

Supporting Information

Lingnau et al. 10.1073/pnas.0902262106

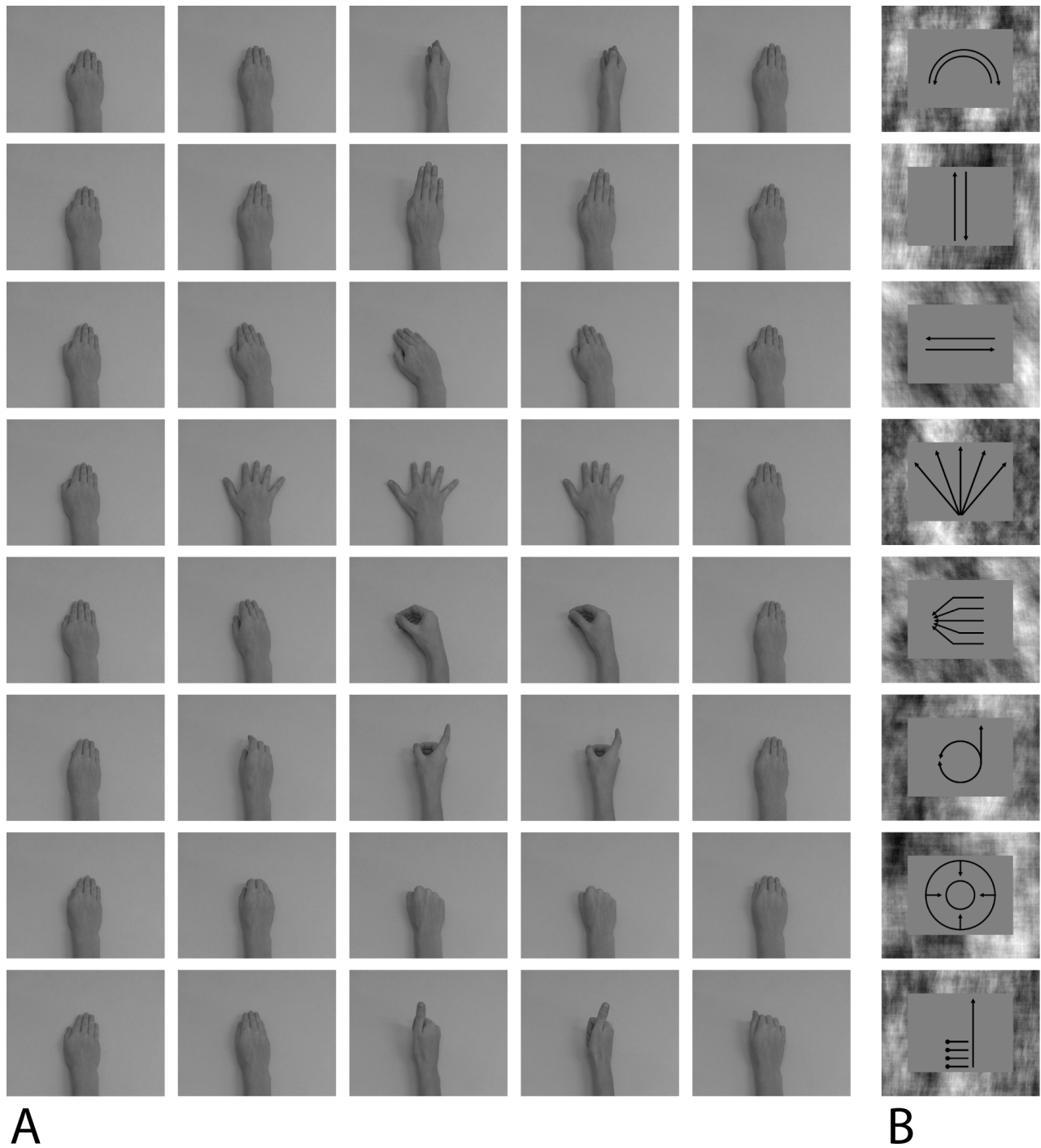


Fig. S1. Material presented during motor act observation (A) and execution (B). Each row shows one of the 8 different motor acts. Columns in A correspond to the movie frames shown at 250, 500, 1,000, 1,250, and 1,500 ms.

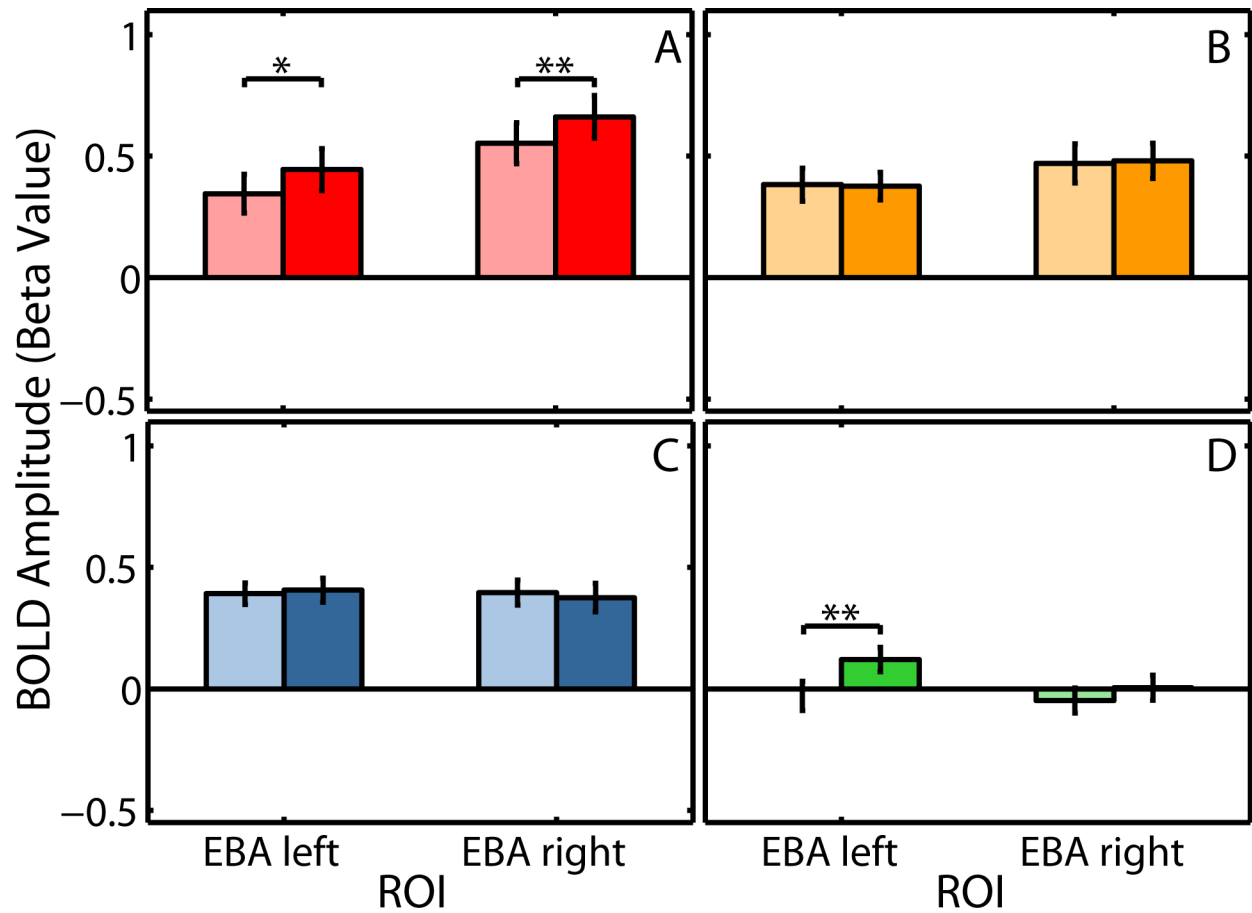


Fig. S2. Average BOLD response in left and right extrastriate body area (see also Table S1). The BOLD response adapted in both ROIs if the same motor act was repeatedly observed (A). Furthermore, there was adaptation in the left EBA if the same motor act was repeatedly executed (D). We found no signs of cross-modal adaptation in the left or right extrastriate body area (B and C). Light colors, same motor act; dark colors, different motor act. *, $P < 0.05$; **, $P < 0.01$. Error bars show SEM.

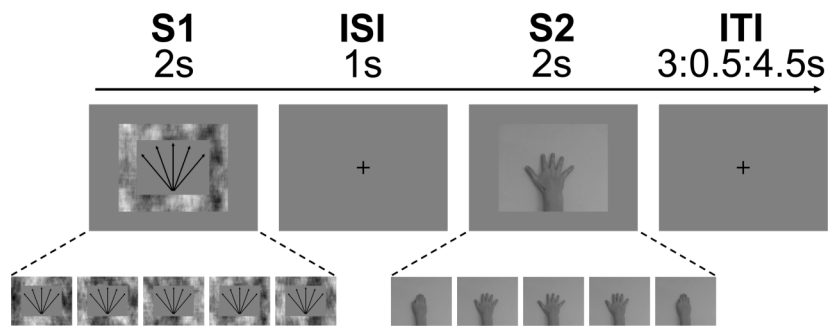


Fig. S4. Trial scheme. Each trial consisted of an adaptation (Video S1) and a test stimulus (Video S2). The example shows a trial for the condition "OE-same" (Video S1, "observe motor act"; Video S2, "execute" same motor act).

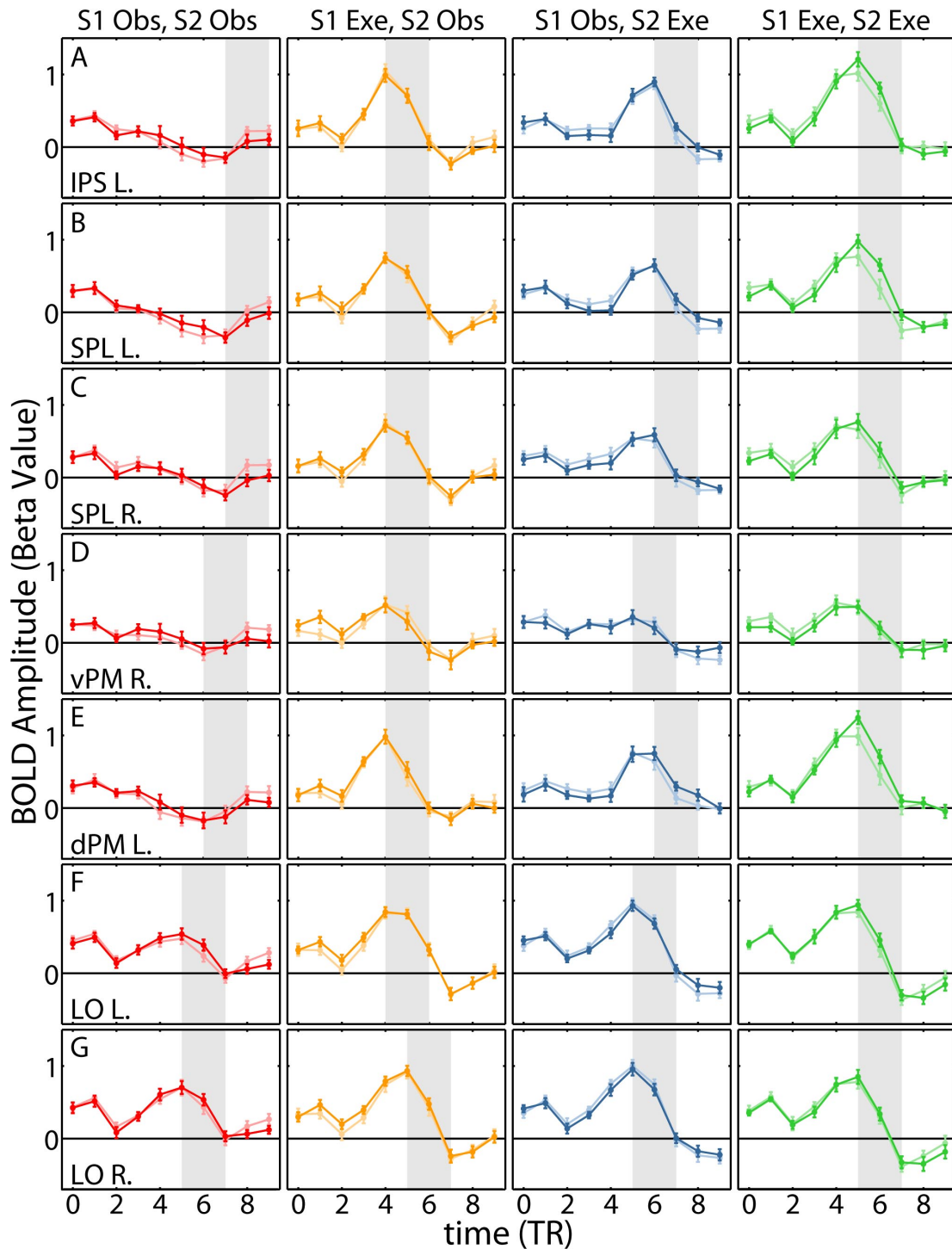


Fig. S5. Event-related deconvolved BOLD response (averaged across trials and participants for all voxels in each ROI) in visuomotor ROIs (A–G), separately for each condition (columns). Light colors, same motor act; dark colors, different motor act. Time window for averaging is marked in gray. Error bars indicate SEM. TR = 0 indicates trial onset. IPS L., left intraparietal sulcus; SPL L., left superior parietal lobule; SPL R., right superior parietal lobule; vPM R., right ventral premotor cortex; dPM L., left dorsal premotor cortex; LO L., left lateral occipital cortex; LO R., right lateral occipital cortex.

Table S1. Pairwise comparisons computed within predefined ROIs (visuomotor ROIs, conjunction hand execution, foot execution \cap hand observation, foot observation; motor ROIs, conjunction hand execution > scrambled observation \cap foot execution > scrambled observation; visual ROIs, conjunction hand observation, foot observation > scrambled observation)

ROI	OO-same < OO-diff		OE-same < OE-diff		EO-same < EO-diff		EE-same < EE-diff		Talairach coordinates		
	<i>p</i>	<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>	<i>t</i>	<i>x</i>	<i>y</i>	<i>z</i>
Visuomotor											
IPS left	0.989	2.327	**0.008	-2.836	0.788	0.830	*0.011	-2.679	-45	-35	27
SPL left	0.971	2.118	*0.038	-1.967	0.301	-0.536	**0.003	-3.385	-28	-55	45
SPL right	0.987	2.552	0.060	-1.684	0.481	-0.048	0.071	-1.580	29	-45	42
vPM right	0.695	0.524	0.579	0.204	0.859	1.133	0.244	-0.716	42	-2	31
dPM left	0.843	1.055	**0.002	-3.718	0.064	-1.649	*0.015	-2.488	-22	-15	45
LO left	*0.021	-2.294	0.515	0.038	0.474	-0.069	*0.016	-2.454	-33	-74	-7
LO right	0.050	-1.802	0.687	0.502	0.291	-0.569	0.152	-1.079	33	-70	-8
Motor											
IPL left	0.802	0.883	*0.010	-2.721	0.814	0.929	0.170	-0.996	-48	-27	22
IPS left	0.959	1.916	*0.023	-2.252	0.329	-0.455	**0.006	-2.981	-38	-37	41
SPL left	0.954	1.847	*0.033	-2.046	0.078	-1.525	*0.044	-1.874	-23	-56	54
vPM left	0.444	-0.144	*0.038	-1.959	0.818	0.949	0.170	-0.997	-44	-1	12
dPM left/SMA	0.314	-0.499	*0.019	-2.371	0.209	-0.843	*0.034	-2.033	-6	-8	54
Thalamus left	0.370	-0.341	*0.019	-2.362	0.726	0.621	0.166	-1.015	-15	-18	10
Cerebellum centr.	0.970	2.094	**0.002	-3.646	0.551	0.132	0.441	-0.153	1	-53	-11
Cerebellum left	0.876	1.222	*0.004	-3.253	0.459	-0.106	0.100	-1.366	-25	-49	-26
Cerebellum right	0.955	1.852	*0.015	-2.479	0.201	-0.872	0.068	-1.611	23	-48	-27
Visual											
EBA left	*0.030	-2.092	0.392	-0.281	0.542	0.108	**0.004	-3.206	-42	-68	-6
EBA right	**0.007	-2.883	0.683	0.351	0.437	-0.162	0.165	-1.021	42	-61	-4

IPS, intraparietal sulcus; SPL, superior parietal lobule; vPM, ventral premotor cortex; dPM, dorsal premotor cortex; LO, lateral occipital cortex; IPL, inferior parietal lobule; SMA, supplementary motor area; EBA, extrastriate body area. *, $P < 0.05$; **, $P < 0.01$.

Table S2. Overview of Talairach coordinates for left and right inferior parietal lobule from studies on observation, imagery, and execution of motor acts

	Paradigm	Talairach coordinates					
		IPL, left hemisphere			IPL, right hemisphere		
		x	y	z	x	y	z
Buccino et al. (1)	Observation	-60	-40	36	52	-32	44
Filimon, Nelson, Hagler, and Sereno (2)	Imagery	-58	-34	39	51	-33	41
Buccino et al. (3)	Execution	-57	-18	18	51	-29	42
Chong, Cunnington, Williams, Kanwisher, and Mattingley (4)	Observation				57	-53	34
Mean		-58	-31	31	53	-37	40

Coordinates reported in MNI space (2, 4) were converted into Talairach coordinates using the matlab function `mni2tal` (available under <http://imaging.mrc-cbu.cam.ac.uk/imaging/MniTalairach#head-b3a445e55dd349a8b2349acce51ab298c90685b>). The two ROIs were defined using $10 \times 10 \times 10 \text{ mm}^3$ around the mean Talairach coordinates.

1. Buccino G, et al. (2001) Action observation activates premotor and parietal areas in a somatotopic manner: An fMRI study. *Eur J Neurosci* 13(2):400–404.
2. Filimon F, Nelson JD, Hagler DJ, Sereno MI (2007) Human cortical representations for reaching: Mirror neurons for execution, observation, and imagery. *Neuroimage* 37(4):1315–1328.
3. Buccino G, et al. (2004) Neural circuits underlying imitation learning of hand actions: An event-related fMRI study. *Neuron* 42(2):323–334.
4. Chong TT, Cunnington R, Williams MA, Kanwisher N, Mattingley JB (2008) fMRI adaptation reveals mirror neurons in human inferior parietal cortex. *Curr Biol* 18(20):1576–1580.

Table S3. Percentages of error trials in the different experimental conditions listed for each participant and averaged across all participants with standard error of mean (SEM)

Participant	Condition								All conditions
	OO-same	OE-same	EO-same	EE-same	OO-diff	OE-diff	EO-diff	EE-diff	
1	0.0	0.0	0.0	0.0	20.8	12.5	8.3	25.0	8.3
2	0.0	0.0	0.0	0.0	0.0	6.3	3.1	0.0	1.2
3	0.0	3.1	0.0	6.3	0.0	0.0	3.1	6.3	2.3
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	3.1	0.0	0.0	3.1	0.0	6.3	1.6
7	0.0	0.0	0.0	0.0	3.1	0.0	0.0	3.1	0.8
8	0.0	0.0	6.3	6.3	0.0	0.0	3.1	0.0	2.0
9	0.0	0.0	0.0	0.0	0.0	0.0	3.1	3.1	0.8
10	0.0	0.0	6.3	3.1	0.0	6.3	6.3	15.6	4.7
11	0.0	12.5	0.0	4.2	4.2	8.3	8.3	4.2	5.2
12	0.0	0.0	0.0	0.0	0.0	0.0	3.1	3.1	0.8
Mean	0.0	1.3	1.3	1.6	2.3	3.0	3.2	5.6	2.3
SEM	0.0	1.1	0.7	0.7	1.7	1.2	0.9	2.2	0.7

Trials were excluded because of incorrect execution of motor acts or execution when only observation was required.