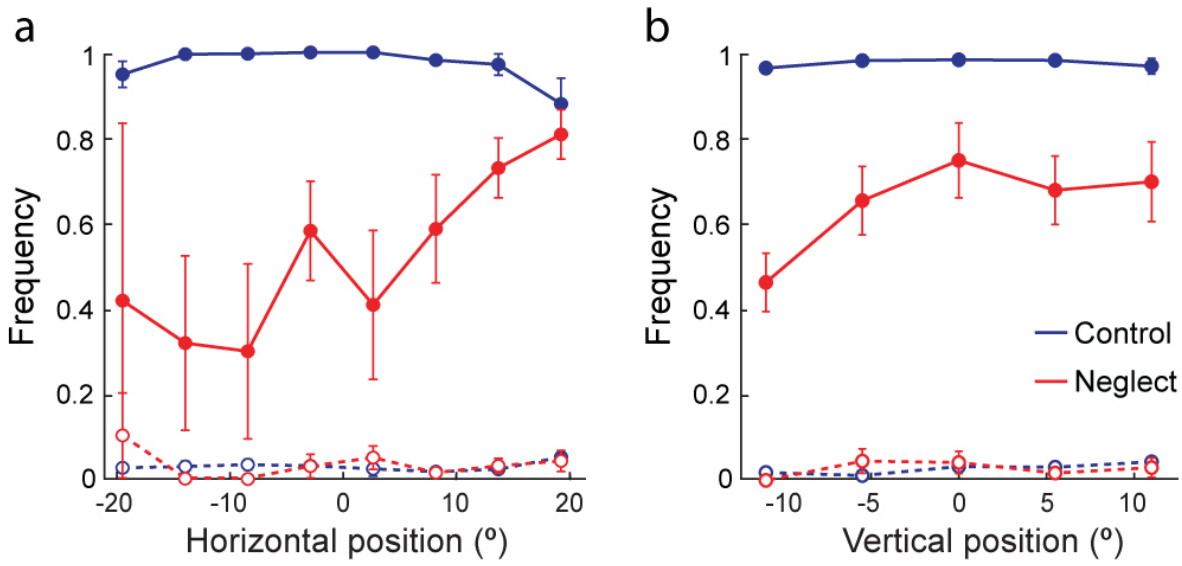
Supplementary Material for Bays et al., "Integration of goal- and stimulus-related visual signals revealed by damage to human parietal cortex."

Supplementary Table 1. Clinical assessment.

Patient	Age	Time since stroke	Lesion*	Visual fields**	Line bisection †	Bells cancellation ‡
Experiment 1						
BQ	67	8 mths	P, F	Intact	1	0
HG	39	1 mth	P, F, T	Small inferior left defect	5	10
LH	77	9 yrs	P, T	Intact	9	0
LQ	60	2 mths	P, F, T	Intact	2	13
TG	66	3 mths	P, F, T	Small inferior left defect	6	10
Experiment 2						
DC	81	2 wks	P, F	Intact	1	11
JK	60	1 mth	F, T	Intact	2	3
Experiment 3						
KB	73	2 mths	P, F, T	Intact	2	7
LE	63	3 wks	P, F, T	Intact	5	9

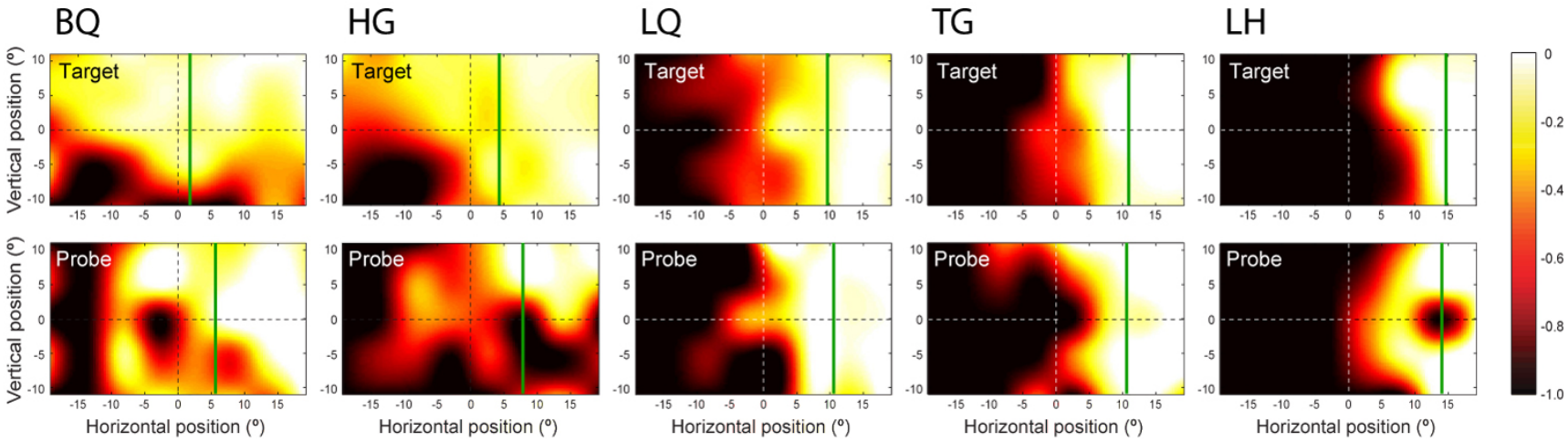
* All lesions involve right hemisphere: (P) parietal; (T) temporal; (F) frontal.
** Visual fields were assessed by confrontation.
† Percentage rightward deviation from centre of line.
‡ RH targets – LH targets (max. 17).



Supplementary Figure 1. Errors in responding to fixated letter targets.

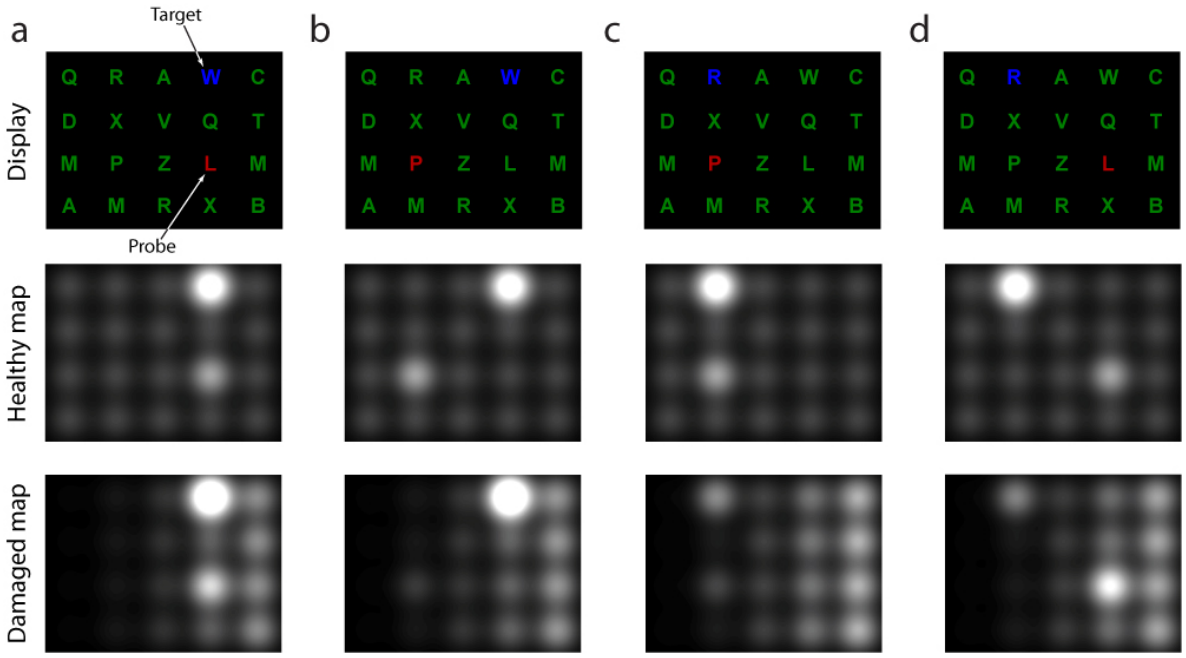
(**a**) Solid lines indicate frequency with which controls (blue) and neglect patients (red) correctly responded with a button-press after fixating a target letter X in Experiment 1, as a function of the horizontal position of the target letter. Note the tendency of neglect patients to omit responses to more contralesional (leftward) targets, even when the target was successfully located and fixated. Dashed lines indicate frequency of 'false alarms', i.e. incorrectly responding with a button-press to a fixated letter that is not an X.

(**b**) As (a) but plotted as a function of vertical target position. Note that neglect patients responded less frequently to target letters in inferior space, even when the target was successfully fixated.



Supplementary Figure 2. Individual deficits in goal- and stimulus-driven orienting.

Normalized frequency of fixations on targets (top) and probes (bottom) in Experiment 1 is plotted as a function of 2d position for each individual patient (compare with group averages plotted in Fig 4c). A normalized ratio of 0 indicates no difference between patient and control performance; -1 indicates complete patient impairment. Green bars indicate the horizontal bias value calculated for each patient and item type (see Methods).



Supplementary Figure 3. Competition within healthy and lesioned priority maps.

Top: Typical *target+probe* search arrays used in Experiment 2. Subjects are instructed to respond only to letters of the target color (here, blue) and ignore letters of any other color. Each array consists of distractors (green letters), a *target* (a single blue letter), and a *probe* (a single red letter).

Middle: How each search array might be represented within a unified priority map. Every item has some representation within the map, but targets and probes have a stronger representation than distractors because of local color contrast (i.e. bottom-up salience). The priority representation of a target also receives an additional top-down contribution due to its goal-relevance, so targets have a higher priority than probes. Attention is directed most frequently towards the peak of the priority representation: for healthy individuals this is always the target (Fig 6b).

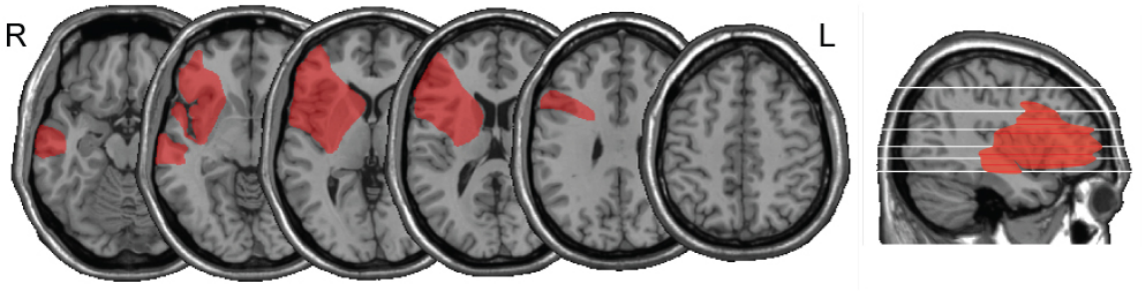
Bottom: These images illustrate how right parietal damage may affect the internal representation of priority. To emulate the under-representation of leftward items within the damaged priority map, we multiply the healthy priority values shown *middle* by an increasing function of horizontal position, then normalize. The consequences for orienting of attention depend on the horizontal locations of target and probe (Fig 6d):

(**a**) When both target and probe are in right hemispace, the under-representation of left space has little effect on their priority: patients direct eye movements towards the target on most trials, like controls.

(**b**) When the probe is in left hemispace, its representation within the damaged priority map is attenuated. The priority of the target, in right hemispace, is relatively unaffected and so the majority of eye movements are still directed towards it, as for controls.

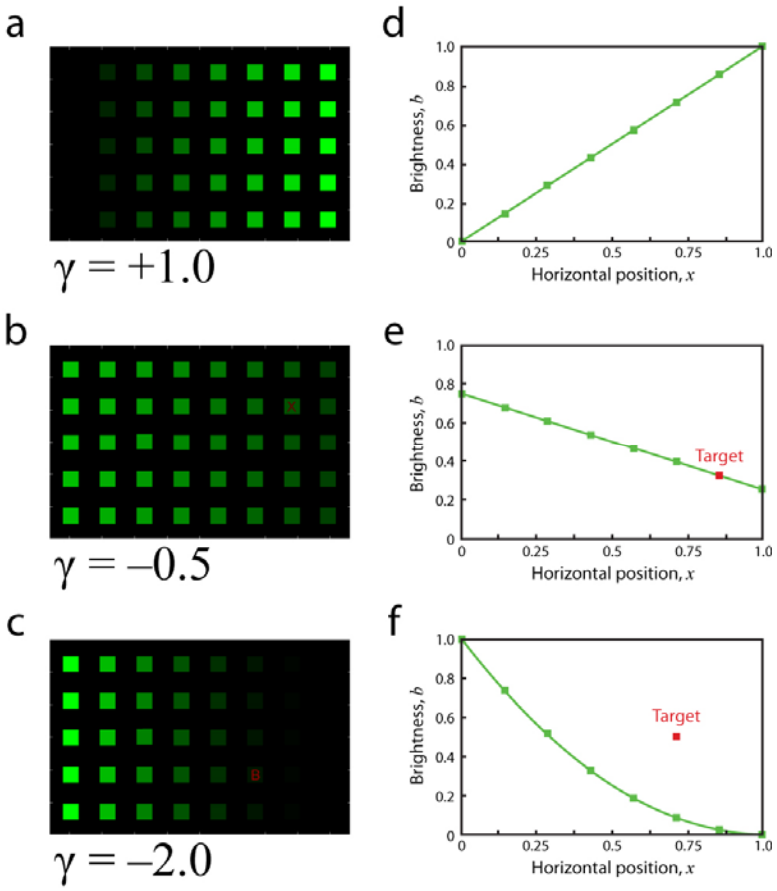
(**c**) When both target and probe are in left space, the priority of both items is attenuated equally, so the relative advantage of the target over the probe is preserved. However, both items must now compete for attention with distractors in right hemispace, which may have a similar or stronger representation in the damaged priority map. As a result, patients are less likely to direct eye movements to either item than controls.

(**d**) When the target is in left hemispace, its representation is attenuated to the extent that a probe in right hemispace has a stronger representation within the priority map. Patients are more likely to direct eye movements to the probe than to the target.



Supplementary Figure 4. Frontal neglect patient JK.

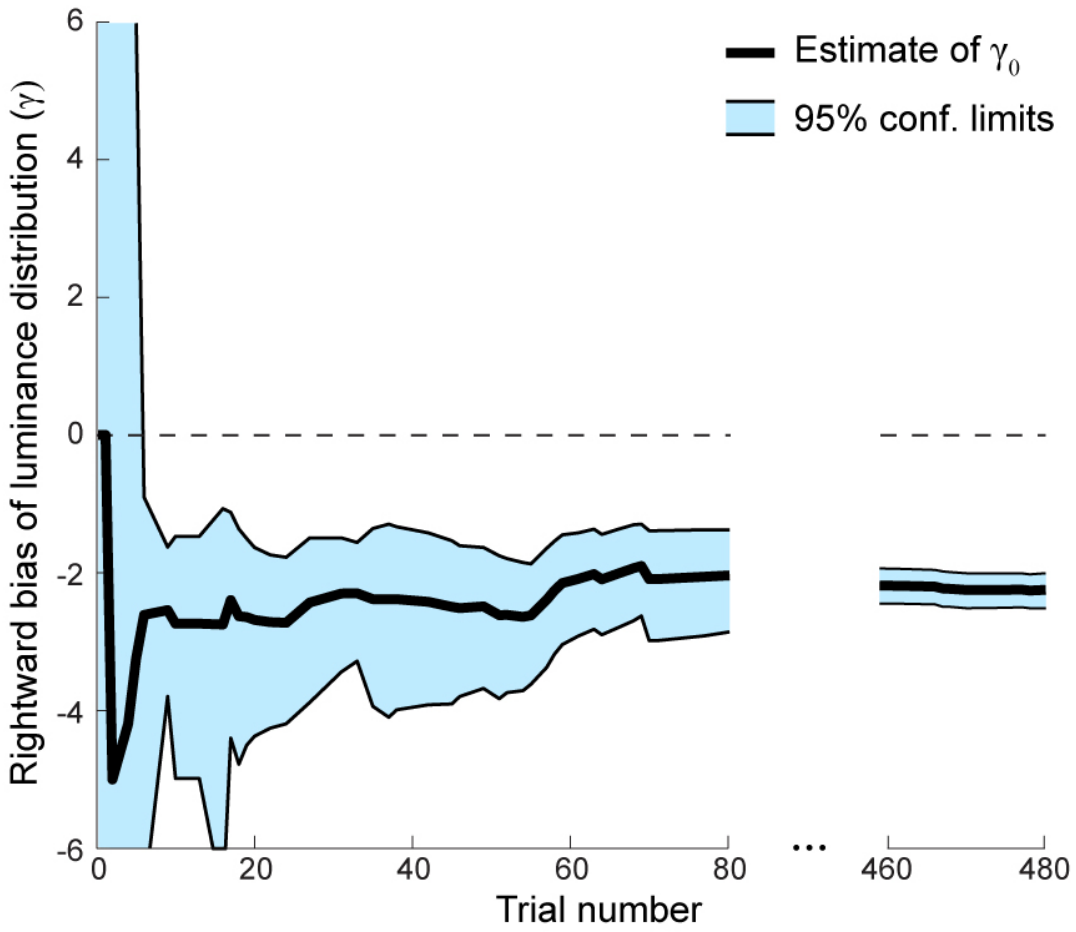
Lesion anatomy of frontal neglect patient JK, plotted on a standard template for comparison with posterior neglect lesion overlap (Fig 2d).



Supplementary Figure 5. Manipulation of salience during visual search.

(**a**–**c**) Examples of search arrays with different horizontal distributions of distractor luminance. The luminance distribution was determined by a bias parameter, γ, with positive values corresponding to rightward biases in luminance. (a) shows a *null* trial, in which no target is present; in (b) a target letter (red X) is presented at the far right of the display, isoluminant with distractors at the same horizontal position; (c) illustrates a target-present trial in the follow-up experiment in which target luminance was held constant (see Methods).

(**d**–**f**) Relationship between normalized brightness (b; see Methods) and horizontal position (x) for each of the example search arrays shown in (a–c). Green squares indicate distractors, red squares indicate targets.



Supplementary Figure 6. Adaptive estimation of corrective luminance.

Performance of the adaptive algorithm for patient KB. The luminance bias that will bring the patient's mean fixation deviation to the centre of the display is estimated on each trial ($\gamma_{0;}$ thick black line). After an initial period of broad sampling, the luminance distribution is confined to values within the 95% confidence limits on γ_0, indicated by the shaded area.