

Figure 8. Histogram of adaptive participants' extent of adaptivity in Study 3. Each range runs from the lower value (inclusively) to the upper value (exclusively).

of the adaptive participants made almost no change immediately, and over 40% adapted almost entirely immediately.

Do these differences in extent and rate of adaptivity relate to task performance? Because adapting strategy use may require cognitive resources, performance on other aspects of the task may suffer. Therefore, it is not necessarily true that differences in OpShort adaptivity will be related to differences in overall task performance. As was done with the binary adaptivity measure, both of these measures were regressed against mean block score. Extent of adaptivity as measured by the rise in OpShort from Blocks 2 to 3 (including only those participants who showed an increase) was significantly correlated with overall score ($r = .62$, $p < .0001$). Rate of adaptivity as measured by the percentage of immediate change from Blocks 2 to 3 (again including only those participants who showed an increase) was not significantly correlated with overall score ($r = .10$, $p > .3$), but it did correlate with score in Block 3 ($r = .23$, $p < .05$). It may be that the low correlations of rate with performance are due to higher noise levels from using trial level rather than block level data in its calculation.

Individual differences among the unadaptive. Why did the unadaptive participants not adapt their strategy use? One potential explanation is that the participants may have always or never used the short runway. In other words, the unadaptive participants did not appear to adapt because of floor or ceiling effects in strategy use. Alternatively, these participants may have used both the short and long runways frequently but were simply unable to adapt their strategy use to the changing base rates. The unadaptive participants (using the strict criterion) were classified into three groups corresponding to these alternative explanations: unadapt high, with OpShort levels above 45% in all three blocks; unadapt low, with OpShort levels below 15% in all three blocks, and unadapt other, the remaining unadaptive participants. Table 3 shows that although there were participants who fell into the unadapt high and unadapt low groups, the great majority of the unadaptive participants fell into the unadaptive other group. In other words, the majority of the unadaptive participants did use the long and short runways frequently but could not adapt their use of them in response to changing success base rates.

What characterized the various participant groups? The five groups (excluded, adaptive, unadaptive high, unadaptive low, unadaptive other) differed in terms of score, $F(4, 143) = 63.2$, $MSE = 3.09 \times 10^6$, $p < .0001$; errors, $F(4, 143) = 10.9$, $MSE = 5,639$, $p < .0001$; crashes, $F(4, 143) = 100.4$, $MSE = 12.4$, $p < .0001$; keypresses, $F(4, 143) = 4.6$, $MSE = 9.23 \times 10^5$, $p < .001$; time spent studying Rule IV, $F(4, 143) = 2.7$, $MSE = 629$, $p < .05$; and overall CAM scores, $F(4, 143) = 54.8$, $MSE = 165$, $p < .0001$ (see Table 3). The excluded group had negative scores, a very large number of errors, very many plane crashes, a low keypress rate, little time spent studying the rule for when planes could land, and the lowest overall CAM scores—their performance was truly abysmal. By contrast, the adaptive group had the highest scores, had low error rates, had low crash rates, had a high keypress rate, spent a significant amount of time studying rule IV, and had the highest CAM scores—their overall performance was quite strong. How did the unadaptive subgroups compare? The unadaptive high (high use of the short runway) participants spent the most amount of time studying Rule IV and thus were able to use the short runway frequently without incurring more errors. The unadaptive low participants spent little time reading Rule IV and thus did well to land the planes infrequently on the short runway and incurred very few errors (and this difference in errors was entirely due to having fewer illegal runway selection errors). However, their scores were still much lower than those of the adaptive participants. The unadaptive other participants were not remarkable in any respect—neither strategy floor effects nor ceiling effects nor lack of time spent reading the rules nor motivational differences could explain their lack of strategy adaptivity.

Predictors of adaptivity. In Studies 1 and 2, reasoning ability tests correlated with strategy adaptivity, but somewhat inconsistently. In Study 3, the participants were more heterogeneous in their abilities, and a different set of ability tests was used. Were these ability tests predictive of adaptivity differences? If one compares ability test scores of the adaptive and unadaptive participants (using the strict criterion), the two groups differ on all but one (processing speed) of the seven psychometric measures. How-

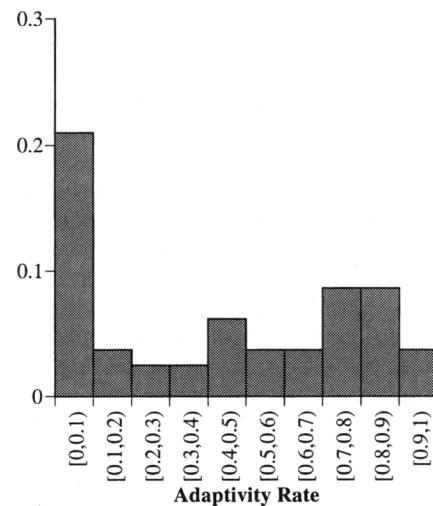


Figure 9. Histogram of adaptive participants' rate of adaptivity in Study 3. Each range runs from the lower value (inclusively) to the upper value (exclusively).