Some cross-cultural data on probability learning¹

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Extended training in a probability learning task was given to 17 Ss from two non-western cultures. Ss came from Moscow University, USSR and Cuttington, Liberia, a small rural African town. Long-term probability matching was obtained in both groups. However, the trial-to-trial changes in response proportions varied markedly between groups; Liberian Ss tended to follow the reinforcing events, while responses by the Russian Ss depended more heavily on their own preceding responses. Some negative recency effect was obtained for both groups. This effect decreased somewhat over trials, but was still present at the termination of training.

A probability learning task was run for an extended number of short sessions on two groups of Ss from non-Western cultures. Most of the previous studies have used Ss from the West European-American cultural milieu and the typical results for group data are probability matching (see Estes, 1964) and negative recency (see Jarvik, 1951; Nicks, 1959). Probability matching occurs when the mean learning curve approaches the probability of the occurrence of the predicted event, and negative recency occurs when the probability of predicting an event decreases as the runs of that event increase.

METHOD

Subjects

The first group consisted of seven college students from Moscow State University. The second group was 16 schoolboys from small villages in Liberia. They were 10 to 14 years old and had one to two years of formal education.

Procedure

A sequence of reinforcing events was generated separately for each S using a method of unrestricted randomization with the probability of event "1" equal to .667 and the probability of event "2" equal to .333. There were 100 trials which took about 6 sec. each in a session. Sessions ordinarily followed each other by at least a 1-day interval, although on occasion several days intervened between sessions. Due to language difficulties and time schedules the following procedural differences occurred: (1) The Russian group responded verbally to E's signal of tapping a pencil on the table, and then E read aloud the appropriate event. Twenty sessions were run. (2) The Liberian group predicted whether one or two bottle tops would be shown, and E produced one or two of them. Five sessions were run for 10 Ss while additional 6 Ss completed two sessions. The data from all Ss are used where appropriate.

RESULTS

General Findings

Figure 1 shows the mean probability of choosing the more frequently reinforced alternative in 50-trial

Fig. 1. Learning curves

blocks. For the 500 trials they have in common, the curves of the two groups are very much alike. With more extended trials, the Russian group's curve is relatively stable just below the event probability value. The terminal mean response proportions in Table 1 indicate that none of the Ss are maximizing (consistently choosing the more frequently reinforced event) and that several Ss are very close to the matching level.

Recency analysis

The recency curves plotted in Fig. 2 a-b and Fig. 3 a-b show the proportion of predicting that an event will occur as a function of the length of the immediately preceding run of that particular event. The analysis has been divided into three blocks of trials in order to investigate possible changes in the shapes of the curves as a function of training. Although the data manifest some variability, certain trends may be discerned. Most of the curves decrease as the length of the preceding runs becomes longer. There are, however, some portions which increase with increasing runs. There is also a tendency for the curves to reach and maintain a higher level as the amount of training increases.

The recency curves of the Liberian group differ from those of the Russian group in two distinct ways. First,

Table 1. Terminal Proportions of A_j Choices by Subjects

Subject	Group	
	Russian ¹	Liberian ²
1	.599	.768
2	.557	.680
3	.673	.796
4	.671	.572
5	.644	.800
6	.667	.512
7	.698	.668
8	—	.720
9	—	.608
10	—	.740

¹ Trials 1001-2000

² Trials 376-500

Fig. 2. Recency curves for the most frequent event

the Liberians show a strong tendency to switch their predictions following a change in the event, while the Russians do not. Secondly, the Liberian curves for the A_2 response following 1, 2, and 3 preceding occurrences of E_2 are at a much higher level than the overall level of making the A_2 response, while the Russian curves remain close to the overall level of choosing A_2 .

Sequential analysis

The proportion of responses conditional on the previous response and the previous event are presented in Table 2 for the final blocks of trials. The Liberian group shows a tendency to predict the event which occurred on the previous trial, but with relatively little dependence on the previous response. The Russian

Table 2. Conditional Proportions for a Terminal Block of Trials

Event		Liberians ¹	Russians ²
$A_{1,n+1}$	$E_{1,n}$	.84	.67
$A_{1,n+1}$	$E_{2,n}$	.35	.62
$A_{1,n+1}$	$A_{1,n}$	.68	.68
$A_{1,n+1}$	$A_{2,n}$	.71	.56

1 Trials 376-500

2 Trials 1501-2000

group shows a different pattern with little dependence on the previous event, but a slight tendency to repeat the previous response.

DISCUSSION

Although both groups showed evidence of a negative recency effect, none of the curves conform to the classic form of the negative recency curve as found by Jarvik (1951) and Nicks (1959). Some changes toward less negative recency occur during the training period but even in the final block of trials the curves are not monotonically increasing.

In view of the unavoidable multiple confoundings inherent in our casual data gathering procedures, we can only indicate what we view as the more reliable conclusions suggested by the data. First, there is evidence of long term probability matching by both groups. Second, there is an unusually strong tendency for the Liberian group to predict the event which occurred on the previous trial. Third, there is the presence of negative recency or "gambler's fallacy" in two non-American cultures.

References

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Note

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Fig. 3. Recency curves for the least frequent event