Supporting Information

## Murphey et al. 10.1073/pnas.0804998106

Fig. S1. Retinotopy for subject BR (left hemisphere). Surface models of the gray-white boundary are viewed from a posterior-superior position. The black discs indicate the location of the electrodes of interest. Purple numbers adjacent to each disc show the electrode number. Black dashed lines indicate borders between visual areas. The name of the visual area is shown in black text. The purple line shows the fundus of the calcarine sulcus. Colored overlay shows the BOLD fMRI response to a retinotopic mapping stimulus. Each color corresponds to the stimulus position that evoked the maximal response. Only retinotopic areas in occipito-temporal-parietal cortex are colored.

V3A

V2

V3

V1

10

20

location of
mapping stimulus

right horizonal
meridian

lower vertical
meridian

left horizontal
meridian

upper vertical
meridian

right horizonal
meridian

V3

V2

V3A

10

V1

20

calcarine
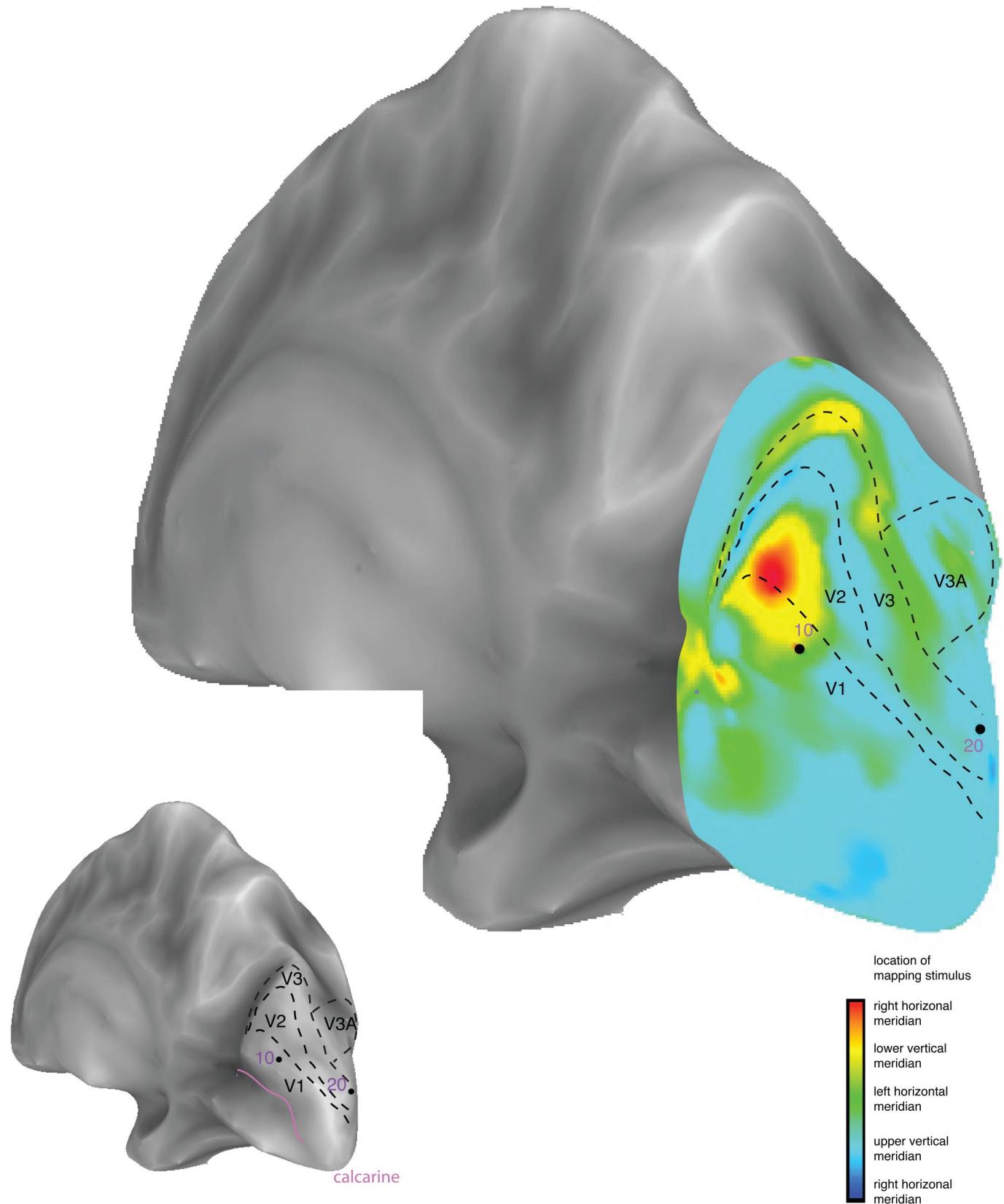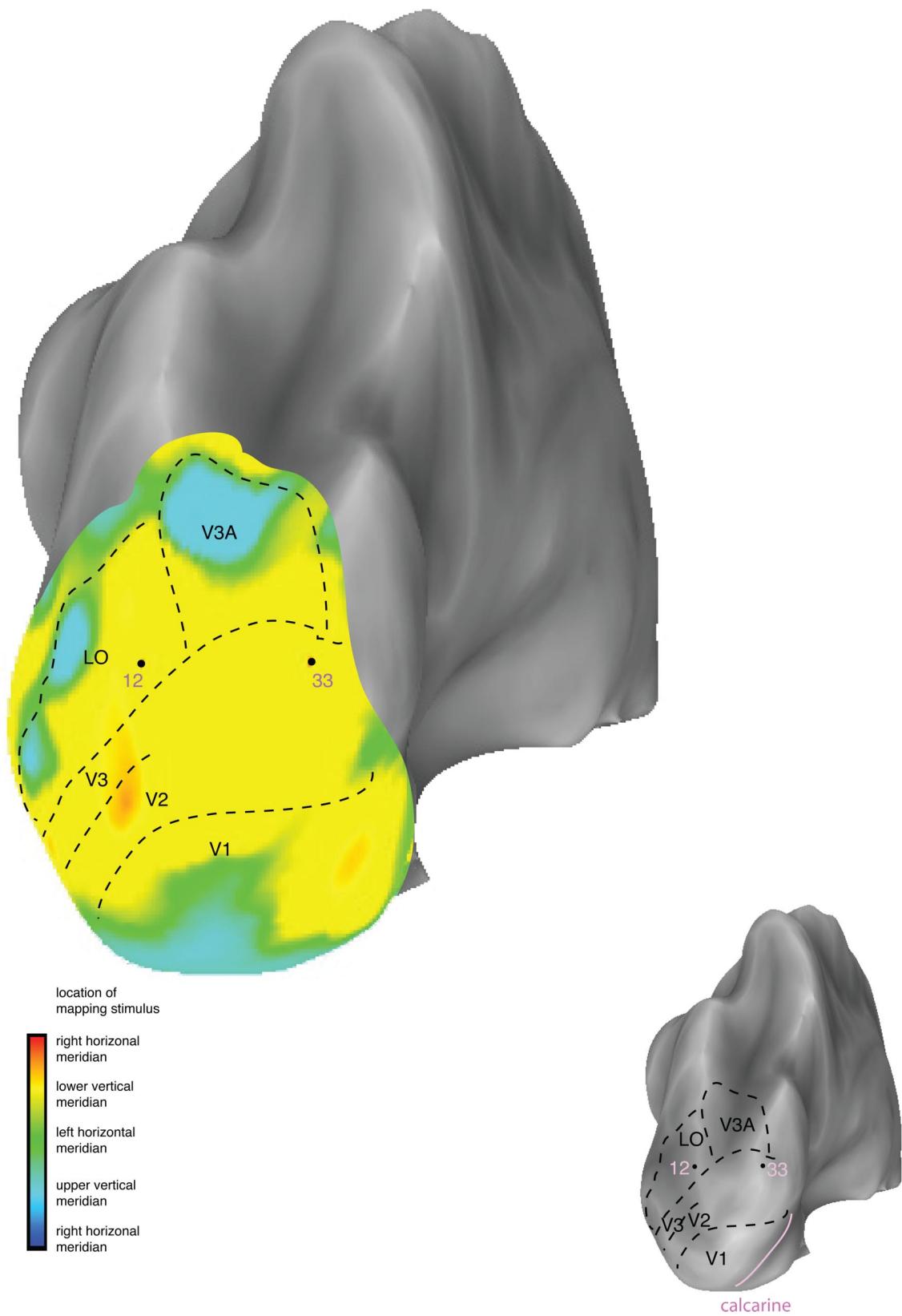
Fig. S2. Retinotopy for subject CE (right hemisphere)

V3A

LO
12   33

V3
V2

V1

location of
mapping stimulus

right horizontal
meridian

lower vertical
meridian

left horizontal
meridian

upper vertical
meridian

right horizontal
meridian

V3A

LO
12   33

V3 V2

V1

calcarine

Fig. S3.   Retinotopy for subject CI (left hemisphere)

location of
mapping stimulus

right horizonal
meridian

lower vertical
meridian

left horizontal
meridian

upper vertical
meridian

right horizonal
meridian
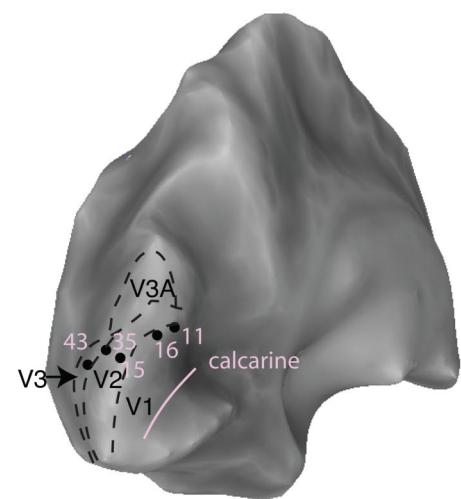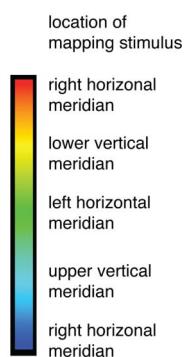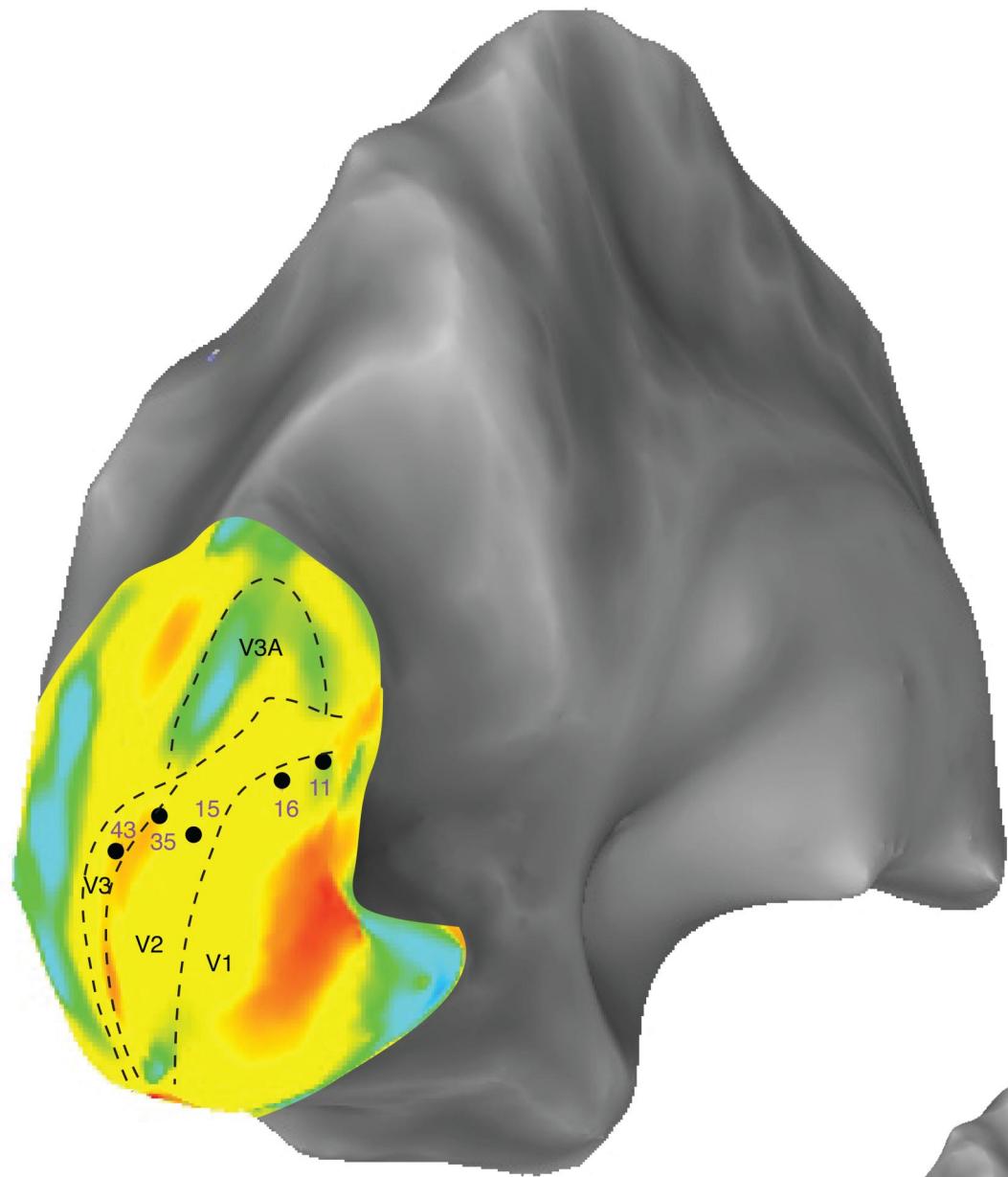
Fig. S4. Retinotopy for subject CS (left hemisphere)

location of
mapping stimulus

right horizontal
meridian

lower vertical
meridian

left horizontal
meridian

upper vertical
meridian

right horizontal
meridian

V3A

V3

V2

V1

3

V3A

V3

V2

3

V1

calcarine
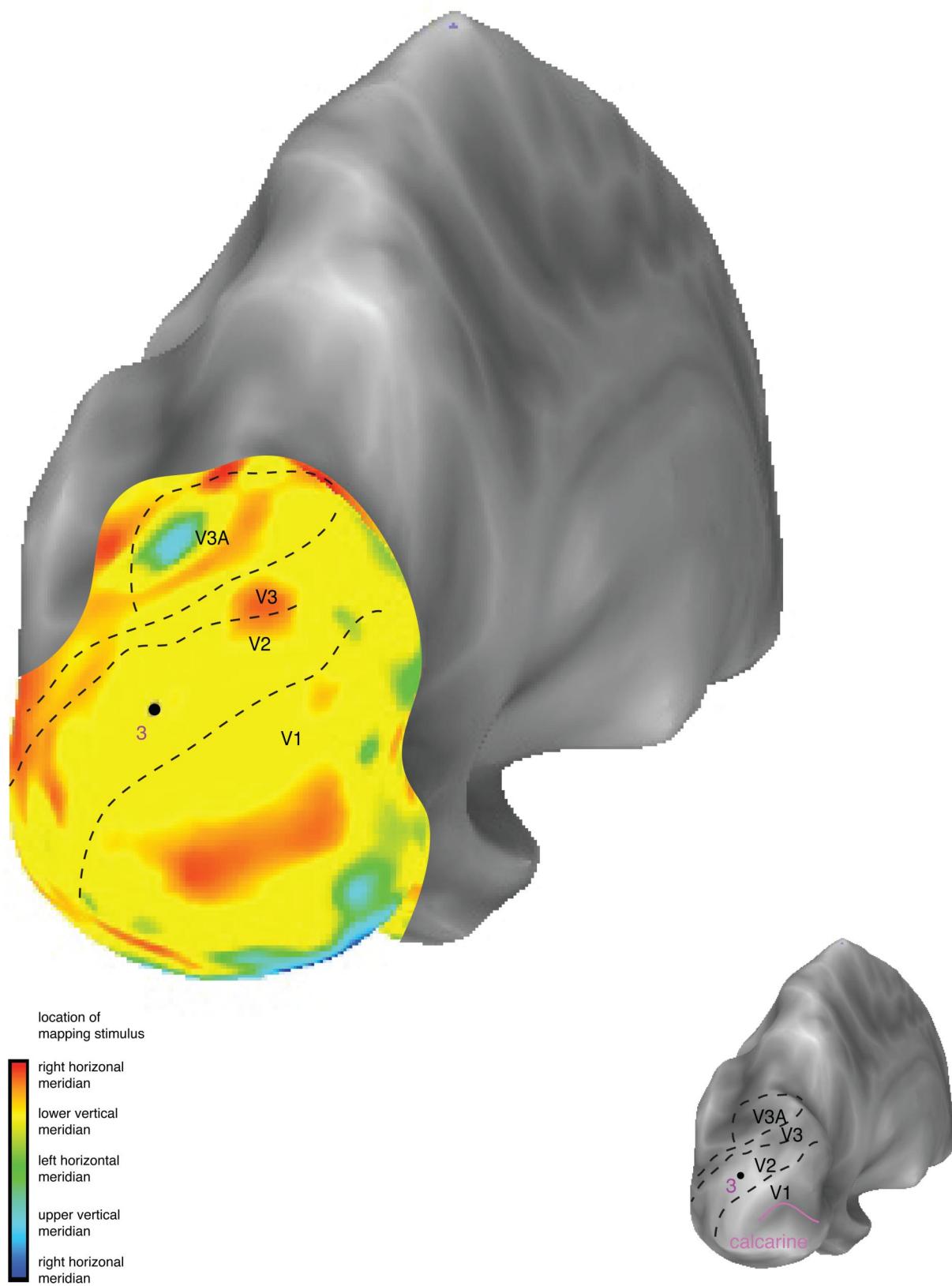
Fig. S5. Retinotopy for subject CY (left hemisphere)
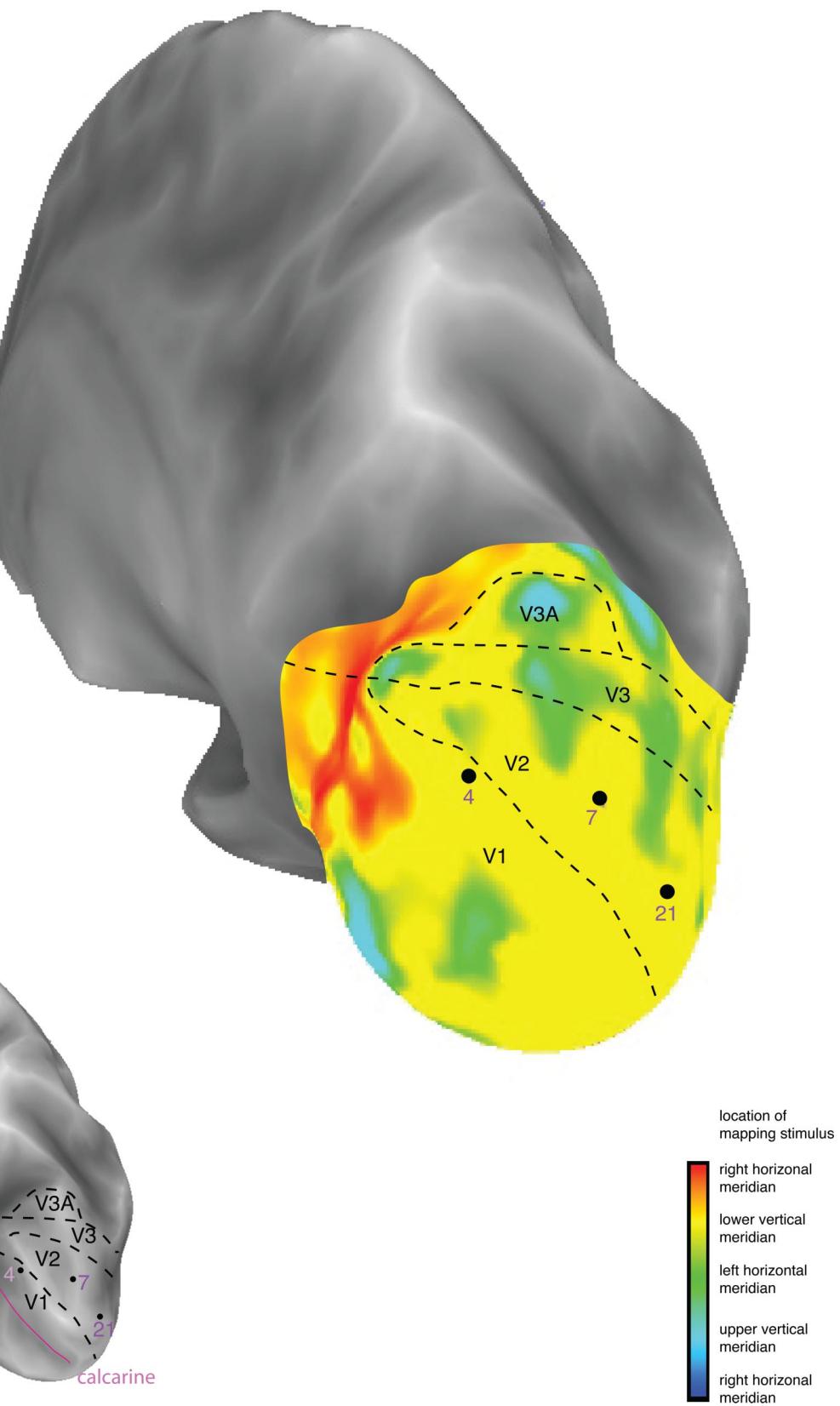
Fig. S6. Retinotopy for subject CY (right hemisphere)

location of
mapping stimulus

right horizonal
meridian

lower vertical
meridian

left horizontal
meridian

upper vertical
meridian

right horizonal
meridian

V3A

18

V3

V2

LO

V1

calcarine
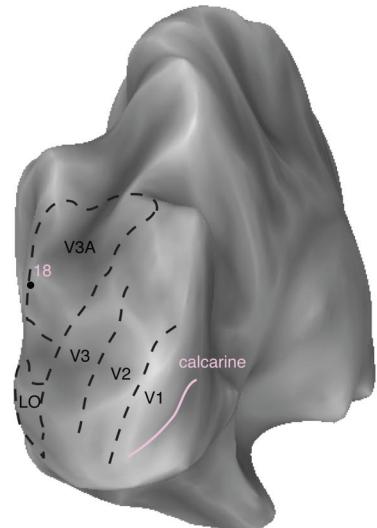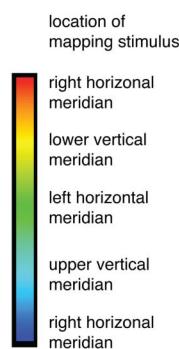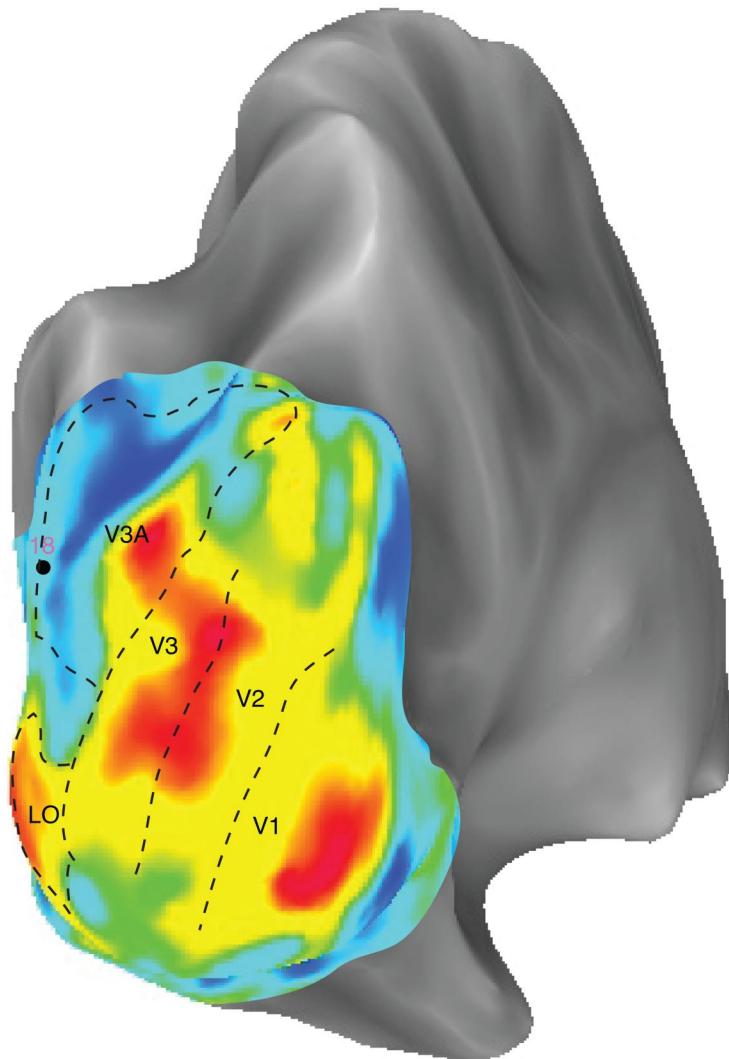
Fig. S7. Retinotopy for subject DE (left hemisphere)

V3A

2

5

V3

1

8

V1

V2

location of
mapping stimulus

right horizonal
meridian

lower vertical
meridian

left horizontal
meridian

upper vertical
meridian

right horizonal
meridian

V3A

calcarine

2

5

V3

1

8

V1

V2
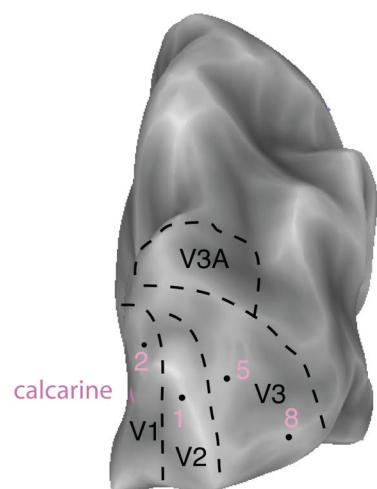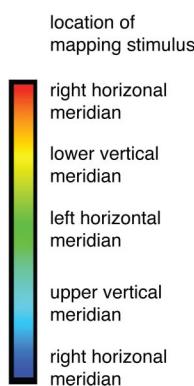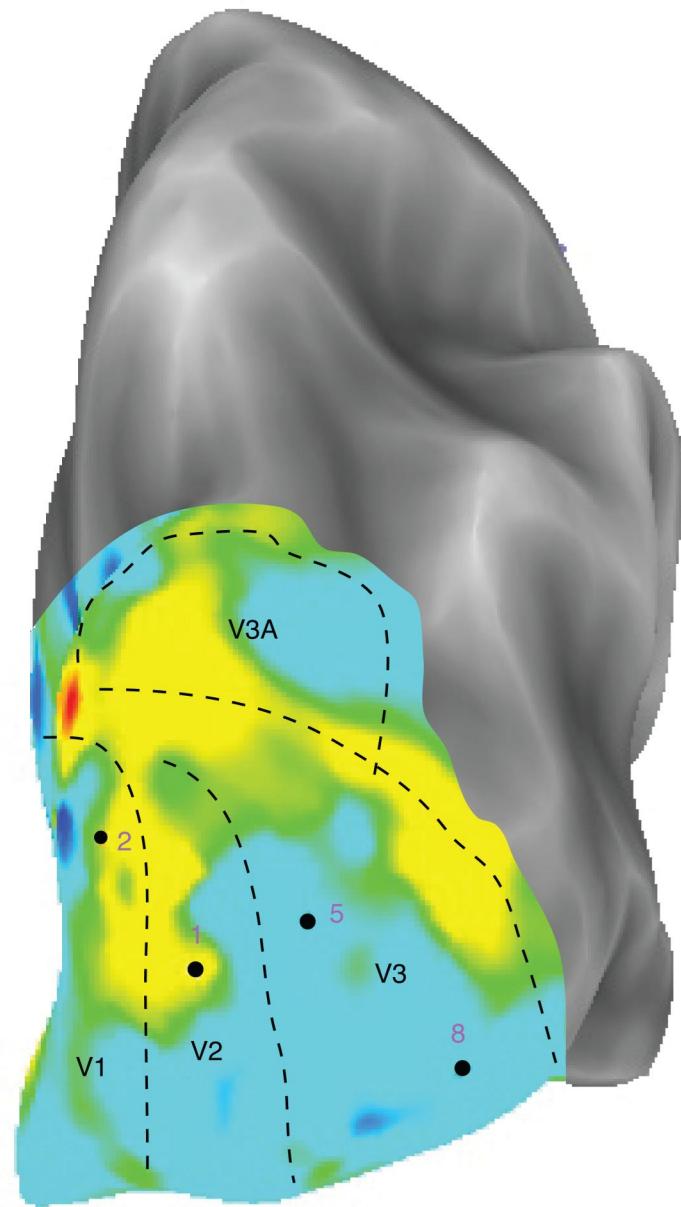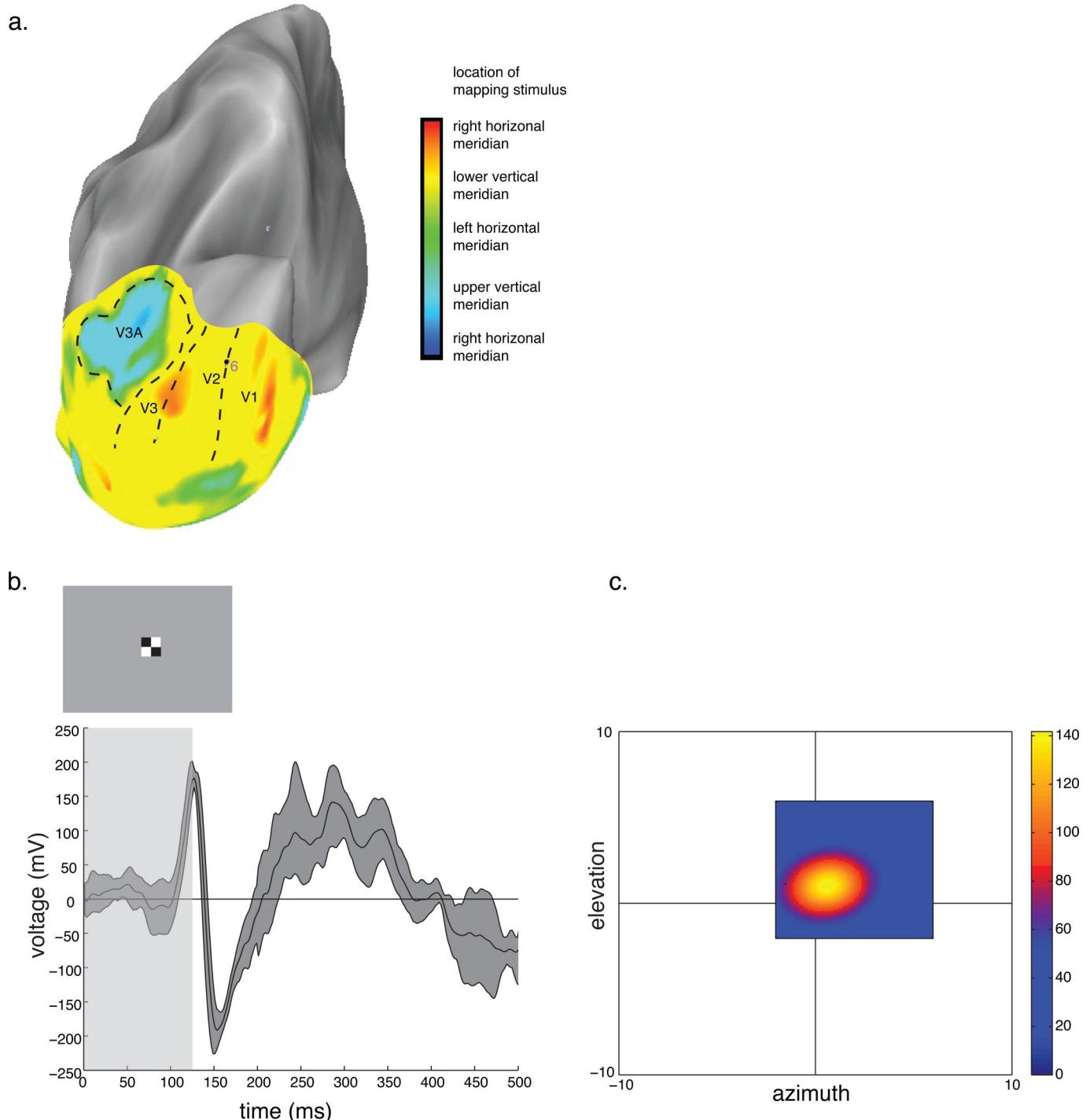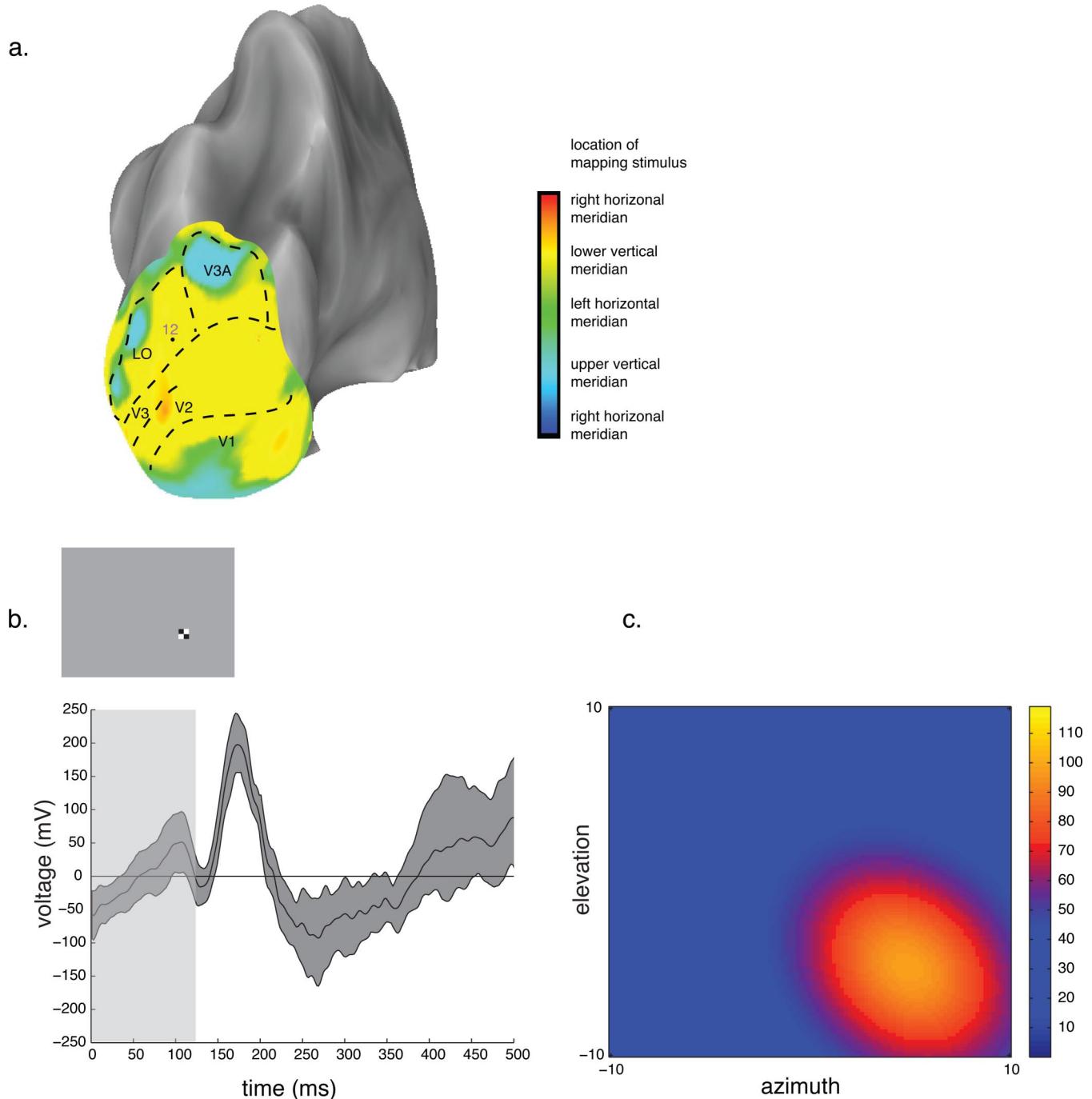
**Fig. S8.** Retinotopy for subject DE (right hemisphere)
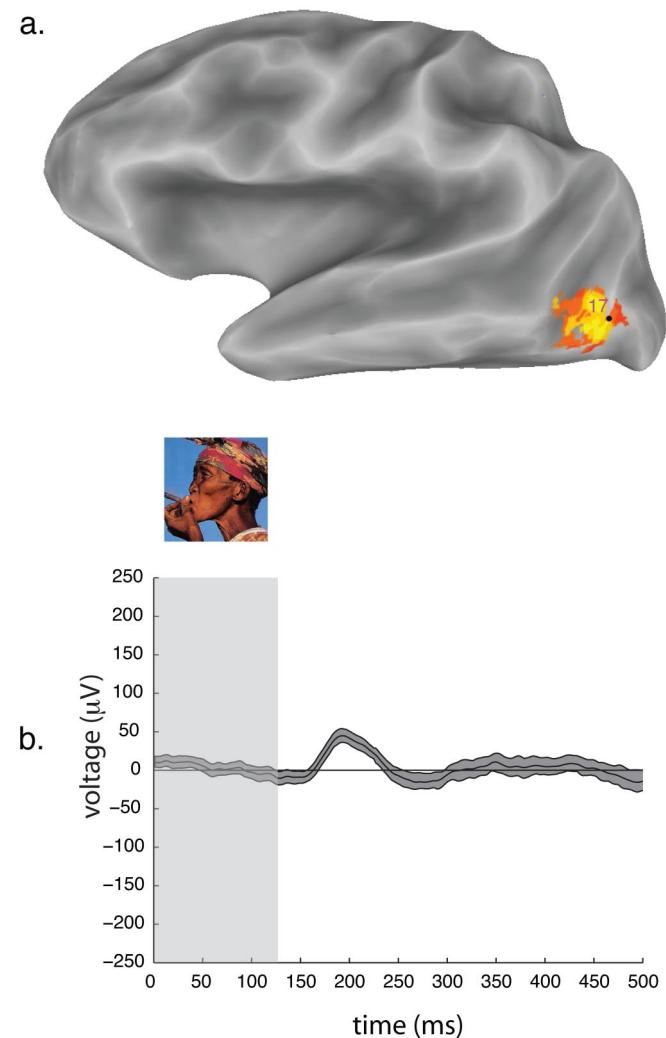
Fig. S9. Converging evidence for electrode 6. Electrical stimulation produced a percept at this site. (*a*) Electrode was identified as being in V1/V2 by fMRI, as shown by retinotopic mapping results. (*b*) A receptive field (RF) was mapped by presenting checkerboards for 125 ms at different visual field locations (1). A checkerboard near the center of gaze evoked the maximal response. Solid black trace shows the local-field potential (LFP; shaded area, 95% CI). (*c*) The LFP responses to flashing checkerboards at different locations were fit with a Gaussian to measure the spatial RF of the electrode. Color scale shows the rms power of the LFP at each spatial field location (no color means that no mapping stimulus was presented at that location).

1. Yoshor D, Bosking WH, Ghose GM, Maunsell JH (2006) Receptive fields in human visual cortex mapped with surface electrodes. *Cereb Cortex* 17:2293–2302.
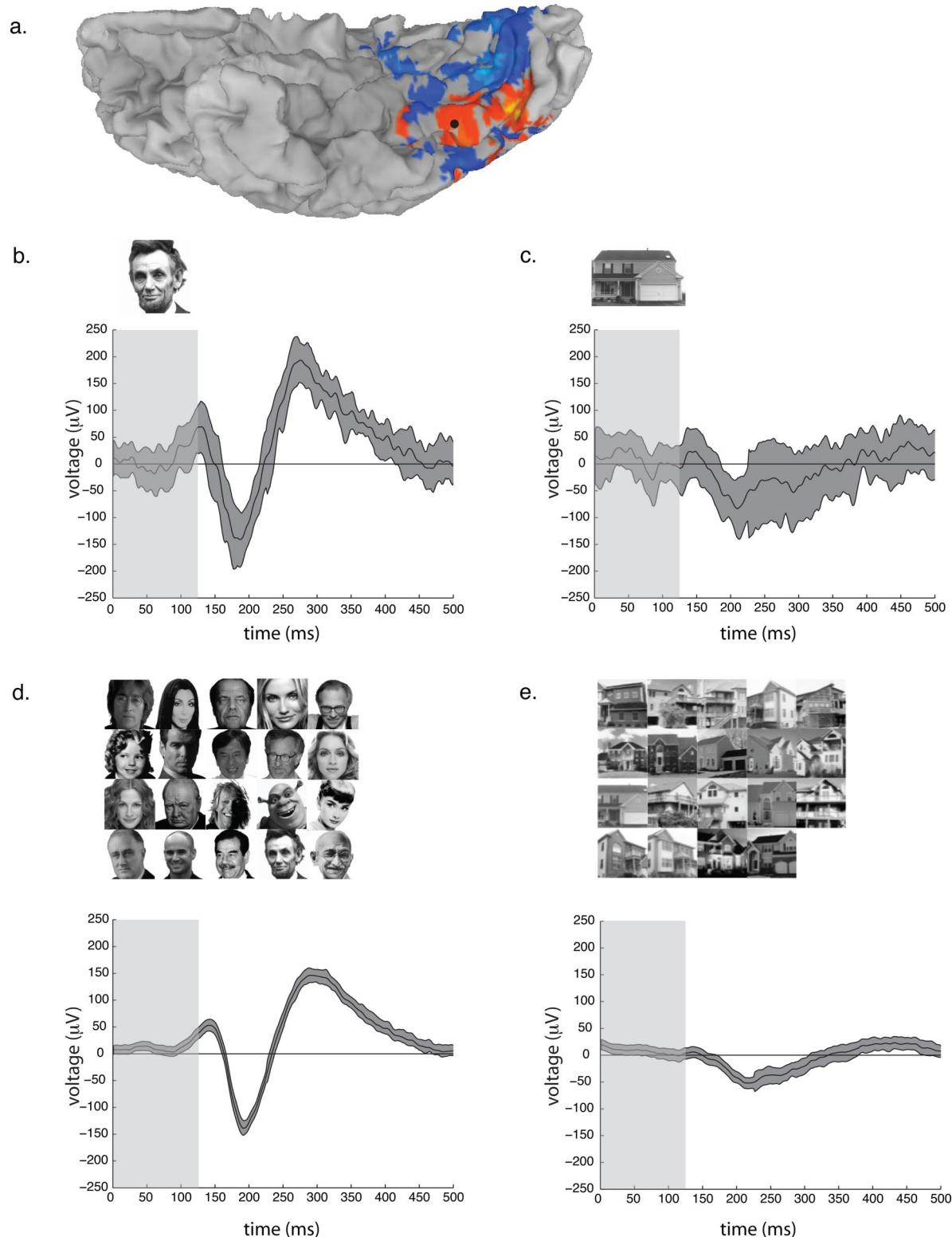
Fig. S10. Converging evidence for electrode 12. Electrical stimulation did not produce a percept at this site. (*a*) Electrode was identified as being in area lateral occipital (LO) by fMRI, as shown by retinotopic mapping. (*b*) LFPs to flashing checkerboards at different visual field location were recorded. Response latency was longer than for a V1/V2 electrode (compare with Fig. S9*B*). (*c*) The spatial RF of the electrode measured with LFPs. The RF was larger than the spatial RF of a V1/V2 electrode (compare with Fig. S9*C*).

Fig. S11. Converging evidence for electrode 17. Electrical stimulation did not produce a percept at this site. (*a*) Electrode was identified as being in area middle temporal (MT) by fMRI, as shown by the contrast of moving dots vs. static dots is visualized in orange-yellow. (*b*) A significant LFP response was recorded in response to static images, consistent with previous reports of responses to static images in ventral MT/MST (1).

1. Kourtzi Z, Bulthoff HH, Erb M, Grodd W (2002) Object-selective responses in the human motion area MT/MST. *Nat Neurosci* 5:17–18.

Fig. S12. Converging evidence for electrode 49. Electrical stimulation did not produce a percept at this site. (*a*) Electrode was identified as being in fusiform face area (FFA) by fMRI, as shown by the contrast of faces (orange) vs. houses (blue). (*b*) Average LFP response to an image of Abraham Lincoln. (*c*) Average LFP response to an image of a house in suburban Maryland. (*d*) Average LFP response to 20 different faces. (*e*) Average LFP response to 19 different houses.

Table S1. Summary data for 50 electrodes in 10 subjects

Electrode	Subject	Visual area	Distance, mm	Detection thresholds, uA (95% CI)	Percept quality
Early					
1	DE	V2	9.49	493 (457–501)	Small, white plus sign
2	DE	V1	16.52	590 (575–599)	Small, star rainbow
3	CY	V2	4.9	593 (379–725)	Small, dime-sized
4	CY	V1	29.14	948 (817–1,106)	Silver flash
5	DE	V3	16.3	695 (613–749)	Light, tiny red dot
6	BR	V1/V2	5.97	554 (484–694)	Bright, one distinct place
7	CY	V2	7.98	1411 (1,081–1,555)	Flash of light, quarter-sized
8	DE	V3	39.6	2652 (2,183–2,952)	Quality not assessed
9	BR	V2/V3	26.35	1450 (1,291–1,634)	Very slight white, a feeling
10	CE	V1	24.61	824 (703–1,021)	Flash of light, stars, and stardust
11	CS	V1/V2	49.79	741 (705–887)	White, blue, 2 of them
13	BR	V2	19.17	541 (456–580)	Small, white light
14	BR	V3/LO	34.22	Chance at 2.5 mA	No percept
15	CS	V2	29.46	2489 (1,205–2,853)	Blue square/triangle
16	CS	V1/V2	29.93	930 (698–1,780)	Chinese checkers
18	DE	V3A	39.07	Chance at 6 mA	No percept
20	CE	V3	14.97	1142 (917–1,303)	Bright, little stars
21	CY	V2	11.31	1326 (1,208–1,404)	Mercury mirror
33	CI	V2	10.5	2527 (2,356–2,664)	Dull wave, middle block, circle
35	CS	V2/V3	29.96	1327 (1,150–1,529)	″P,″ blue square
36	BT	V1/V2	19.58	832 (736–1,294)	Four-sided star
37	BT	V1/V2	9.78	860 (763–1607)	Circles
38	BS	V2	41.4	1224 (998–1,459)	Pattern, triangle, green, aquas
39	BS	V1	3.89	551 (430–601)	Dustbunnies
40	BS	V4/V8	56.3	1204 (1,126–1,324)	Projecting light cone
Late					
12	CI	LO	23.8	Chance at 7 mA	No percept
17	CI	MT	69.88	Chance at 7 mA	No percept
19	DE	UVR	62.28	Chance at 6 mA	No percept
22	CE	LO/MT	59.86	Chance at 2.5 mA	No percept
23	CI	UVR	103.18	Chance at 7 mA	No percept
24	CE	FFA	71.19	Chance at 2.5 mA	No percept
25	CI	UVR	132.27	Chance at 6 mA	No percept
26	CY	FFA	81	Chance at 7 mA	No percept
27	DE	PPA	103.2	1214 (1,173–1,391)	Little explosion
28	DE	FFA	97.9	Chance at 6 mA	No percept
29	CI	V4α	97.18	1711 (1,456–1,892)	Foil, flash
30	CS	UVR	95.02	Chance at 6 mA	No percept
31	CI	FFA	93.41	Chance at 7 mA	No percept
32	DE	FFA	106.68	2648 (1,745–2,929)	Not assessed
34	CI	V8	109.71	Chance at 6 mA	No percept
41	BT	V8/UVR	94.7	Chance at 2.5 mA	No percept
42	BT	UVR	95.98	Chance at 2.5 mA	No percept
43	CS	UVR	35.92	Chance at 2.5 mA	No percept
44	CE	FFA	77.6	Chance at 2.5 mA	No percept
45	CE	FFA/PPA	88.47	Chance at 2.5 mA	No percept
46	BR	V8	86.1	Chance at 2.5 mA	No percept
47	CE	LO/MT	43.8	Chance at 2.5 mA	No percept
48	BS	UVR	109.52	Chance at 2.5 mA	No percept
49	DN	FFA	110.53	Chance at 6 mA	No percept
50	DO	FFA	129.19	Chance at 2 mA	No percept

The first column shows electrode number; electrodes are numbered to allow for comparison with other figures and tables. The second column shows the subject code (2-letter code not corresponding to subject initials). The third column shows the identity of the visual area. The fourth column shows the distance in millimeters along the cortical surface between the electrode and the occipital pole. The fifth column shows the detection threshold (with 95% CI) or ″chance″ if no threshold was measured with the maximum tested current. The sixth column shows the self-report of the percept quality from the subject. The first 25 rows show electrodes in visual areas classified as ″early;″ the remaining rows show electrodes in visual areas classified as ″late.″ PPA, parahippocampal place area; UVR, unidentified visually responsive. Each electrode was assigned a number. Detailed data for each electrode (by its number) are available in the table. Subjects were assigned 2-letter codes not corresponding to their initials.