

## Supplemental Material

### Additional Analyses of the Effect of Experience

#### Visual Search

Trainees showed a greater improvement in their ability to identify categorical outliers in arrays of fingerprints compared to arrays of inverted faces. On the fingerprint task: Trainee Group A correctly selecting the odd fingerprint pattern 60.6% ( $SD = 23.2\%$ ) of the time with no experience matching prints, 85.8% ( $SD = 11.5\%$ ) of the time after three months, 87.3% ( $SD = 11.6\%$ ) of the time after six months, 86.8% ( $SD = 9.6\%$ ) of the time after nine months, and 88% ( $SD = 11.9\%$ ) of the time after 12 months experience working in a fingerprint unit. On the inverted face task: Trainee Group A correctly selected the face targets 66.7% ( $SD = 17.5\%$ ) of the time with no experience, 74.6% ( $SD = 18.6\%$ ) of the time after three months, 71.5% ( $SD = 21.9\%$ ) of the time after six months, 74.8% ( $SD = 17.1\%$ ) of the time after nine months, and 73.2% ( $SD = 21.6\%$ ) of the time after 12 months. The mean percent correct for Trainee Group B on the fingerprint task was comparable to Trainee Group A at three months (85.6% correct;  $SD = 8.7\%$ ), six months (89.3% correct;  $SD = 7.7\%$ ), nine months (93.8% correct;  $SD = 5.3\%$ ), and 12 months (94.8%;  $SD = 6.8\%$ ). On the inverted face task, Trainee Group B was more accurate than Trainee Group A at three months (76.0% correct;  $SD = 15.1\%$ ), six months (83.0% correct;  $SD = 5.5\%$ ), nine months (84.3% correct;  $SD = 10.5\%$ ), and 12 months (84.0% correct;  $SD = 8.8\%$ ). See the top two panels to the right in Fig. 2, for an illustration of each individual trainee's percent correct scores on the fingerprint and inverted face search task over time (the light and dark turquoise lines indicate the average percent correct for Trainee Group A and Trainee Group B).

A one-way within-subjects analysis of variance using the percent correct scores for Trainee Group A on the fingerprint search task over the 12 months revealed a significant

effect of Experience,  $F(1, 9) = 20.53, p = .001, \eta^2_G = .70$ . Follow up comparisons revealed a significant improvement in the percent correct scores for Trainee Group A three months after starting in fingerprints,  $t(11) = 4.32, p = .001$ , Cohen's  $d = 1.38$ , but no further improvements between three and six months,  $t(11) = .67, p = .518$ , three and nine months,  $t(9) = 1.06, p = .318$ , or three and 12 months,  $t(9) = 1.46, p = .178$ . On the inverted face task, there was no discernible effect of Experience overall,  $F(1, 9) = .39, p = .548$ . Follow up comparisons also revealed no significant improvement with three,  $t(11) = 2.04, p = .066$ , six,  $t(11) = 1.36, p = .200$ , nine,  $t(9) = .99, p = .351$ , or 12 months experience working in fingerprints,  $t(9) = .66, p = .527$ .

We ran the same analyses between subjects using the percent correct data for Trainee Group A at zero months, and the percent correct data for Trainee Group B at three, six, nine, and 12 months. On the fingerprint task, there was a significant effect of Experience on trainees' accuracy in detecting categorical outliers,  $F(1, 52) = 33.71, p < .001, \eta^2_G = .39$ . Further analyses showed a significant difference between Trainee Group A with no experience and Trainee Group B with three months experience matching prints,  $t(46) = 3.49, p = .004$ , Cohen's  $d = 1.43$ . Trainee Group B showed no significant improvement from three to six months,  $t(44) = 10.4, p = .313$ , a significant increase in their percent correct from three to nine months,  $t(44) = 2.70, p = .015$  Cohen's  $d = 1.14$ , and no significant improvement from nine to 12 months,  $t(42) = .37, p = .719$ . On the inverted face task, there was also a significant effect of Experience with data from Trainee Group B,  $F(1, 52) = 13.10, p < .001, \eta^2_G = .20$ . Follow up comparisons showed no significant difference between Trainee Group A with no experience and Trainee Group B with three months experience matching prints,  $t(46) = 1.40, p = .175$ , however the difference between groups from zero to six months experience was

significant,  $t(44) = 3.06$ ,  $p = .009$ , Cohen's  $d = 1.26$ . There were no further significant improvements from six months onwards on the inverted face task.

### **Speeded Matching**

The percent correct scores on the fingerprint and inverted face speeded matching task are depicted in the middle two panels to the right in Fig. 2. When matching prints presented very briefly, the percent correct scores for Trainee Group A improved from zero (64.8% correct;  $SD = 7.4\%$ ) to three months (68.4% correct;  $SD = 5.1\%$ ), but plateaued at six, (67.1% correct;  $SD = 7.2\%$ ), nine (70.1% correct;  $SD = 4.5\%$ ), and 12 months (69.7% correct;  $SD = 7.0\%$ ). When matching inverted face identities presented very briefly, Trainee Group A showed no stable pattern of improvement: averaging 57.3% correct ( $SD = 9.9\%$ ) at the beginning, 58.4% correct ( $SD = 6.8\%$ ) after three months working in fingerprints, 59.2% correct ( $SD = 8.2\%$ ), after six months, 55.9% correct ( $SD = 20.8\%$ ) after nine months, and 63.2% correct ( $SD = 7.1\%$ ) after 12 months. Trainee Group B followed a similar pattern: on the fingerprint task, they scored on average 66.8% correct ( $SD = 5.9\%$ ) with three months in fingerprints, 65.9% correct ( $SD = 5.9\%$ ) with six months, 70.2% correct ( $SD = 6.7\%$ ) with nine months, and 68.1% correct ( $SD = 3.7\%$ ) with 12 months. On the inverted face task, Trainee Group B averaged 53.7% correct ( $SD = 7.5\%$ ) after three months experience with matching prints, 57.7% correct ( $SD = 7.4\%$ ) after six months, 61.2% correct ( $SD = 7.6\%$ ) after nine months, and 56.0% correct ( $SD = 7.3\%$ ) after 12 months.

For ease of comparison across tasks, we have reported descriptive statistics based on trainees' percent correct data above. For the purposes of analysis, we computed the average discrimination ability ( $A'$ ) of trainees on the speeded fingerprint and inverted face matching tasks at each level of experience (Donaldson, 1992). This performance measure allows us to isolate the improvements for each trainee's accuracy independent of their response threshold

(e.g., tendency to same “match” or “no match”). The mean  $A'$  for Trainee Group A on the fingerprint task was .72 with no experience, .77 with three months experience, .75 with six months experience, .79 with nine months experience, and .78 with 12 months experience. We found a significant overall effect of Experience on Trainee Group A’s ability to discriminate fingerprints presented very briefly,  $F(1, 9) = 27.31, p = .024, \eta^2_G = .45$ . Follow up comparisons showed no significant improvement with three,  $t(11) = 2.09, p = .059$ , or six months experience in the domain,  $t(11) = 1.15, p = .276$ , but their discrimination of briefly presented prints did significantly improve after nine months,  $t(9) = 2.42, p = .039$ . This improvement also remained stable after 12 months experience,  $t(9) = 2.38, p = .0413$ . In contrast, Trainee Group A showed no significant improvement in their ability to discriminate briefly presented inverted faces as they gained experience with matching prints,  $F(1, 9) = 3.26, p = .104$  (their mean  $A'$  on the inverted face task was .61 with no experience, .63 after three months, .65 after six months, .67 after nine months, and .70 after 12 months). Follow up comparisons revealed no discernible difference in their discrimination of inverted faces after three,  $t(11) = 1.31, p = .217$ , six,  $t(11) = 1.22, p = .248$ , nine,  $t(9) = .83, p = .430$ , or 12 months experience with matching fingerprints,  $t(9) = 2.05, p = .071$ .

We ran the same analyses substituting the  $A'$  scores for Trainee Group A with Trainee Group B’s at three (*Mean  $A'$  for prints* = .75; *Mean  $A'$  for inverted faces* = .75), six (*Mean  $A'$*  = .74; *Mean  $A'$  for inverted faces* = .75), nine (*Mean  $A'$*  = .79; *Mean  $A'$  for inverted faces* = .75), and 12 months (*Mean  $A'$*  = .76; *Mean  $A'$  for inverted faces* = .75). A between-subjects one-way analysis of variance revealed a small but significant effect of Experience on their ability to discriminate briefly presented prints,  $F(1, 52) = 4.37, p = .042, \eta^2_G = .08$ . Follow up comparisons revealed no significant difference between Trainee Group A with no experience and Trainee Group B with three months experience,  $t(46) = .97, p = .346$ , or six months

experience,  $t(44) = .74, p = .469$ . There was a significant difference between Trainee Group A with no experience and Trainee Group B with nine months experience,  $t(44) = 2.13, p = .047$ , but no further significant improvement from nine to 12 months,  $t(42) = 1.07, p = .301$ . On the inverted face task, we observed no overall effect of Experience,  $F(1, 52) = .85, p = .362$ , and no significant difference in discriminating inverted faces between Trainee Group A with no experience, and Trainee Group B at three months,  $t(46) = .89, p = .384$ , six months,  $t(44) = .37, p = .714$ , nine months,  $t(44) = 1.45, p = .163$ , or 12 months,  $t(44) = .18, p = .861$ .

### Person Matching

The percent correct scores for trainees in the person matching task are represented in the bottom panel to the right of the fingerprint index in Fig. 2. As can be seen in Fig. 2, Trainee Group A showed an improvement in their ability to discriminate people as they gained experience with matching fingerprints, plateauing after three months: correctly discriminating people 65.1% ( $SD = 11.4\%$ ;  $A' = .71$ ) of the time with no experience, 72.2% ( $SD = 9.4\%$ ;  $A' = .80$ ) of the time with three months experience, 71.8% ( $SD = 6.6\%$ ;  $A' = .80$ ) of the time after six months, 72.2% ( $SD = 11.4\%$ ;  $A' = .79$ ) of the time after nine months, and 72.7% ( $SD = 6.5\%$ ;  $A' = .81$ ) of the time after 12 months of working in fingerprints. Trainee Group B showed no improvement in their ability to discriminate people past one to three months either: correctly discriminating people 75.6% ( $SD = 9.2\%$ ;  $A' = .83$ ) of the time with three experience, 75.8% ( $SD = 7.5\%$ ;  $A' = .83$ ) of the time with six months experience, 75.2% ( $SD = 7.8\%$ ;  $A' = .83$ ) of the time after nine months, and 79.0% ( $SD = 6.1\%$ ;  $A' = .86$ ) of the time after 12 months experience with fingerprints.

A within-subjects one-way analysis of variance using the  $A'$  scores from Trainee Group A revealed no significant overall effect of Experience,  $F(1, 9) = 1.670, p = .228$ . However, we ran the analysis between-subjects including data from the two trainees who were

unavailable, and there was a significant effect of Experience on trainees' ability to discriminate people,  $F(1, 52) = 4.04, p = .049, \eta^2_G = .07$ . Follow up comparisons revealed a significant improvement in Trainee Group A's accuracy on the person matching task with three months experience matching prints,  $t(11) = 2.32, p = .041$ , but no further improvements from three to six months,  $t(11) = .29, p = .780$ , through nine,  $t(9) = 1.11, p = .297$ , and 12 months,  $t(9) = .43, p = .675$ . A between-subjects analyses using the  $A'$  scores from Trainee Group B, also showed a significant effect of Experience,  $F(1, 52) = 10.85, p = .002, \eta^2_G = .17$ . Further analyses showed a significant improvement in person matching accuracy when comparing Trainee Group A with no experience with Trainee Group B at three months,  $t(46) = 2.34, p = .030$ , but no further significant improvements when comparing trainees with three and six,  $t(44) = .18, p = .856$ , three and nine,  $t(44) = .01, p = .993$ , or three and 12 months experience with matching prints,  $t(44) = 1.13, p = .273$ .

### **Fingerprint Matching**

The percent correct scores on the fingerprint matching task are depicted in the bottom rightmost panel in Fig. 2. As with the other measures, trainees' fingerprint matching ability improved as they gained experience working in a fingerprint unit. On average, Trainee Group A was correct 75.2% ( $SD = 15.7\%$ ;  $A' = .80$ ) of the time with no experience matching prints, 87.7% ( $SD = 9.1\%$ ;  $A' = .92$ ) of the time with three months experience, 88.4% ( $SD = 9.5\%$ ;  $A' = .92$ ) of the time after six months, 89.2% ( $SD = 8.9\%$ ;  $A' = .92$ ) of the time after nine months, and 90.9% ( $SD = 8.6\%$ ;  $A' = .93$ ) of the time after 12 months of working in fingerprints. On average, Trainee Group B was correct 88.4% of the time with three months experience ( $SD = 7.0\%$ ;  $A' = .92$ ), 91.7% of the time after six months ( $SD = 6.9\%$ ;  $A' = .94$ ), 94.7% of the time after nine months ( $SD = 3.8\%$ ;  $A' = .96$ ), and 95.7% ( $SD = 2.9\%$ ;  $A' = .96$ ), of the time after 12 months experience working in fingerprints.

Within-subjects analyses of trainees'  $A'$  scores revealed a significant overall effect of Experience on fingerprint matching accuracy for Trainee Group A,  $F(1, 9) = 9.77, p = .012, \eta^2_G = .52$ , and a significant improvement in their accuracy from none to three months experience,  $t(11) = 2.96, p = .013$ . There were no further improvements in their accuracy from three to six months,  $t(11) = .06, p = .953$ , three to nine months,  $t(9) = .314, p = .761$ , or three to 12 months experience with matching prints,  $t(9) = 1.27, p = .236$ . Between-subject analyses including the  $A'$  scores of Trainee Group B also showed a significant effect of Experience on fingerprint matching accuracy,  $F(1, 52) = 4.04, <.001, \eta^2_G = .30$ . There was a significant increase in accuracy between Trainee Group A with no experience and Trainee Group B with three months experience,  $t(46) = 2.71, p = .018$ . There was no significant difference in Trainee Group B's fingerprint matching accuracy between three and six months,  $t(44) = .981, p = .339$ , but there was a significant increase in their accuracy between three and nine months,  $t(44) = 2.70, p = .015$ . There was no significant improvement from nine to 12 months,  $t(42) = .206, p = .839$ .