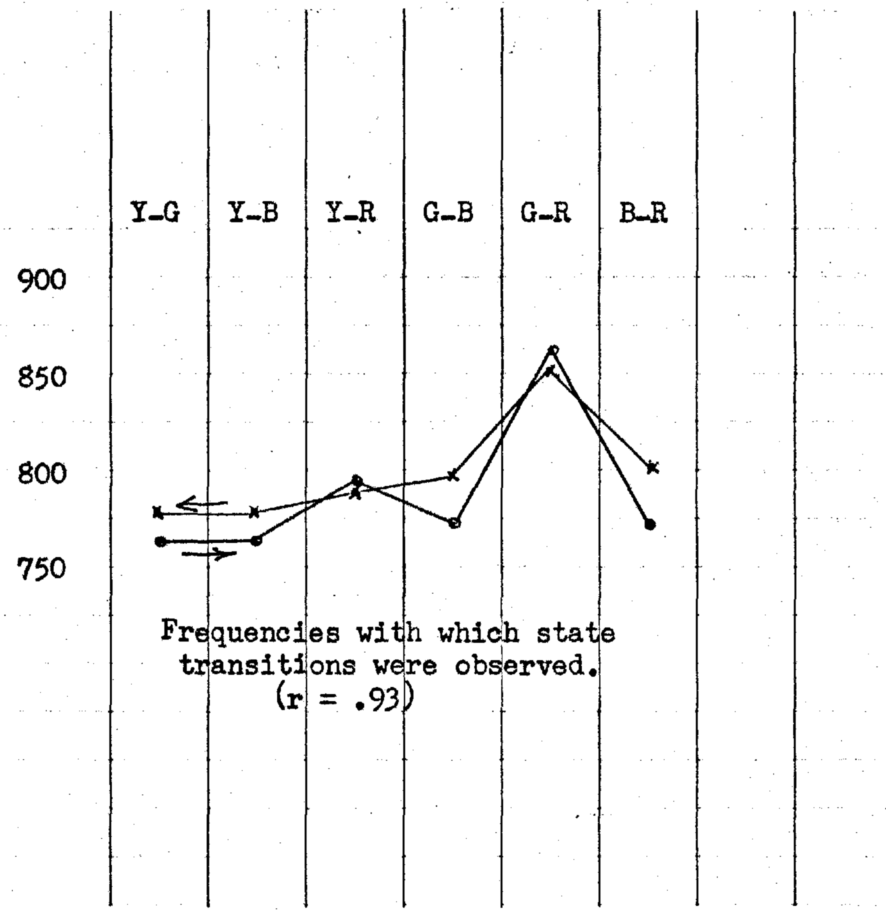
Attachment to ORD 2240-75



Frequencies with which state transitions were observed. (r = .93)

988 passes). The results, shown in Table 3, indicate no significant departure from random expectation during the successful run, and therefore, the significant result cannot be attributed to machine malfunction.

At a later time, subject S2 was asked to repeat the entire experiment, and he was able to replicate successfully a high mean scoring rate (27.88/100 average over 2500 trials, a result whose *a priori* probability under the null hypothesis is $p = 4.8\times10^{-4}$).

We thus conclude from this part of the study that of the six subjects tested, one subject (S2) generated a significant result replicable and not attributable to machine malfunction.

Finally, the study taken as a whole (15,750 trials) was significant, yielding an average scoring rate 26.47 hits/100 trials, a result whose *a priori* probability under the null hypothesis is $p = 1.1\times10^{-5}$.

The bit rate associated with the information channel can be calculated from

$$R = H(x) - H_y(x) \quad ,$$

where H(x) is the uncertainty of the source message containing symbols with *a priori* probability P_i

$$H(x) = \sum_{i=1}^{4} P_i \log_2 P_i$$

and $H_y(x)$ is the conditional entropy based on the *a posteriori* probabilities that a received symbol was actually transmitted

$$H_y(x) = -\sum_{i,j=1}^{4} P(i,j) \log_2 P_i(j).$$

For S2's first run, with $P_i = 1/4$, $P(k,k) = 0.2936$, and an average of 30 seconds per choice, we have a source uncertainty $H(x) = 2$ bits and a calculated bit rate

$$R \approx 0.007 \text{ bits/symbol}$$

or

$$R/T \approx 2\text{x}10^{-4} \text{ bits/sec.}$$