

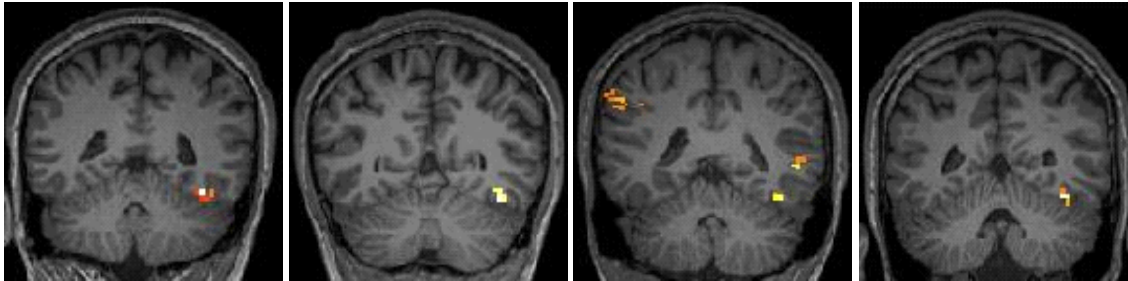
Supplementary Material

Many Faces of Expertise – Fusiform Face Area in Chess Experts and Novices

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Figure S1 presents several individual fusiform face areas isolated in experts and novices.

A Experts



B Novices

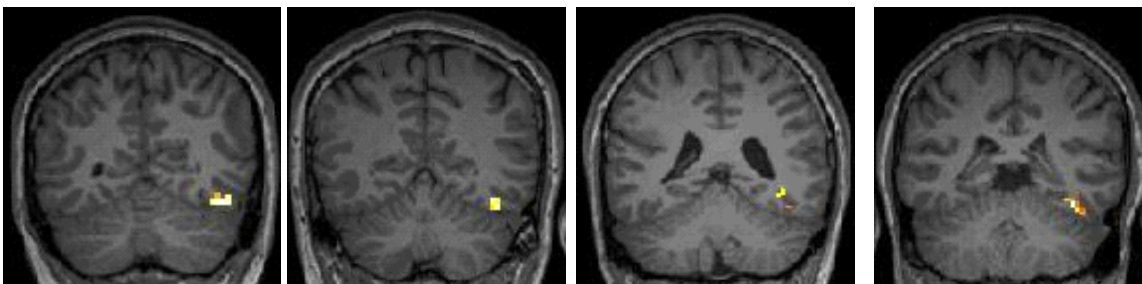


Figure S1. Fusiform face area (FFA) and chess-sensitive area locations. The brain area more activated when passively seeing faces (in the localizer task) than objects in four representative experts **(a)** and novices **(b)**.

The isolated areas were used to calculate the activation levels in the four experiments.

Figure S2 presents all three regions of interest (ROIs) used in the experiments based on group data. Table S1 gives an overview of the MNI coordinates and size of the ROIs.

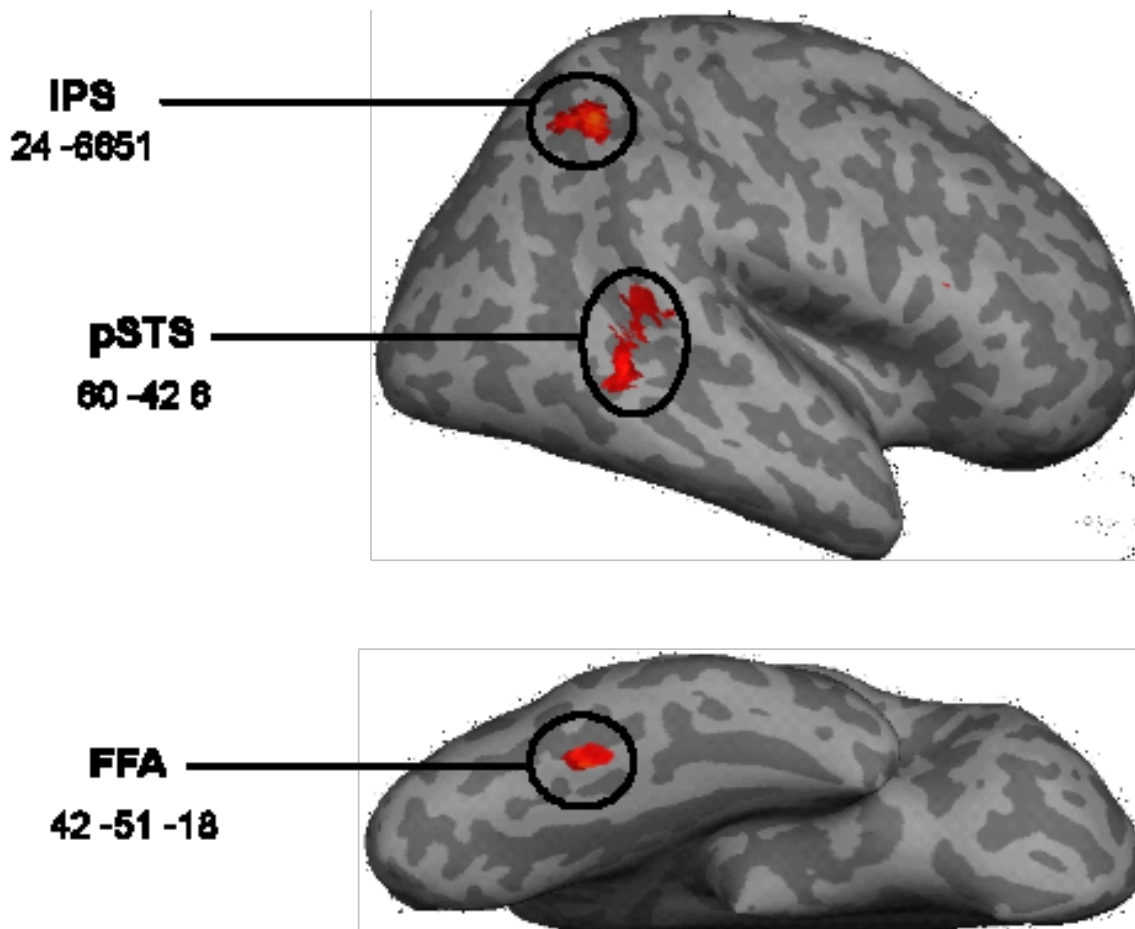


Figure S2. Fusiform face area (FFA), posterior superior temporal sulcus (pSTS), and intraparietal sulcus (IPS) with peak-voxel MNI coordinates as identified at group level (FFA and pSTS at Localizer task [faces vs objects], and IPS at 1-back task [common activations for faces and chess positions vs baseline]).

Table S1. ROI summary. MNI coordinates and size (mm³).

ROI	MNI coordinates \pm SD			Size \pm SD
FFA	42 \pm 3	-51 \pm 4	-18 \pm 2	713 \pm 142
pSTS	60 \pm 2	-42 \pm 2	6 \pm 1	252 \pm 78
IPS	24 \pm 1	-66 \pm 3	51 \pm 2	152 \pm 96

Control-ROIs statistics. Figure S3 and Figure S4 present the statistics on the control ROIs, IPS and pSTS, respectively. We present IPS activations (Figure S3) in Experiment 1 and Localizer only to show that Experiment 1, where the ROIs were taken, clearly engaged the IPS more than the Localizer task did. Experiment 2 yielded a significant task effect [$F(1, 12) = 28, P < .001$], because both chess tasks, i.e., Check and Knight tasks, yielded stronger activation in IPS than the control Dot task. The effect of position type was also significant [$F(1, 12) = 8.6, P < .05$], but mainly because both chess tasks (i.e., Check and Knight tasks) elicited stronger activations on Random positions than on Normal ones [$F(1, 12) = 12.3, P < .01$ and $F(1, 12) = 4.7, P < .05$, for Check and Knight tasks, respectively], while there was no difference in the Dot task. This pattern also produced a task type \times position type interaction [$F(1, 12) = 9.2, P < .01$]. There were, however, no expertise effects in any of the tasks or across all three tasks. Experiment 3 also produced more activation in chess tasks (i.e., Threats and Knight & Bishops tasks) than in the control task, which resulted in a significant main effect of task [$F(1, 11) = 4.9, P < .05$]. No other effects, including any expertise effects, were significant.

In Experiment 1, pSTS was more activated in response to face stimuli, compared to chess stimuli (Figure S4; $F(1, 13) = 278, P < .001$). In all other experiments, however, there were no significant differences in pSTS activity.

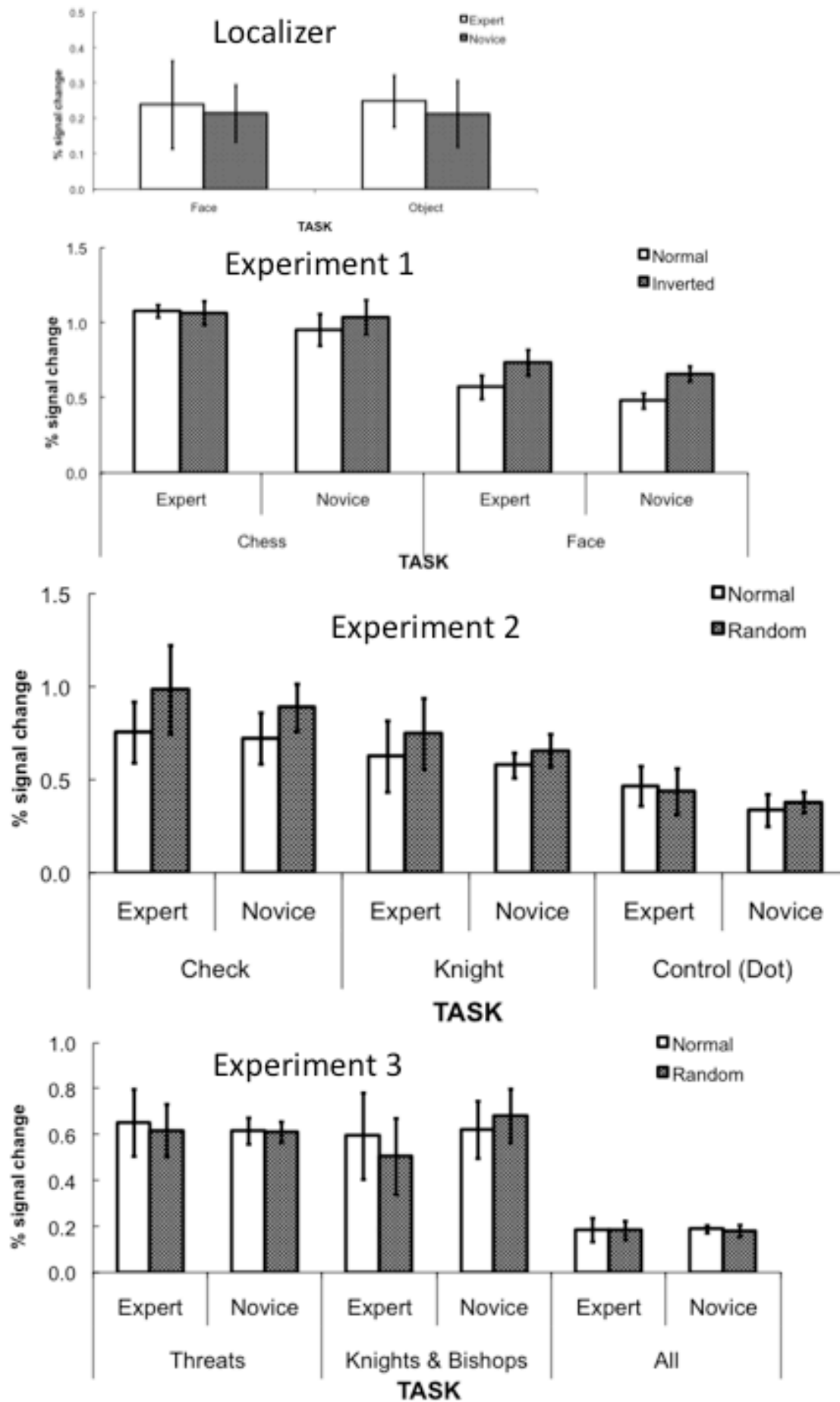


Figure S3. Intraparietal sulcus (IPS) activations in the Localizer task and Experiments 1-3.

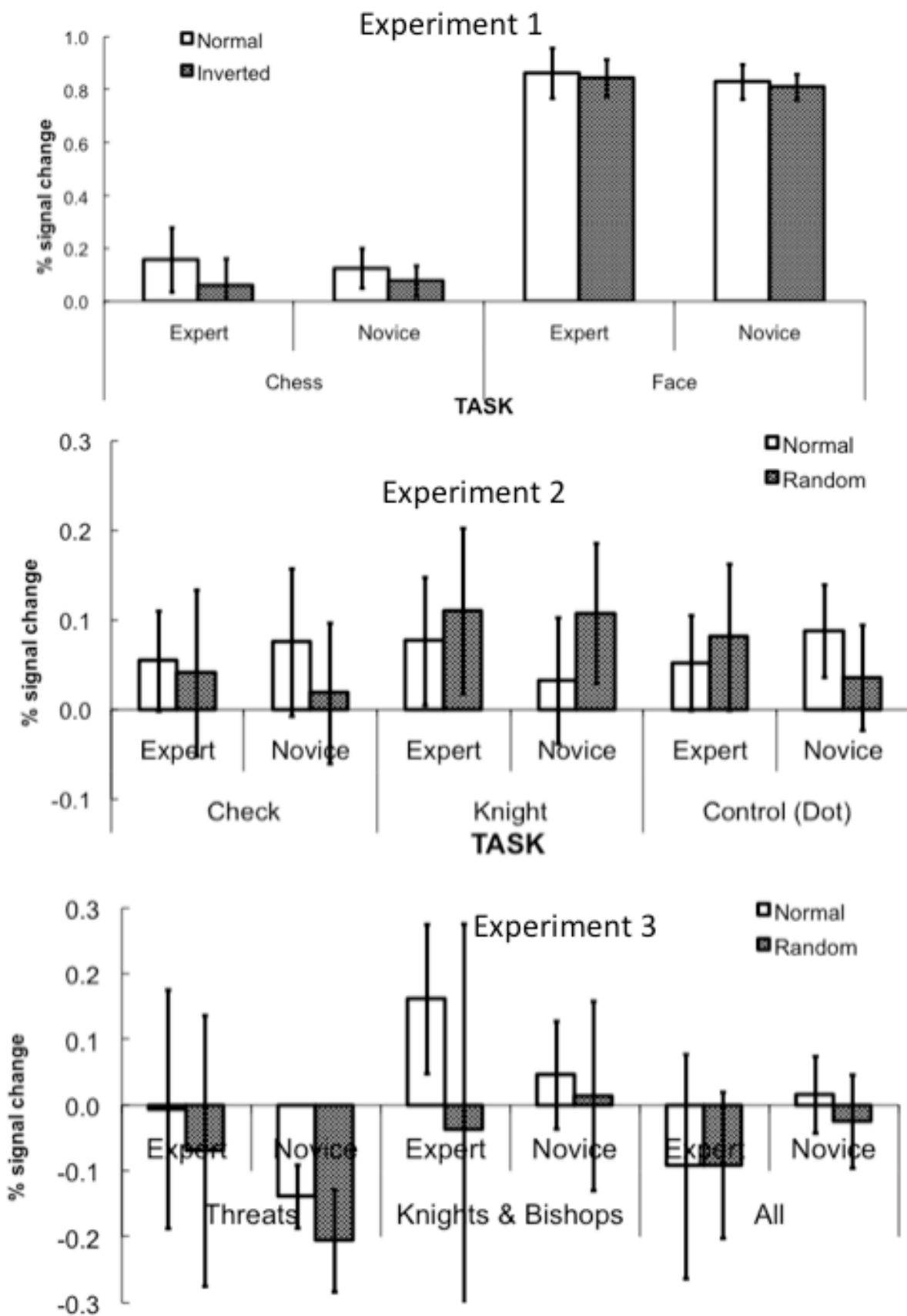


Figure S4. Posterior superior temporal sulcus (pSTS) activations in Experiments 1-3.

Control-ROIs around FFA. We also checked the activity around the FFA by selecting 4 additional ROIs medial (MNI coordinates 32 -51 -18), lateral (52 -51 -18), anterior (42 -41 -18) and posterior (42 -61 -18) to the FFA (42 -51 -18). All five ROIs, including the FFA, had a size of 6 x 6 x 6 mm³. The activation from the group maps was extracted for all five ROIs in all three experiments – see Table S3, S4, and S5.

Experiment 1. The group FFA generally showed similar activation as the individual FFAs presented in the main text. Face stimuli generally elicited more FFA activation than did chess stimuli [ANOVA main effect of stimulus type: $F(1, 13) = 45$; $P < .001$]. The group FFA was more activated in expert players than novices when recognizing chess stimuli [planned contrast of expertise with chess stimuli: $F(1, 13) = 6.7$; $P = .022$]. There were no such effects for face stimuli.

These effects were strictly confined to the identified FFA. Anterior, posterior, medial, and lateral ROIs next to the FFA did not show preferential activations for faces. In fact, the lateral ROI showed preference for chess stimuli [ANOVA main effect of stimulus type: $F(1, 13) = 10.1$; $P = .007$]. Non of the neighboring ROIs was sensitive to expertise – there were no significant differences between experts and novices outside the FFA.

Table S2. Control FFA ROIs in Experiment 1. Activation in FFA and neighboring areas in Exp. 1

ROI	Chess				Face			
	Expert		Novice		Expert		Novice	
	Upright	Inverted	Upright	Inverted	Upright	Inverted	Upright	Inverted
FFA	.81 (.09)	.95 (.07)	.35 (.17)	.58 (.16)	1.47 (.1)	1.44 (.12)	1.33 (.11)	1.22 (.13)
Anterior	.41 (.07)	.45 (.06)	.44 (.09)	.43 (.06)	.50 (.09)	.60 (.08)	.54 (.12)	.46 (.11)
Posterior	.66 (.16)	.73 (.22)	.62 (.21)	.72 (.18)	.75 (.13)	.92 (.23)	.76 (.14)	.85 (.17)
Lateral	.80 (.13)	.79 (.14)	.64 (.16)	.72 (.15)	.40 (.10)	.60 (.09)	.56 (.11)	.45 (.15)
Medial	.93 (.06)	1.13 (.13)	.83 (.16)	.93 (.13)	.89 (.05)	1.16 (.08)	.92 (.20)	1.01 (.18)

Experiment 2. Just like in the individual FFA analysis presented in the main text, all tasks elicited higher group FFA activation in experts than in novices [ANOVA main effect of chess expertise: $F(1, 12) = 12.5$; $P = .004$; planned contrast of chess expertise in the Check task: $F(1, 12) = 15.4$; $P = .002$; planned contrast of chess expertise in the Knight task: $F(1, 12) = 5.3$; $P = .04$; planned contrast of chess expertise in the Dot task: $F(1, 12) = 12.7$; $P = .003$]. The Check task elicited more activation in the group FFA [ANOVA main effect of chess expertise: $F(1, 12) = 5.3$; $P = .039$], and Random positions elicited more group FFA activation than normal positions [ANOVA main effect of position type: $F(1, 12) = 6.9$; $P = .021$; planned contrast of position type in the Check task: $F(1, 12) = 8.4$; $P = .012$]. Just like with individual FFA, this seemed to be a consequence of higher sensitivity to random piece arrangements among experts [ANOVA interaction chess expertise \times position type: $F(1, 12) = 12.5$; $P = .004$; planned contrast of chess expertise \times position type interaction in the Check task: $F(1, 12) = 5.4$; $P = .036$].

None of the other neighboring ROIs was sensitive to expertise.

Table S3. Control FFA ROIs in Experiment 2. Activation in FFA and neighboring areas in Exp. 2.

ROI	Check				Knight				Dot			
	Expert		Novice		Expert		Novice		Expert		Novice	
	Normal	Random	Normal	Random	Normal	Random	Normal	Random	Normal	Random	Normal	Random
FFA	.79 (.14)	1.09 (.16)	.34 (.06)	.37 (.08)	.56 (.13)	.69 (.10)	.29 (.10)	.32 (.10)	.74 (.17)	.85 (.12)	.21 (.09)	.28 (.09)
Anterior	.38 (.16)	.56 (.10)	.30 (.11)	.33 (.06)	.35 (.10)	.31 (.11)	.19 (.08)	.24 (.09)	.41 (.14)	.38 (.13)	.16 (.04)	.20 (.05)
Posterior	.68 (.17)	.94 (.18)	.82 (.09)	1.14 (.11)	.44 (.19)	.56 (.18)	.53 (.17)	.71 (.14)	.61 (.25)	.74 (.21)	.33 (.11)	.46 (.11)
Lateral	.59 (.19)	.69 (.24)	.54 (.16)	.68 (.21)	.54 (.18)	.56 (.20)	.33 (.12)	.36 (.08)	.54 (.23)	.56 (.24)	.33 (.14)	.41 (.14)
Medial	.79 (.17)	1.03 (.21)	.92 (.17)	1.12 (.21)	.58 (.18)	.67 (.16)	.66 (.12)	.83 (.22)	.75 (.19)	.83 (.19)	.51 (.08)	.59 (.12)

Experiment 3. Group FFA showed a similar pattern of activation as the individual FFAs presented in the main text. Experts had more activation in group FFA than novices across all tasks [ANOVA main

effect of position type: $F(1, 11) = 32.5$; $P < .001$; planned contrast of chess expertise in the Threats task: $F(1,11) = 13.8$; $P = .005$; Knights & Bishops task: $F(1, 11) = 11.1$; $P = .008$; Control task: $F(1, 11) = 44.5$; $P < .001$. There were significant differences in group FFA activation between the three tasks [ANOVA main effect of task: $F(1, 11) = 7.5$; $P = .021$], but experts and novices did not display different patterns of activity in all three tasks. There were no differences between normal and random positions across groups but experts tended to have more activation in random positions than in normal positions [ANOVA interaction expertise \times position type \times task: $F(1, 11) = 3.4$; $P = .094$]. Threats and Control (All) tasks exhibited trends for this pattern of results [planned contrast of expertise \times position type interaction in the Threats task; $F(1, 11) = 9.7$; $P = .011$; in the Control task: $F(1, 11) = 9.4$; $P = .011$], unlike the Knights & Bishops task.

Just like in the previous two experiments, the neighboring ROIs did not show significantly different activation in experts and novices.

Table S4. Control FFA ROIs in Experiment 3. Activation in FFA and neighboring areas in Exp. 3.

ROI	Threats				Knights & Bishops				All			
	Expert		Novice		Expert		Novice		Expert		Novice	
	Normal	Random	Normal	Random	Normal	Random	Normal	Random	Normal	Random	Normal	Random
FFA	.61 (.11)	.74 (.17)	.34 (.06)	.14 (.03)	.55 (.13)	.56 (.10)	.15 (.07)	.11 (.09)	.35 (.05)	.54 (.05)	.09 (.02)	.16 (.03)
Anterior	.27 (.06)	.22 (.08)	.15 (.04)	.16 (.06)	.12 (.04)	.04 (.03)	.13 (.03)	.14 (.04)	.18 (.12)	.26 (.11)	.10 (.09)	.17 (.09)
Posterior	.41 (.07)	.28 (.07)	.48 (.06)	.31 (.09)	.28 (.12)	.25 (.13)	.35 (.09)	.20 (.12)	.14 (.03)	.24 (.14)	.16 (.07)	.27 (.03)
Lateral	.27 (.13)	.14 (.16)	.19 (.06)	.21 (.08)	.19 (.12)	.24 (.17)	.13 (.03)	.09 (.07)	.14 (.04)	.28 (.11)	.17 (.07)	.18 (.06)
Medial	.33 (.05)	.47 (.19)	.34 (.07)	.23 (.06)	.27 (.07)	.28 (.13)	.33 (.05)	.17 (.06)	.11 (.10)	.12 (.08)	.12 (.06)	.14 (.07)