of the condition of isometric contraction, according to our previous research (Ruggieri, *et al.*, 1983), block motor activity which acquires the role of inhibition. We think it is possible to interpret the correlation between middle levels of Barrier scores and muscular tone as indicating a relationship between Barrier and activation, that is, the preparedness for interaction with the environment.

This concept is supported also by the other datum for this group of subjects, that is, the negative correlation between Barrier scores and latency of tickle of the right half of the body. In fact, in previous research (Ruggieri, *et al.*, 1982) we have pointed out that gesturing with the right half of the body increases during interaction with the environment. An inverse relationship between Barrier scores and latency indicates a greater disposition to

perceive pleasurable stimuli. Then, in conclusion, a middle Barrier score has an important positive meaning for the relationship with the environment.

The high Barrier subjects show for the right half of the body a correlation of Barrier scores positive with latency and negative with duration of tickle. Given the meaning of the right half of the body, it seems clear that, within this group, high Barrier scores represent isolation and defense in the relation with the environment.

Finally, it is interesting to remark the negative correlation between Barrier scores and duration of tickle for both sides of the body by the low Barrier group. We can hypothesize that the presence of boundaries in poorly structured subjects could have no role allowing an interaction with the environment, as occurs for middle Barrier-scoring subjects but serve the function of preventing or blocking pleasurable, sensorial tactile experiences already initiated. In the same way we can affirm that for this group the relatively less structured subjects have difficulties in inhibiting tactile sensations already started. This last datum seems congruent with the hypothesis of Kepecs and Robin (1956) according to which poorly structured personality would show a tendency to a prolonged perception of tickle.

In conclusion, within the extreme scoring groups on the Barrier dimension (high and low Barrier groups) increasing the Barrier score indicates an inhibitory attitude towards the environment stimuli, while within the middle Barrier group, scores indicate an attitude towards activation. However, our results must be considered as preliminary conclusions because sample sizes are small, and they should be confirmed by further research.

Barrier Score and Body Perception

Very interesting is the negative correlation for middle Barrier group between Barrier scores and body perception. In previous research we have noted (Ruggieri, *et al.*, 1983) that body perception is negatively correlated with muscular tone. If within the middle Barrier group muscular tone and boundary definiteness increase, body perception decreases. We suppose that both Barrier scores and muscular tone carry the meaning of activation, that is, preparedness for action, and that such a subject pays most attention to external environment. In other words, the more the subject is alert and ready to manipulate the environment (by motor activity and sensorial somesthetic interaction), the less attention he pays to his body.

Penetration Score

The last datum to examine is the negative correlation between muscular tone on the left side of the body and Penetration score within the whole group of subjects. In previous research (Ruggieri, *et al.*, 1983) we found an inverse relationship between muscular tone at rest and sensitivity to tickle, which is

lower when the levels of muscular tone increase. This relationship, more evident for the left side of the body, has induced us to hypothesize that the muscular system, especially of the left side of the body, has the role to inhibit the pleasurable tactile experiences (tickle) through a feedback mechanism. Also in this case, we hypothesize that the muscular tone inhibits in some way the body experience called by Fisher (1970) "Penetration." The concept of Penetration refers either to the perception of disrupted boundaries (and such experience would have a negative emotional connotation) or to the active passing through structures. In this last case the emotional connotation would be quite different. We do not know how prevalent is each of these components in our group, but we think that the muscular tone can reduce, once more by a retroactive inhibition on the encephalic centers, the perception of disrupted boundaries. Such perception can represent a condition of fragility and vulnerability of the ego. Further research should be done to confirm our results.

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