Only data from the first nine trials were used because error rates were very low after the ninth trial. Moreover, some participants only completed nine trials. Because different participants have different OpShort rates and different error rates, it was important to do this analysis by participant to avoid participant–strategy confounds. However, some participants landed few planes, and some participants made very few errors. This resulted in few opportunities to evaluate OpShort adaptiveness for these participants. To reduce noise levels due to low numbers, we removed all participants with minimum *N*s of less than 3, where the minimum *N* for each participant was defined as the minimum of two numbers: (a) the total number of OpShort opportunities after a success and (b) the total number of OpShort opportunities after an error. As expected, participants were more likely to use OpShort when the previous attempt was successful than when it was unsuccessful (mean Opshort of .32 vs. .24, $F(1, 46) = 22.4$, $MSE = 0.008$, $p < .0001$). Thus, people were generally sensitive to the successfulness of their previous attempts.

Because error rates decreased over time and OpShort use increased over time, the preceding analyses may have confounded adaptivity with time-based change—OpShort increases and errors decrease simply as participants learn the rules, and the OpShort increases may be unrelated to the decrease in error rates. Moreover, strategy use may have become less flexible with increased experience in the task, and strategy successes and failures may have had weaker or no effect in later trials. To investigate these issues, we reanalyzed the data separating the first four trials from the later five trials—in the first four trials, error rates are above 50% for short landings; in the later five trials, error rates are well below 50%. As Figure 2 shows, participants appeared just as adaptive in the later trials as in the early trials. The analysis of variance (ANOVA) confirmed this assessment—the effect of success was significant, $F(1, 38) = 25.8$, $MSE = 0.015$, $p < .0001$, and effects of early or late and the interaction were nonexistent $F(1, 38) < 1$. Thus, the observed adaptivity was not a result of a time-based confound, and participants continued to show strong strategy adaptivity to success information in later trials (i.e., there was no evidence for a reduction in strategy choice adaptivity over time).

The previous analyses collapsed across situations in which the short runway was legal for the selected plane type and those in which it was illegal—the definition of OpShort required only that

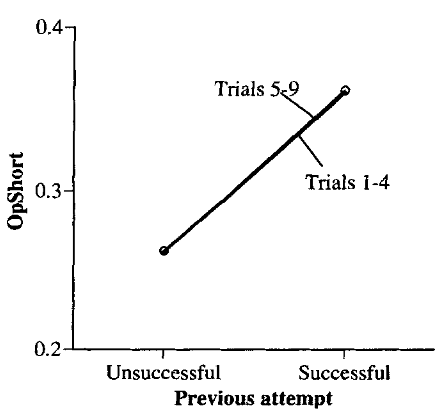

Figure 2. Ackerman Study 1, mean OpShort for early trials (1–4) and later trials (5–9) as a function of the success of the previous attempt to land that plane type.

the two runways were open. Thus, the observed adaptivity may have reflected several types of strategy shifts. It may have led participants to learn the rules more completely after an unsuccessful attempt and then be less likely to use the short runway in illegal situations. Alternatively, it may have reflected a simple shift in tendency to use the short runway that would have had equal impact in legal and illegal situations. Figure 3 suggests that this second alternative is what occurred, and ANOVA results supported this view: There were main effects of legality, $F(1, 42) = 76.2$, $MSE = 0.05$, $p < .0001$, and success of the previous attempt, $F(1, 42) = 20.2$, $MSE = 0.01$, $p < .0001$, but no hint of an interaction, $F(1, 42) < 1$.

In sum, we have found evidence for a general adaptivity to the success of previous attempts that biases participants in their use of the short runway. These results are in agreement with those found in previous research on strategy selection in simple problem-solving tasks (e.g., Lovett & Anderson, 1996; Reder, 1987). Of interest here is that participants were able to demonstrate this strategy adaptivity in the context of performing in a complex, dynamic task.

Individual differences in adaptivity. Now that we have established that there is strategy adaptivity for OpShort, we can examine evidence for individual differences in strategy adaptivity. Because individuals varied in how quickly their failures dropped over time, averaging performance over many trials results in differential weighting of early versus later trials across individuals for strategy use after successes and failures. Change in strategy use over trials also varied across participants. Therefore, averaging over many trials to produce estimates of individual strategy sensitivity to successes and failures may produce spurious individual differences. To reduce such artifactual individual differences, we focused on adaptivity in the first four trials. To reduce differences due to noise, participants were required to have a minimum *N* of greater than 5 to be included in this analysis. Using this threshold, 34 of the 57 participants were included. Figure 4 presents a histogram of the OpShort adaptivity measure—the difference between OpShort use after successes and OpShort use after failures. The histogram reveals that there was indeed a large range of sensitivity in adaptivity. The modal adaptivity level (-0.05 to $+0.05$) did not include the mean adaptivity level across all participants (0.13). One quarter of the participants showed adaptivity levels that were three or more times as high as the mean, and almost 40% showed no adaptivity at all. Each individual's adaptivity was tested against zero using a z-score approximation. Using a strict $p < .05$ criterion, 3 of the 34 participants showed strategy adaptivity. Using a very lax $p < .5$ criterion, only 17 of the 34 participants showed significant strategy adaptivity. Thus, some participants showed very strong evidence of strategy adaptivity to success rates, whereas many participants showed no evidence of strategy adaptivity to success rates.

How do these individual differences in strategy adaptivity relate to performance in the task? Because the primary goal of the KA–ATC task is to land planes, we correlated DC10 OpShort adaptivity against the number of planes landed. Because individual differences in OpShort adaptivity were measured using Trials 1–4, we used the mean number of planes landed in Trials 1–4. Over this range, OpShort adaptivity correlated positively with planes landed, $r = .40$, $p < .02$. By contrast, of the 22 individual difference tests administered by Ackerman, the four best predictors of planes