

## FORMATION OF FIXED SETS IN RATS

*S. Tsagareli, A. Stamateli**Iv. Javakhishvili Tbilisi State University*

*Abstract:* Tests were carried out in the special cabin. At the first stage of the project conditioned food recovery response on passage through illuminated door has been formed. The second stage of experiment was to cultivate fixed set to both doors. White rats have functional asymmetry to parties, we calculated the advantage attaching coefficient  $K$ . We conclude that in case of fixed set, if the set is drawn, asymmetry factor does not work.

*Key words:* fixed set, assimilated and contrast responses, advantage attaching coefficient, grooming

*MSC 2000:* 62P10, 92B15

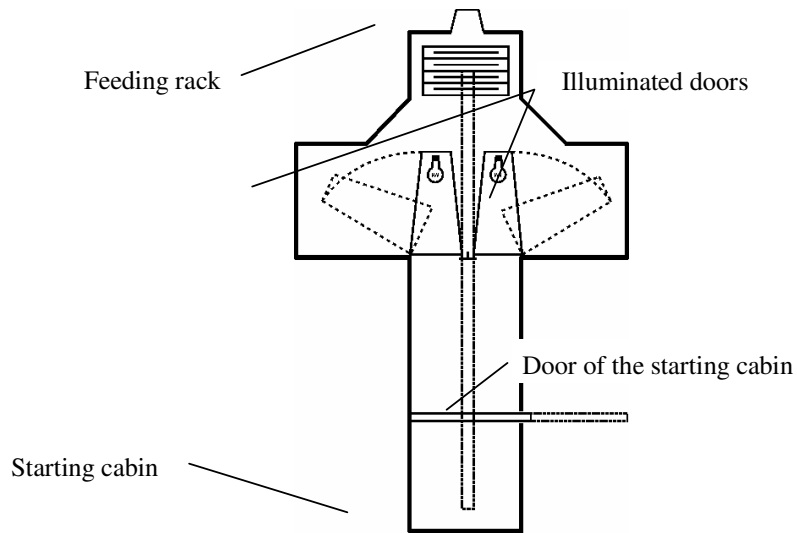
As a study object white rats were selected. Tests were carried out in the special cabin (see Fig. 1). The latter has a starting cabin separated from the rest of the chamber by means of a transparent door, in 30cm to which there are two doors illuminated with different intensity light. Intensity depends on the voltage applied (6 V to the first door, 12 V to another). Intensity of illumination can be changed from the control board. At the first stage of the project conditioned food recovery response on passage through illuminated door has been formed. If from the starting section the animal goes to the less illuminated door, it is not let to the feeding rack compartment. If it chooses the door illuminated with higher intensity it is let in the feeding rack section and gets food.

Time-spatial program has been developed which enables to carry out experiments in the same conditions, implement statistic analysis of the data and minimize experimenters interference in the test.

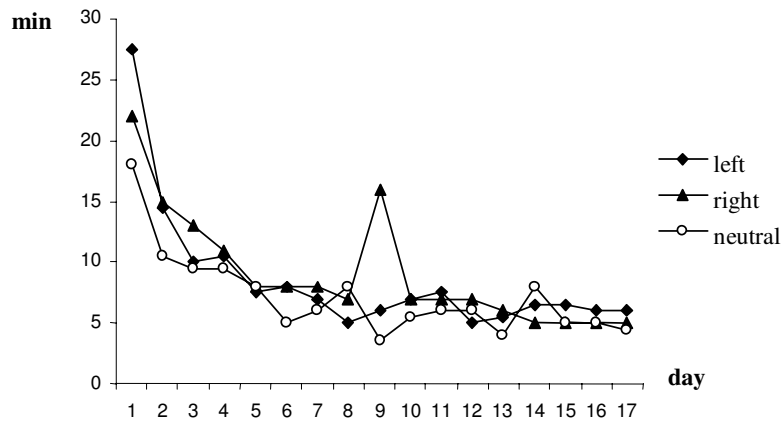
Results were recorded. The following indicators were used: 0 which means that experimenter interferes in the test, 1 which stands for the case than animals act themselves. When conditioned response was developed the second stage of experiment commenced. It was to cultivate fixed set to both doors (see [1]). After that, in the control test both doors were illuminated with the same intensity (9V).

If animal passed through the door for which set was formed response was named assimilated, if the other door was selected - contrast.

Since white rats have functional asymmetry to parties, in the report registered were the frequencies for selection of the right and the left side  $N_1$  and  $N_2$  and the frequencies of correct selection of direction which coincides with irritant -  $n_1$  and  $n_2$  (see [2]). From these data it was easy to identify the frequency for selection of one or another direction  $m_1$  and  $m_2$ . For each rat the advantage attaching coefficient  $K$  has been calculated. The sign and value of which corresponds to direction of movement and the degree of this advantage:



**Fig. 1. Test cabin**



**Fig. 2. Time of action**

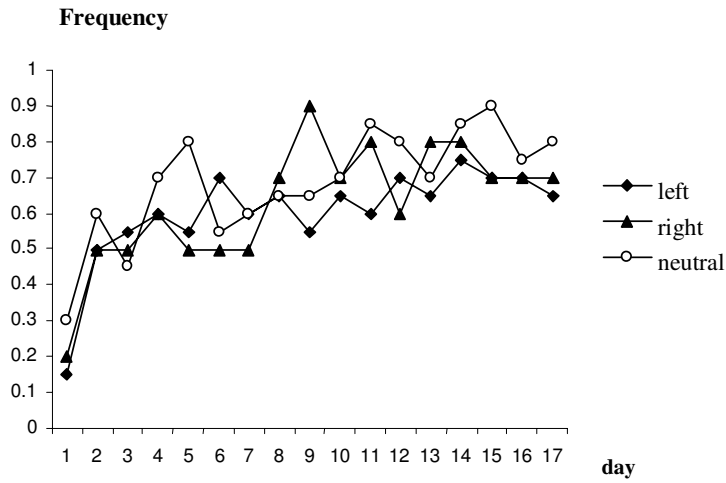


Fig. 3. Differentiation of response (reflex)

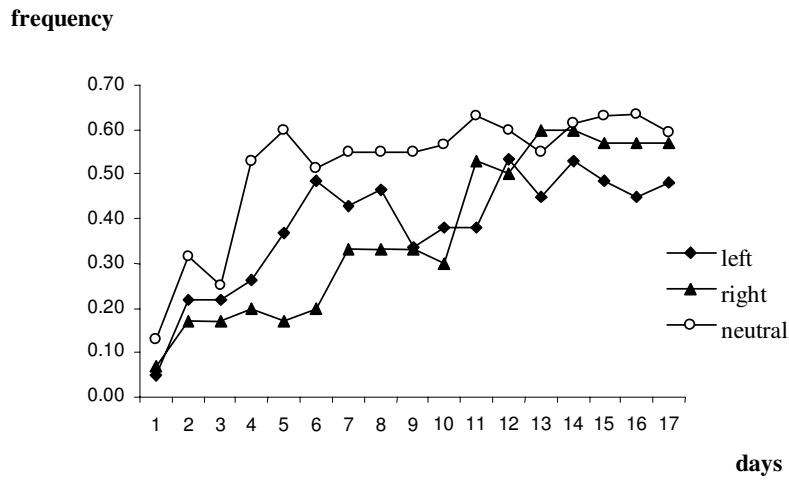
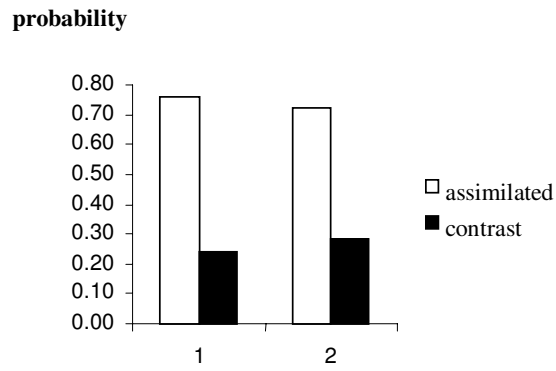
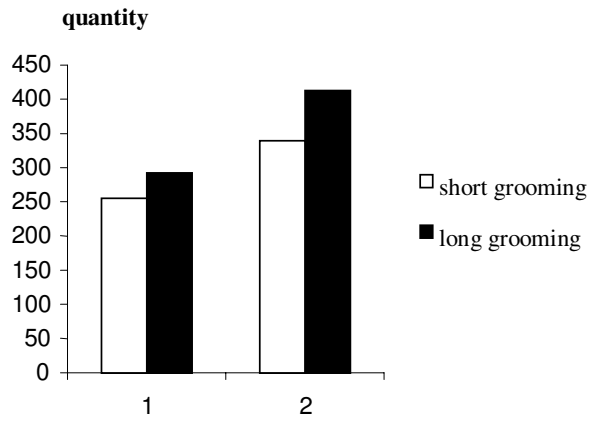


Fig. 4. Quantitative index of animal habituation



**Fig. 5. Probabilities of assimilated and contrast responses**



**Fig. 6. Total number of grooming**

$$K = \frac{m_1 - m_2}{m_1 + m_2}, \text{ where } m_1 = N_1 - n_1, \quad m_2 = N_2 - n_2, \quad -1 \leq K \leq 1.$$

According to asymmetry we have divided animals into three groups: left, right and neutral. During elaboration of conditioned food recovery response we determined the time, required by animal for action and plotted the chart for each group (see Fig. 2). The chart shows that time required by the animal to act reduces, i.e., because of learning the time which animal needs to solve the problem becomes less and less. Besides, it shows that for the neutral group, compared to the others, required time initially is less.

Based on the data the chart showing probability of response (reflex) formation vs days has been built (see Fig. 3). The chart shows that probability of response (reflex) formation for the neutral group by days is often higher than for the other two groups of animals.

Average learning chart has been plotted separately (see Fig. 4). It shows that for the neutral group learning, starting from the third day, sharply increases; probability level, compared to other groups, is comparatively higher.

We have calculated the number of assimilated and contrast responses and found that assimilated reactions outnumber the contrast ones (see Fig. 5). From that one can conclude that in case of fixed set, if the set is drawn, asymmetry factor does not work.

During the tests duration and number of groomings was recorded. The groomings were divided into two groups: short term and long term, histogram plotted (see Fig. 6).

As a consequence of set the number of groomings increases. After 4 months the quantity of both short and long groomings grows.

By this test we have developed the general structure in order to enable the study of influence of the different structures of the brain on differentiation of conditioned response, set and realization of the drawn reactions. Under development is the research of the changes caused by hippocampus coagulation. For control, selected were the actions of neocortex and amygdala injured (damaged) animals. This approach enables to study different impacts on set and actions (sleep deprivation, influence of different substances) and identify the difference between male and female rats.

### R e f e r e n c e s

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