

## Supplementary Materials for

### Direct brain recordings reveal prefrontal cortex dynamics of memory development

E. L. Johnson\*, L. Tang, Q. Yin, E. Asano, N. Ofen\*

\*Corresponding author. Email: eljohnson@berkeley.edu (E.L.J.); noa.ofen@wayne.edu (N.O.)

Published 19 December 2018, *Sci. Adv.* **4**, eaat3702 (2018)

DOI: 10.1126/sciadv.aat3702

#### **This PDF file includes:**

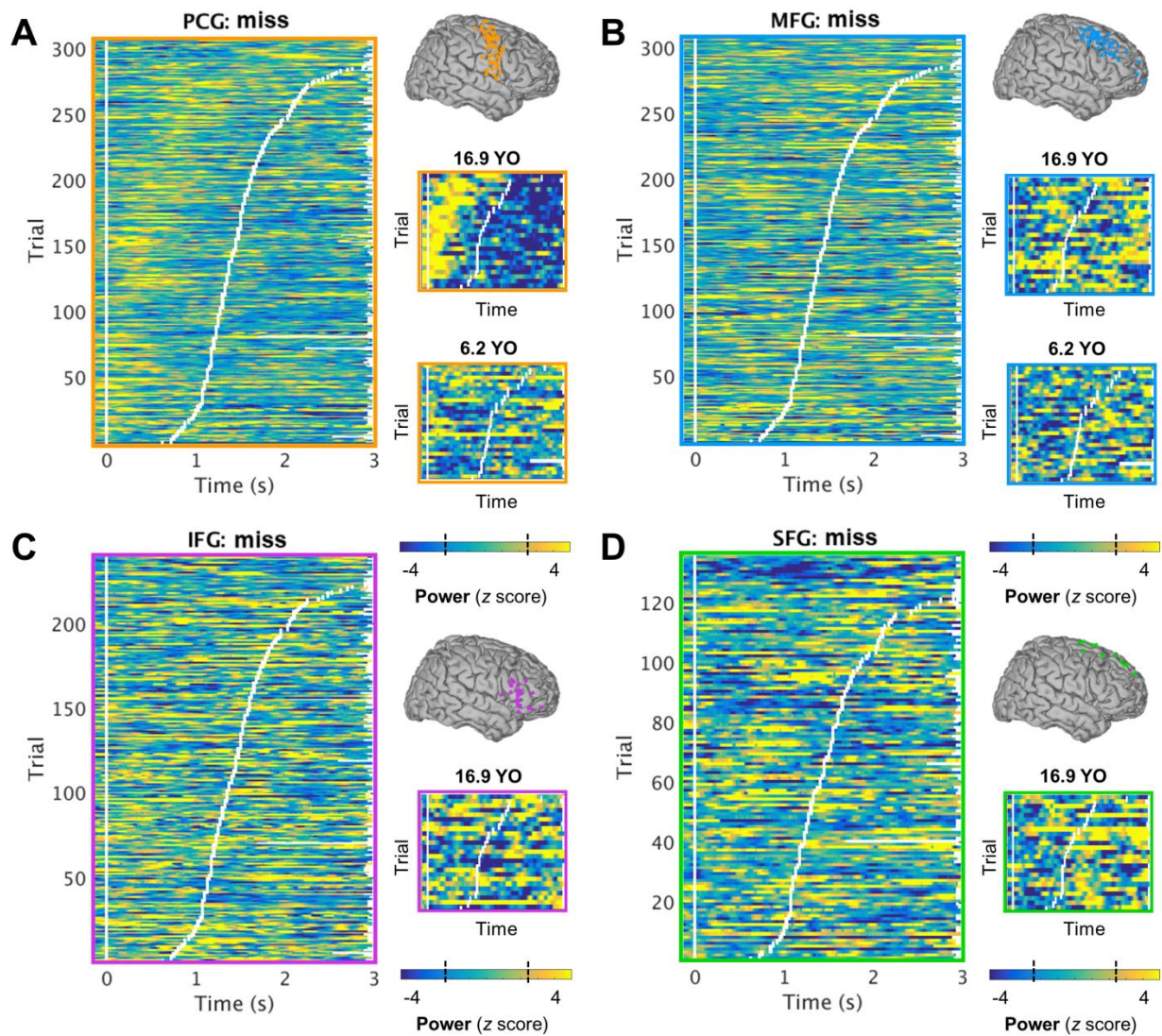
Fig. S1. Frontal activity on subsequent miss trials by region of interest.

Fig. S2. SFG-PCG activity flow.

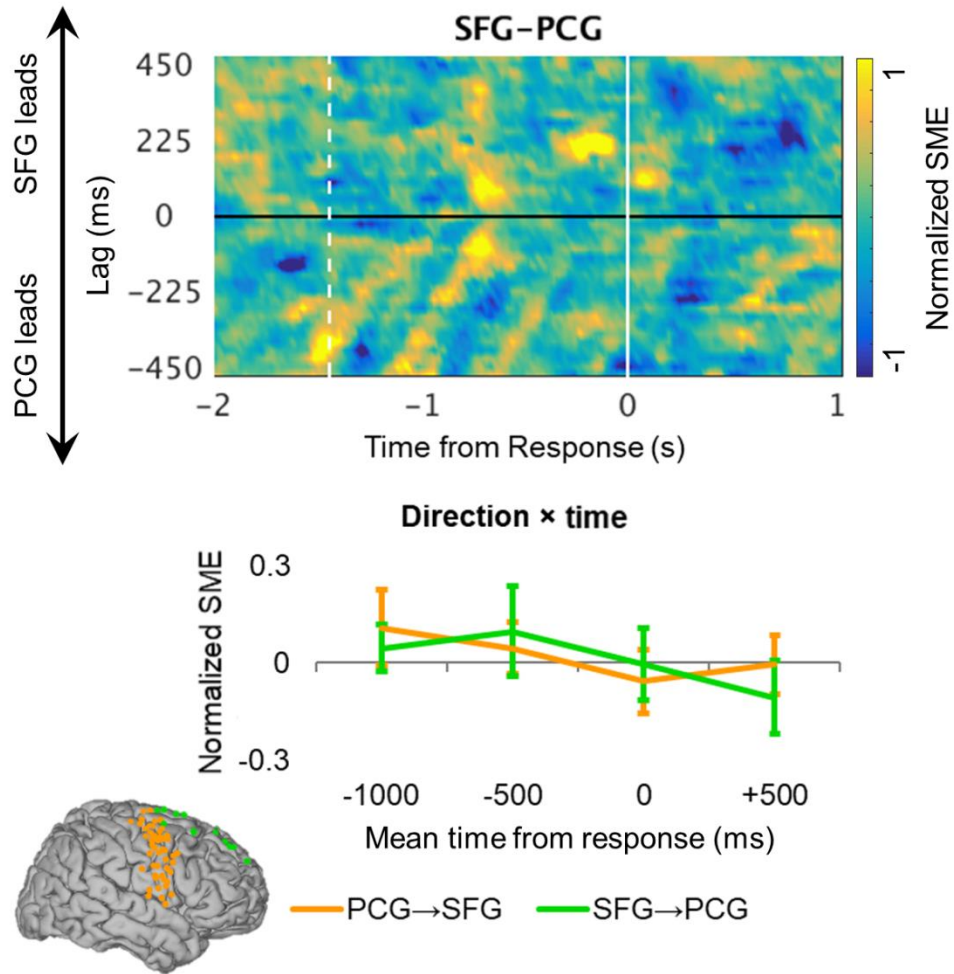
Fig. S3. MFG-IFG/SFG activity flow.

Table S1. Individual patient information and behavior.

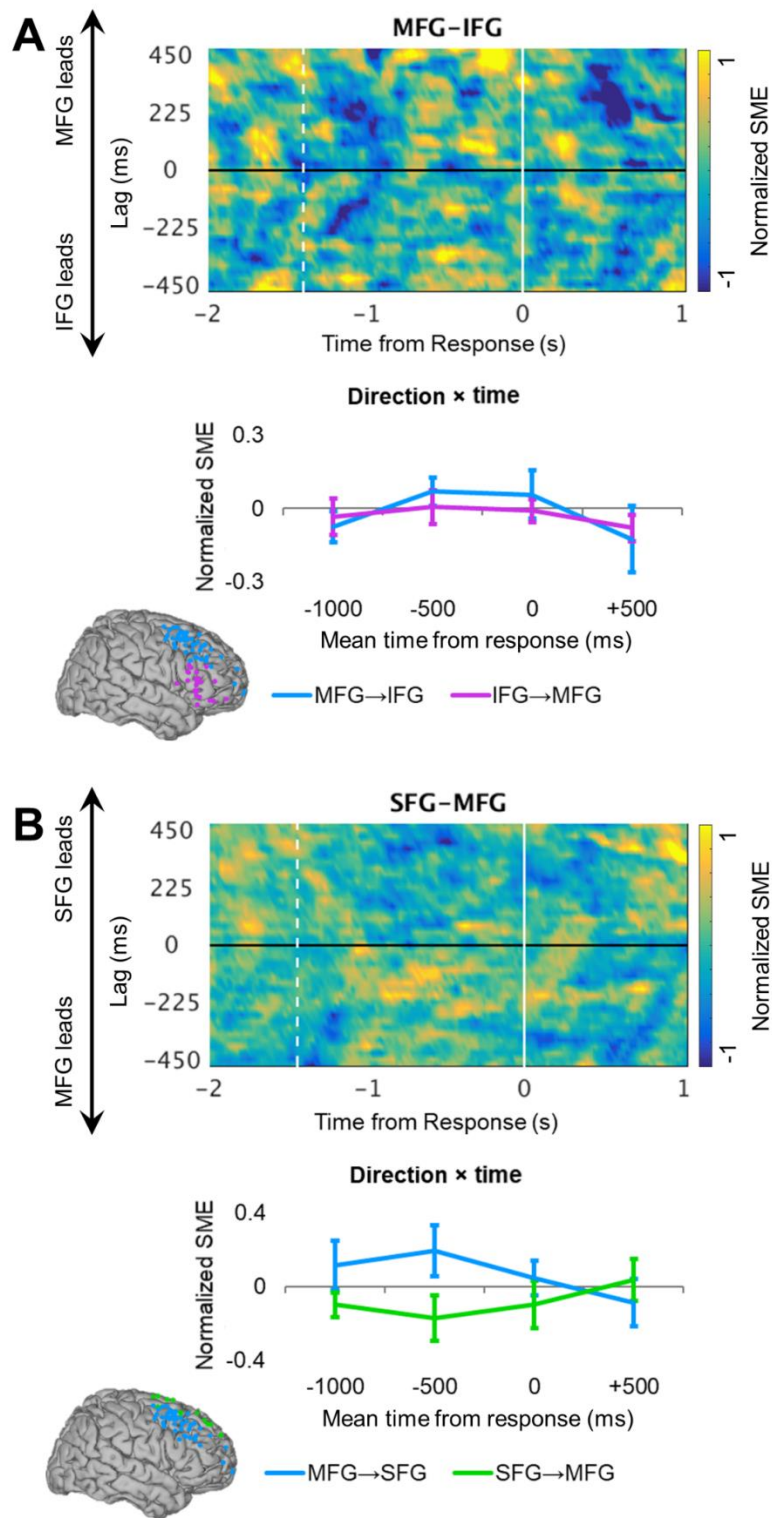
## Supplementary Materials



**Fig. S1. Frontal activity on subsequent miss trials by region of interest.** (A) *Left:* vertically stacked single miss trials for all subjects sorted by RT (white tick marks), averaged over all active PCG electrodes per subject (cf. Fig. 2). Scene onset is indicated by the vertical white line at time = 0 s. Single-trial PCG activity (i.e., z-scored power values compared with a baseline distribution) preceded the response onset ( $z > 2.57$ ,  $P < 0.01$ ). *Right:* Representative electrode-sample single trials for two subjects aged 16.9 and 6.2 years, showing similar activation patterns regardless of age. The dashed lines on the color bar indicate the threshold of significance ( $|z| > 1.96$ ,  $P < 0.05$ ). YO, years old. (B) Equivalent to (A): MFG activity was sustained following the response onset. (C) Equivalent to (A): IFG activity was sustained following the response onset. (There was no IFG or SFG coverage in the youngest subject.) (D) Equivalent to (A): SFG activity was sustained following the response onset.



**Fig. S2. SFG-PCG activity flow.** *Top:* normalized power-correlation subsequent memory effects (SMEs) per temporal lag for all subjects, averaged over all active SFG-PCG electrode pairs per subject. *Bottom:* there were no omnibus effects of time or direction between SFG and PCG sites. Data are represented as mean  $\pm$  SEM on the group level (cf. Fig. 5). Orange, PCG-to-SFG; green, SFG-to-PCG.



**Fig. S3. MFG-IFG/SFG activity flow.** (A) *Top*: normalized power-correlation subsequent memory effects (SMEs) per temporal lag for all subjects, averaged over all active SFG-PCG electrode pairs per subject. *Bottom*: there were no omnibus effects of time or direction between MFG and IFG sites. Data are represented as mean  $\pm$  SEM on the group level (cf. Fig. 5). Blue, MFG-to-IFG; purple, IFG-to-MFG. (B) Equivalent to (A): similar effects were observed between MFG and SFG sites. Blue, MFG-to-SFG; green, SFG-to-MFG.

**Table S1. Individual patient information and behavior.**

	Age	Study Data		Test Data		Trials
		Accuracy	RT (ms)	Accuracy	RT (ms)	
1	13.7	0.98	1,457	0.32	2,107	80
2	12.0	0.88	2,113	0.26	3,452	80
3	11.6	0.66	1,638	0.24	2,819	80
4	15.1	1.00	1,168	0.18	2,275	40
5	12.9	0.98	1,441	0.57	2,136	80
6	17.3	1.00	763	0.79	1,410	80
7	10.5	0.96	1,491	0.23	1,909	80
8	15.6	0.86	1,277	0.76	2,481	80
9	10.6	0.95	1,534	0.34	2,582	40
10	16.9	0.96	1,250	0.05	1,342	80
11	6.2	0.95	1,501	0.02	2,077	80
12	11.1	0.91	2,004	0.14	3,877	80
13	16.7	0.65	1,935	0.10	4,176	40
14	19.4	0.95	1,345	0.32	2,676	80
15	16.1	0.95	1,206	0.45	1,867	80
16	8.5	0.83	1,629	0.27	4,626	40
17	14.7	0.98	1,339	0.39	2,416	80