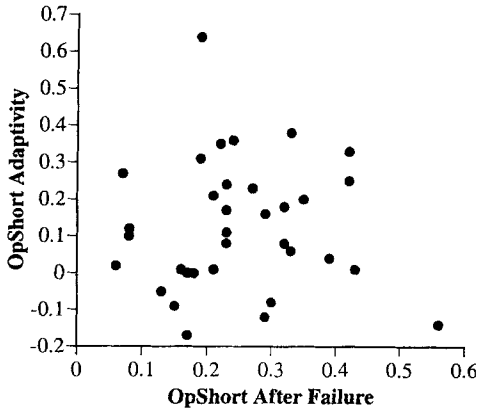

Figure 5. Ackerman Study 1, scatterplot of OpShort adaptivity (success − failure) against OpShort use after failure.

the individual differences battery—in that unadaptive low participants had the lowest scores, $F(4, 52) = 1.9$, $MSE = 44.0$, $p < .15$. Overall, the three unadaptive groups were quite similar to one another, and the excluded participants were more similar to the unadaptive participants (especially the unadapt other participants) than to the adaptive participants. These trends are consistent with the view that excluded participants were unadaptive in their behavior and made extreme behavioral choices relating to OpShort, which resulted in their being excluded. Thus, these measures of strategy adaptivity may have underestimated the proportion of unadaptive participants.

What predicts adaptivity? Another issue of interest is whether adaptivity can be predicted from the psychometric ability tests. Only 3 of the 22 psychometric scores were significantly correlated with OpShort adaptivity (Trials 1–4, minimum $N > 5$): Letter Sets, $r = .45$, $p < .02$, Simple RT, $r = .42$, $p < .02$, and 2-Choice RT, $r = .41$, $p < .02$. The first test is a measure of reasoning ability, and the other tests are measures of psychomotor ability. The N (30) is too low in this analysis for us to be sure which factors are really the best predictors, especially given the collinearity among several of the psychometric tests. Across the three studies reported here, it should become clearer which factors consistently predict adaptivity. However, these correlations do provide another piece of evidence that the individual differences in adaptivity were not simply due to chance variation.

Study 2 (Ackerman, 1988): Adaptivity During Environment Change

Study 1 found that people could adapt their strategy use to microlevel success and failure feedback, that people varied in how much they adapted, and that these individual differences were predictive of performance in the task. The analyses of Study 2 attempt to replicate these findings in a slightly different situation. Study 1 focused on adaptivity to success and failure feedback as people were just learning a complex task. By contrast, Study 2 focuses on adaptivity to success and failure feedback as people encounter a change in the task after having mastered many aspects of the task already. It may be that once people have settled on a particular strategy, they will be less adaptive in response to success and failure feedback. Also, if people are adaptive in this case, the individual differences in adaptivity may disappear because the working-memory demands of the task are lower in later stages of training.

Method

Participants. The participants of Ackerman's Study 2 (also reported in Ackerman, 1988) were 63 University of Minnesota undergraduates who participated for course credit and $25.[6]

Procedure. As in Study 1, Ackerman's participants were given 27 10-min trials. The participants were also given the same 22 ability tests as in Study 1. The primary difference from Study 1 was that the participants experienced only good weather (low wind speed and dry runways) for 18 trials, followed by 9 trials using the full weather conditions as in Study 1—a mixture of good and bad weather. The participants were not told in advance that the first trials would only involve good weather nor that this would change on Trial 19.

Results and Discussion

Overall adaptivity. As with Ackerman's Study 1, we analyzed the OpShort data as a function of whether the previous attempt to land that plane type on the short runway had been successful (i.e., had not resulted in an error). However, because the first 18 trials did not involve bad weather (and thus there could be no errors in landing on the short runway for the DC–10s), we used data from the first four foul-weather trials (i.e., Trials 19–22). As in overall adaptivity analyses of Study 1, we removed all participants with minimum numbers of less than 3 in any condition.[7] The mean OpShort rates after a successful landing attempt were significantly higher than those after an unsuccessful landing attempt, mean OpShort of .41 vs. .28, $F(1, 46) = 18.4$, $MSE = 0.022$, $p < .0001$. Thus, people were sensitive to the successfulness of their previous attempts even when they were well practiced with other aspects of the task.

As with Study 1, the effects of success of the previous attempt on OpShort rates were divided into legal and illegal cases. There was a main effect of success, $F(1, 39) = 6.07$, $MSE = 0.040$, $p < .02$, a main effect of legality, $F(1, 39) = 174.1$, $MSE = 0.034$, $p < .0001$, and no hint of an interaction, $F(1, 39) < 1$, $MSE = .026$, with approximately 8% more OpShort selections when the prior landing attempt was successful, regardless of whether the current situation was legal or not. Thus, once again, the impact of previous successes and failures appears to be a bias in strategy use rather than learning the rules for runway applicability.

Individual differences in adaptivity. After considerable training with the task, were participants just as variable in their adaptivity? As with Study 1, to reduce individual differences due to noise, participants had to have a minimum number of greater than 5 to be included in the individual differences analyses. Using this threshold, 45 of the 54 participants were included. Surprisingly, there was approximately the same level of individual differences in both Study 1 and Study 2 in the adaptivity measure of the difference between OpShort use after successes and OpShort use after failures. The standard deviation in individual adaptivity was the same in both studies (0.18), and the range in values was

[6] The original Ackerman study had 65 participants. However, data from 2 of the participants could not be extracted from the CD-ROM.

[7] The number of participants removed varied by analysis—the *N*s can be inferred from the degrees of freedom in the ANOVAs.