

FIG. 1A-1C

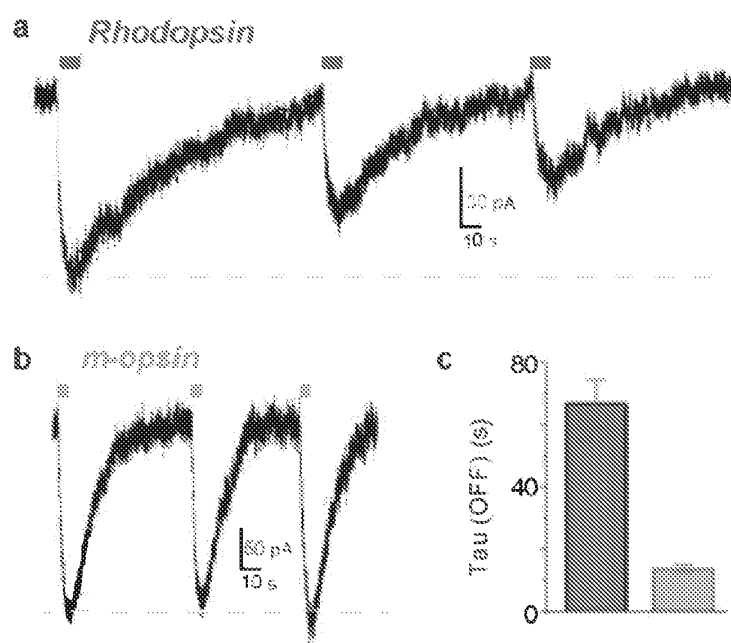


FIG. 2A-2G

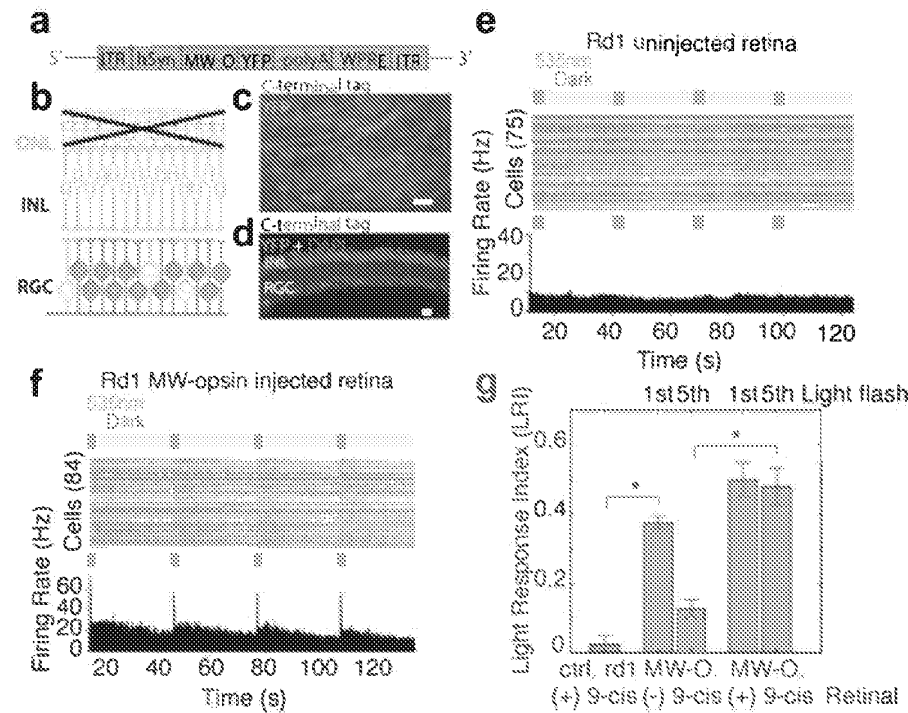


FIG. 3A-3G

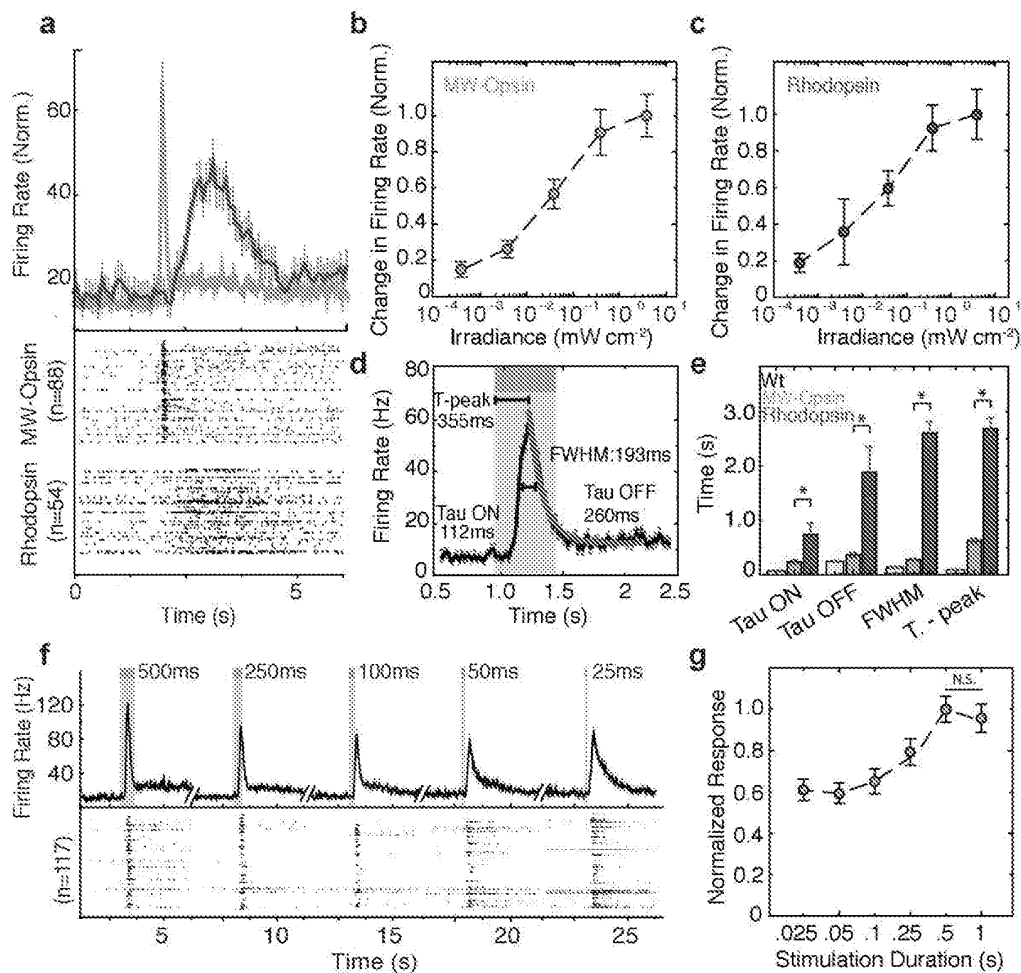


FIG. 4A-4I

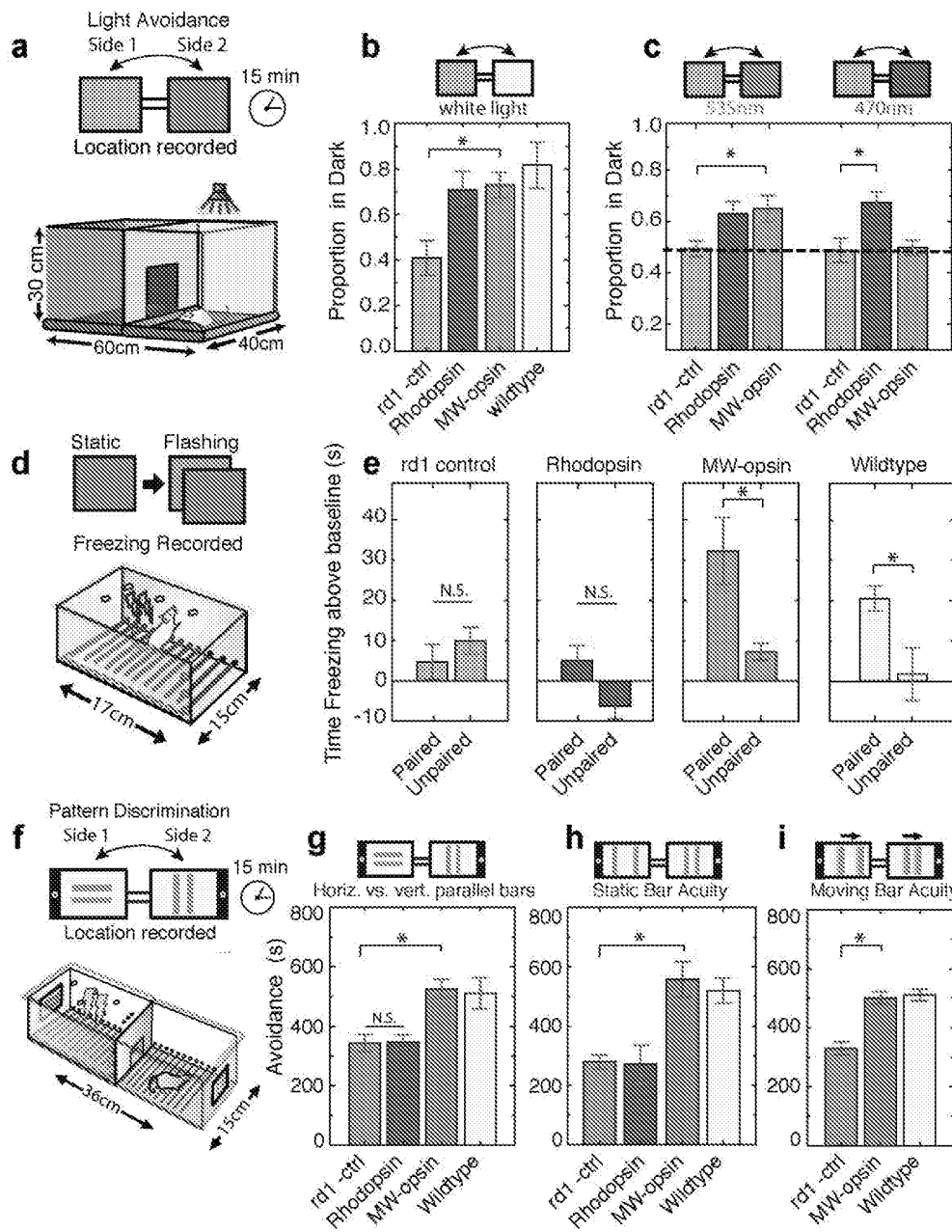


FIG. 5A-5F

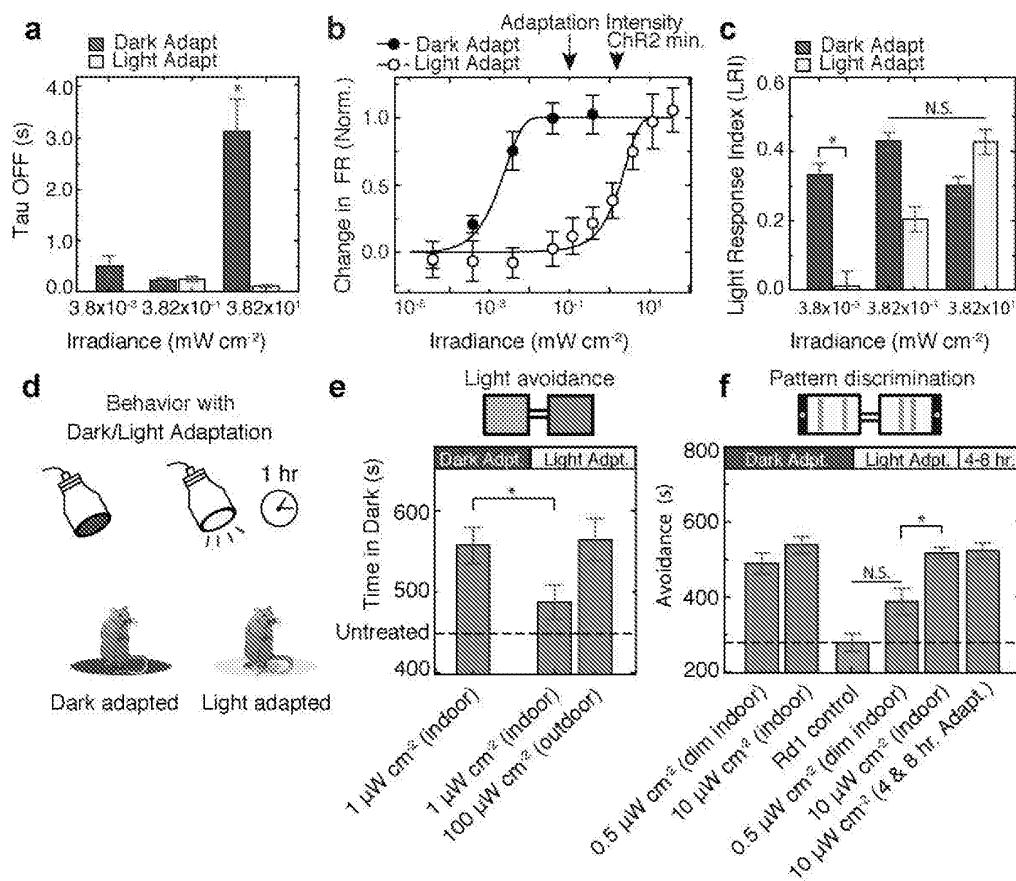


FIG. 6

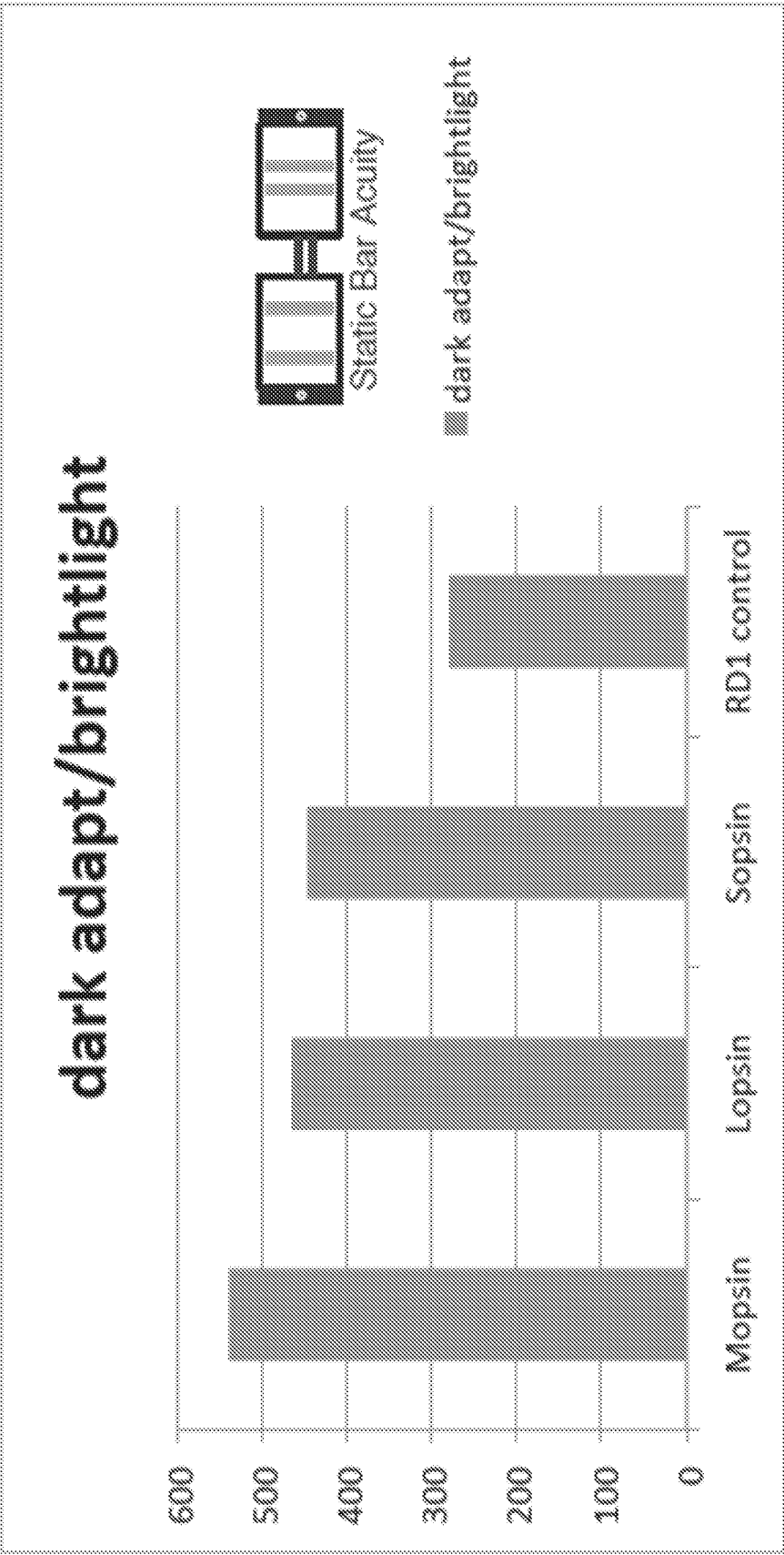


FIG. 6 Learned pattern discrimination of parallel bars at different distances (1 vs 6 cm) in *rd1* mice expressing either MW-opsin, LW-opsin or SW-opsin in RGCs, compared to untreated *rd1* control. Proportion of time spent avoiding pattern paired with shock.

FIG. 7

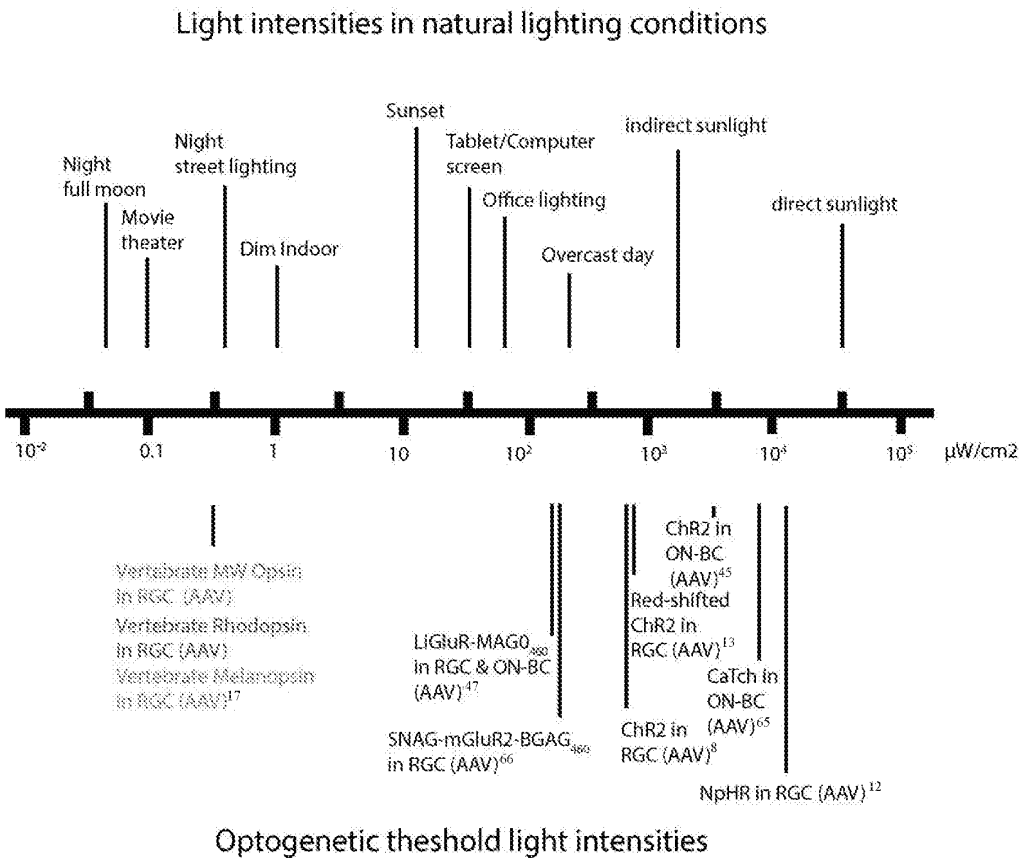


FIG. 8A-8E

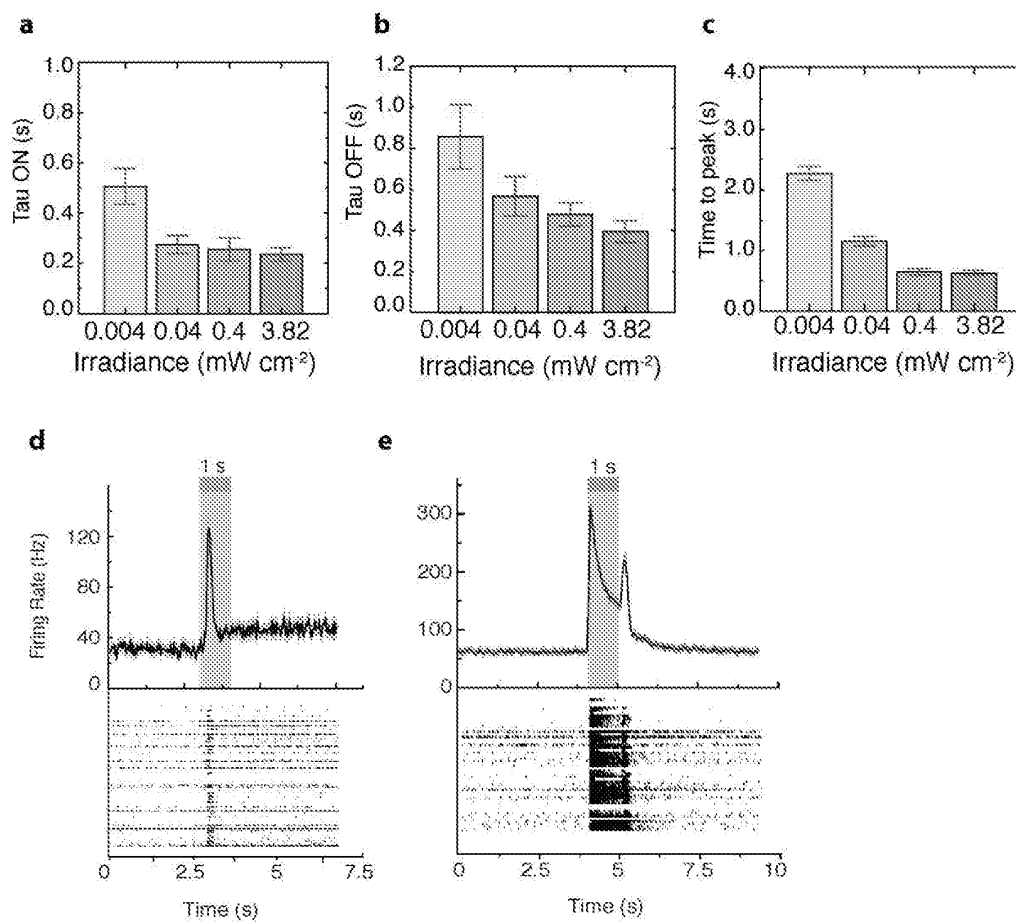


FIG. 9A-9G

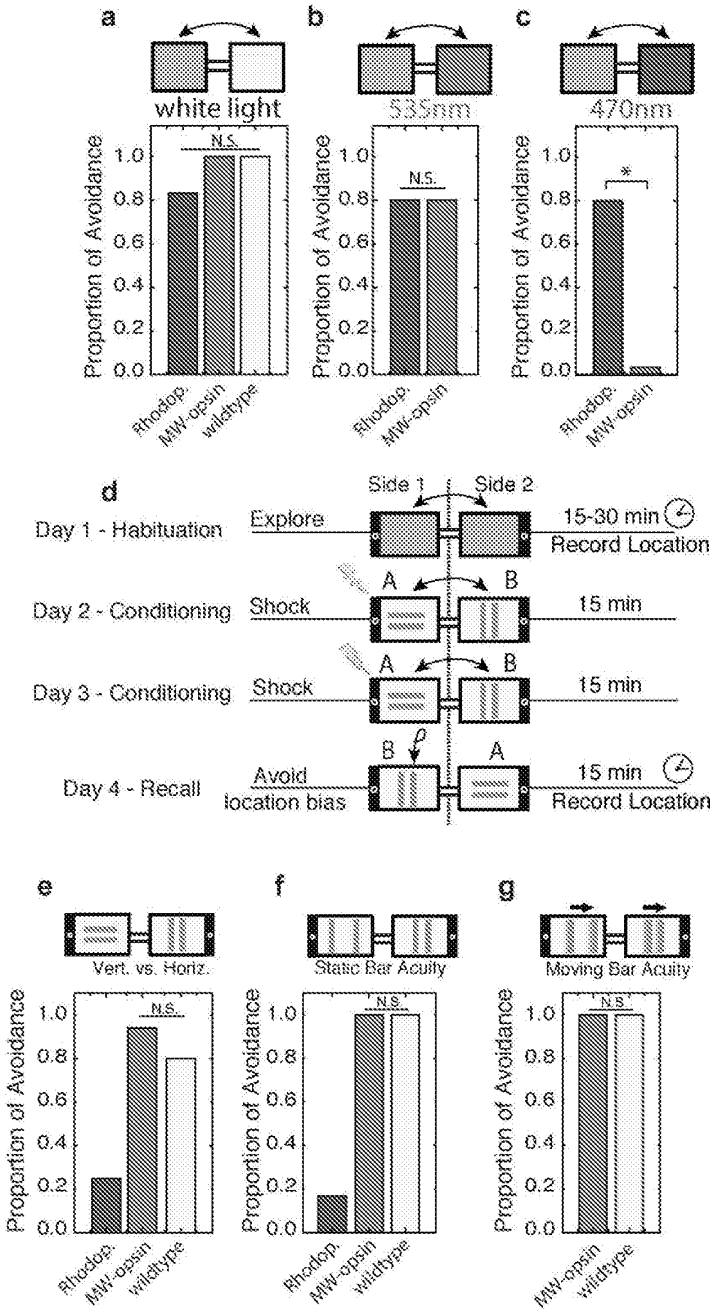


FIG. 10A-10G

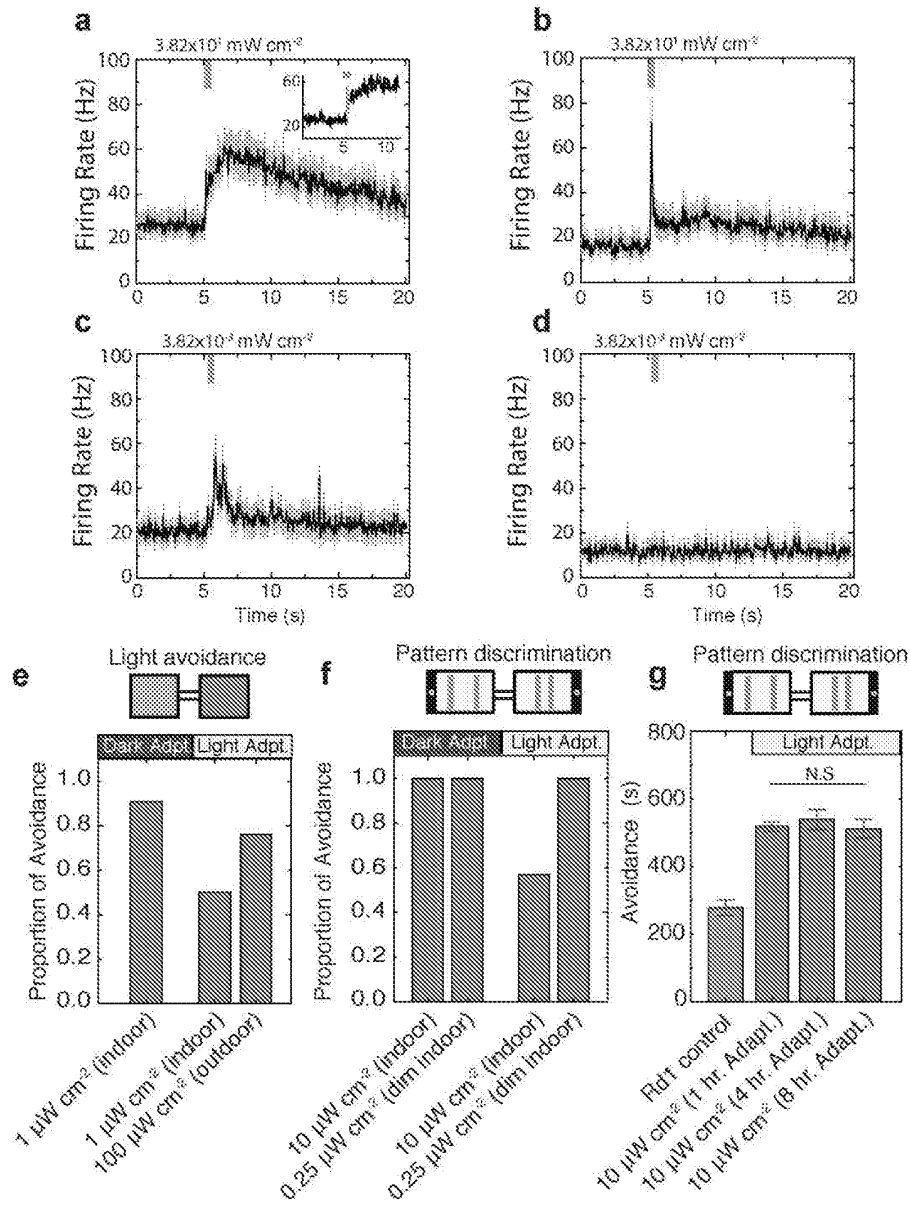


FIG. 11 (Table 1)

Light dark avoidance - white light		Fisher's exact test (one sided)	Significance?
<i>rd1</i> control vs <i>rd1</i> mw-opsin		0.048	Yes
<i>rd1</i> control vs <i>wt</i>		0.048	Yes
<i>rd1</i> rhodopsin vs <i>rd1</i> mw-opsin		0.545	No
<i>rd1</i> rhodopsin vs <i>wt</i>		0.545	No
<i>rd1</i> mw-opsin vs <i>wt</i>		N/A	No
Light dark avoidance - color		Fisher's exact test (one sided)	Significance?
<i>rd1</i> control - green vs <i>rd1</i> control - blue		0.778	No
<i>rd1</i> control - green vs <i>rd1</i> rhodopsin - blue		0.024	Yes
<i>rd1</i> control - green vs <i>rd1</i> mw opsin - blue		0.722	No
<i>rd1</i> control - blue vs <i>rd1</i> rhodopsin - green		0.103	No
<i>rd1</i> control - blue vs <i>rd1</i> rhodopsin - blue		0.024	Yes
<i>rd1</i> control blue vs <i>rd1</i> mw opsin - green		0.103	No
<i>rd1</i> control blue vs <i>rd1</i> mw opsin - blue		0.722	No
<i>rd1</i> rhodopsin - green vs <i>rd1</i> mw opsin - green		0.778	No
<i>rd1</i> rhodopsin - blue vs <i>rd1</i> mw opsin - green		0.5	No
<i>rd1</i> rhodopsin - blue vs <i>rd1</i> mw opsin - blue		0.048	Yes
<i>rd1</i> mw opsin - green vs <i>rd1</i> mw opsin - blue		0.167	No
Light dark avoidance - white		Fisher's exact test (one sided)	Significance?
<i>rd1</i> control vs <i>rd1</i> rhodopsin		0.119	No
<i>rd1</i> control vs <i>rd1</i> mw-opsin		0.048	Yes
<i>rd1</i> control vs <i>wt</i>		0.048	Yes
Horizontal vs. vertical parallel bars	Pearson's Chi-Square Test (2-sided)	Fisher's exact test (one sided)	Significance?
<i>rd1</i> control vs <i>rd1</i> mw-opsin	0.001	0.002	Yes
<i>rd1</i> control vs <i>rd1</i> rhodopsin	0.522	0.5	No
<i>rd1</i> mw-opsin vs <i>rd1</i> rhodopsin	0.005	0.01	Yes
<i>rd1</i> mw-opsin vs <i>wt</i>		0.313	No
<i>rd1</i> rhodopsin vs <i>wt</i>		0.249	No
parallel bars static	Pearson's Chi-Square Test (2-sided)	Fisher's exact test (one sided)	Significance?
<i>rd1</i> control vs <i>rd1</i> mw opsin	0.001	0.003	Yes
<i>rd1</i> control vs <i>wt</i>	0.006	0.015	Yes
<i>rd1</i> mw opsin vs <i>wt</i>		N/A	No
moving bars	Pearson's Chi-Square Test (2-sided)	Fisher's exact test (one sided)	Significance?
<i>rd1</i> control vs <i>rd1</i> mw opsin	0.001	0.001	Yes
<i>rd1</i> control vs <i>wt</i>	<0.001	<0.001	Yes
<i>rd1</i> mw opsin vs <i>wt</i>		N/A	No
Adaptation - Light dark avoidance		Fisher's exact test (one sided)	Significance?
<i>rd1</i> control - green vs <i>rd1</i> mw-opsin light adapted, indoor		0.278	No
<i>rd1</i> control - green vs <i>rd1</i> mw-opsin light adapted, outdoor		0.047	Yes
<i>rd1</i> control - green vs <i>rd1</i> mw-opsin dark adapted, indoor		0.013	Yes
	Pearson's Chi-Square Test (2-sided)	Fisher's exact test (one sided)	
<i>rd1</i> mw-opsin -light adapted, indoor stimuli vs dark adapted, indoor	0.033	0.045	Yes
adaptation - parallel bars		Fisher's exact test (one sided)	Significance?
<i>rd1</i> control vs <i>rd1</i> mw-opsin light adapted, dim indoor		0.121	No
<i>rd1</i> control vs <i>rd1</i> mw-opsin light adapted, indoor		0.01	Yes
<i>rd1</i> control vs <i>rd1</i> mw-opsin dark adapted, dim indoor		0.007	Yes
<i>rd1</i> control vs <i>rd1</i> mw-opsin dark adapted, indoor		0.007	Yes
<i>rd1</i> control vs <i>rd1</i> mw-opsin dark adapted, dim indoor		0.007	Yes
<i>rd1</i> control vs <i>rd1</i> mw-opsin dark adapted, indoor		0.007	Yes

FIG. 12A

Hu	6	EEEELEKNISSVGPWDGPPQYHIAPVWAFYLQAAFMGTIVFLIGFPLNAMVLVATLRYKKL	65
Mo	4	EDDFYLEQNISSVGPWDGPPQYHLAPVWAFRLQAAFMGTFVFFVGTPLNAIVLVATLHYKKL	63
Chimera		EDDFYLEQNISSVGPWDGPPQYHLAPVWAFYLQAAFMGTIVFLIGFPLNAMVLVATLHYKKL	
Hu	66	RQPLNYILNVSEFGGFLLCIFSVFPEFVASONGYFVFGRHVCALEGFLGTVAGLVTGWSL	125
Mo	64	RQPLNYILNVSLGGFLFCIFSVFTVFETIASCHGYELFGRHVCALEAFGLGSVAGLVTGWSL	123
Chimera		RQPLNYILNVSEFGGFLLCIFSVFPEFVASONGYFVFGRHVCALEGFLGTVAGLVTGWSL	
Hu	126	AFLAFERYIVICKPFGNERESSKHALTVVLATWTIGIGVSIPPPFEGWSRFIPEGLQCSOG	185
Mo	124	AFLAFERYIVICKPFGSIRENSKHALMVVLATWTIIGIGVSIPPPFEGWSRFIPEGLQCSOG	183
Chimera		AFLAFERYIVICKPFGSIRENSKHALTVVLATWTIGIGVSIPPPFEGWSRFIPEGLQCSOG	
Hu	186	PDWYTVGTKYRSESYTWELFIFCFIVPLSLICFSYQTLLRALKAVAAQQQESATTQKAER	245
Mo	184	PDWYTVGTKYRSEYYTWELFIFCFIIPLSLICFSYQQLLETLRAVAAQQQESATTQKAER	243
Chimera		PDWYTVGTKYRSESYTWELFIFCFIVPLSLICFSYQTLLRALRAVAAQQQESATTQKAER	
Hu	246	EVSRMVVMVVGSEFCVCYVPYAAAFAMVMVNNRNHGLDLRLVLTIPSEFSKSACIYNPIIYCF	305
Mo	244	EVSHMVVMVVGSEFCVCYVPYAAALAMVMVNNRNHGLDLRLVLTIPAFFSKSSCVYNPIIYCF	303
Chimera		EVSHMVVMVVGSEFCVCYVPYAAAFAMVMVNNRNHGLDLRLVLTIPSEFSKSACIYNPIIYCF	

FIG. 12B

Hu	306	<u>MNKQFQACIN</u> KMVCGKAMTDESDTCSSQKTEVSTVSSSTQVGEN	348
Mo	304	<u>MNKQFRACILEM</u> VCRKPMADESDVSGSQKTEVSTVSSSKVGFH	346
Chimera		<u>MNKQFRACILEM</u> VCRKPMADESDVSGSQKTEVSTVSSSKVGFH	

FIG. 13A-13L

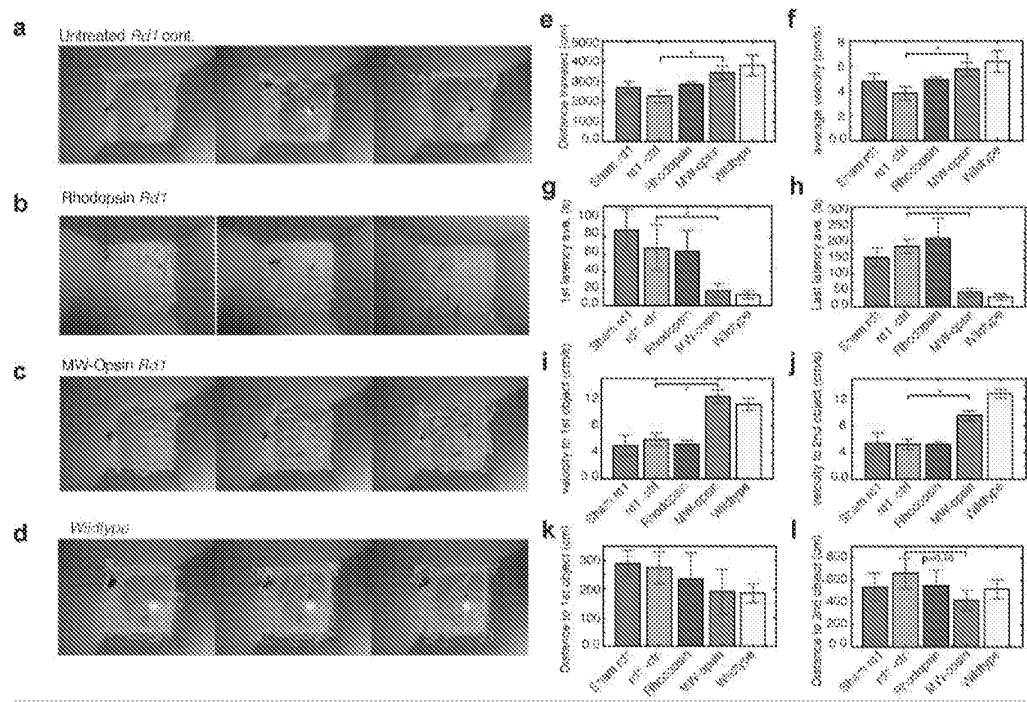


FIG. 14A-14B

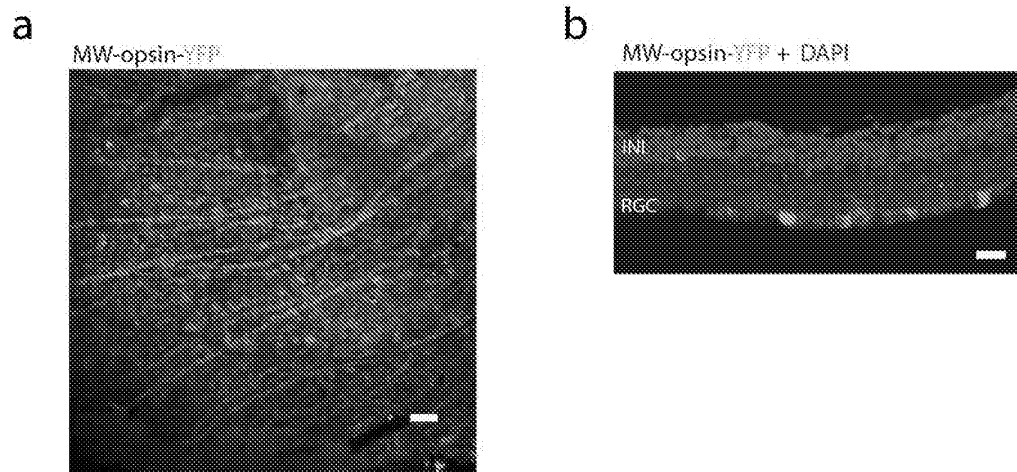


FIG. 15A-15B

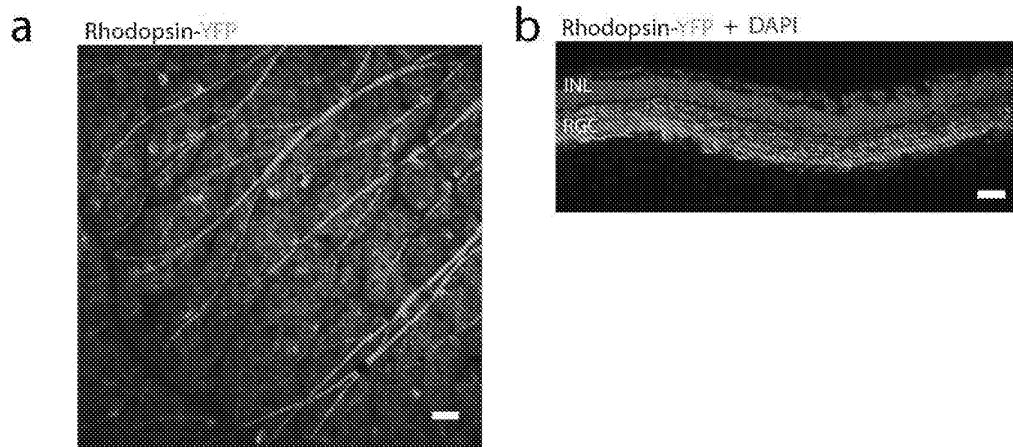


FIG. 16A-16D

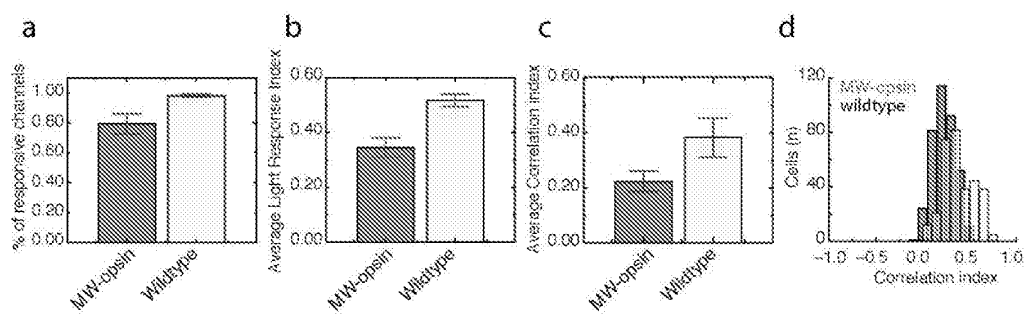


FIG. 17A-17D

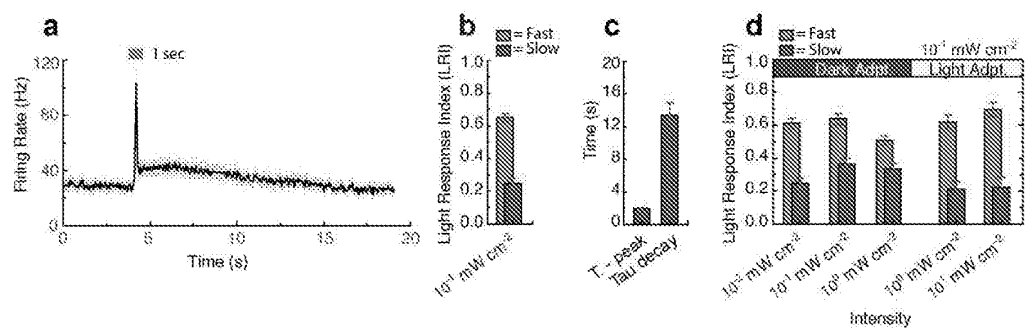


FIG. 18A-18C

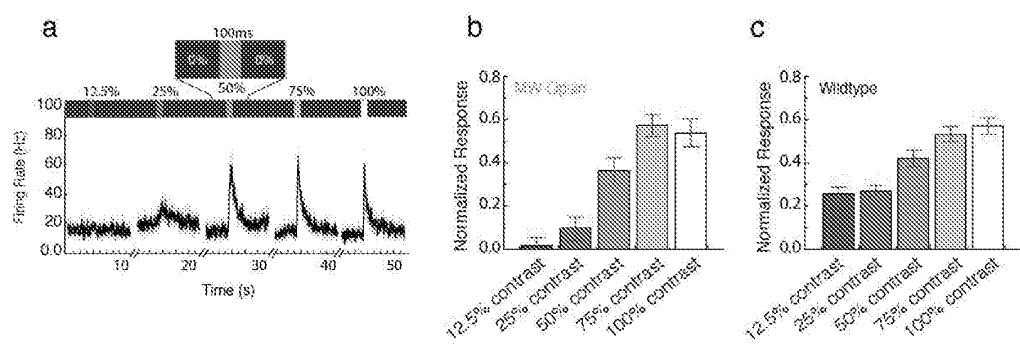


FIG. 19A-19E

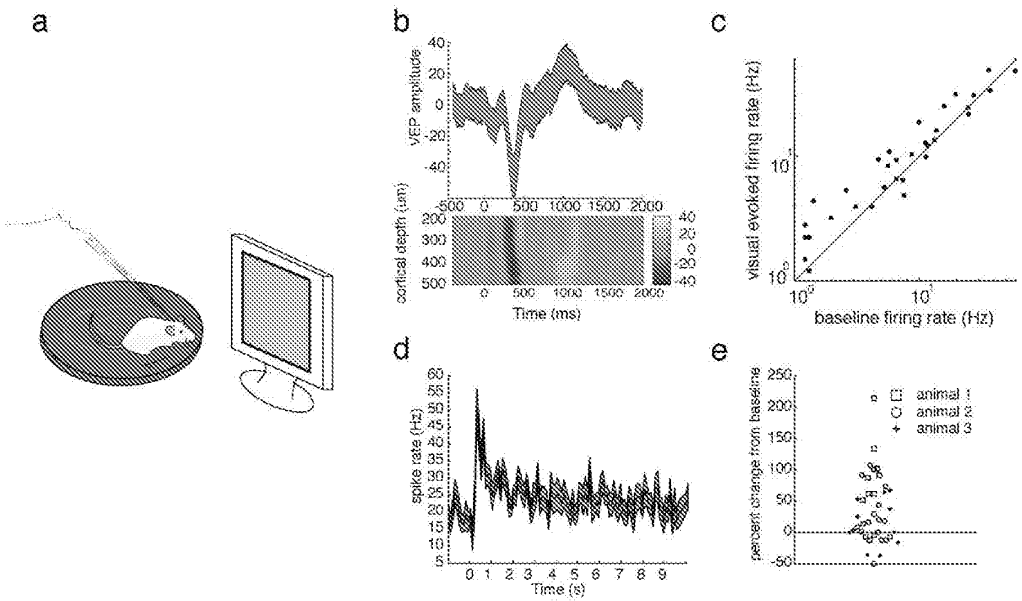


FIG. 20A-20B

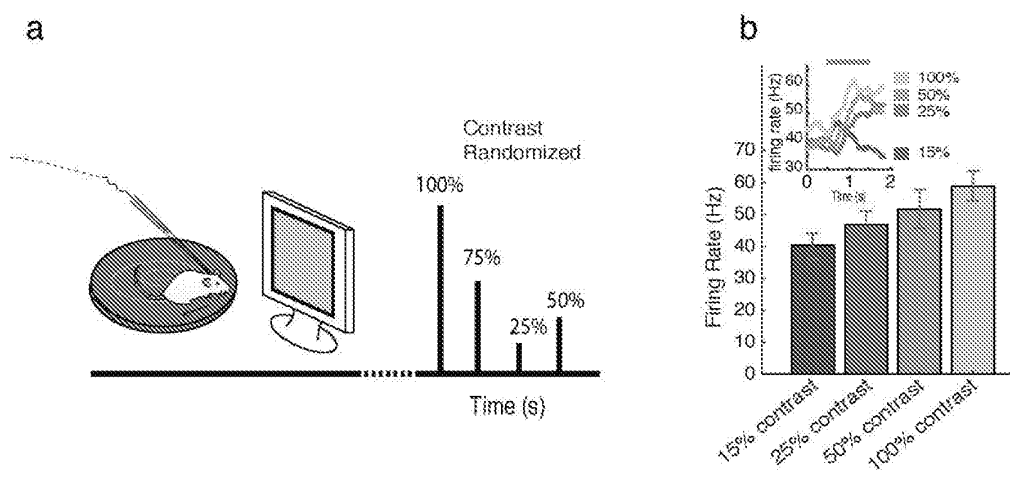


FIG. 21A-21C

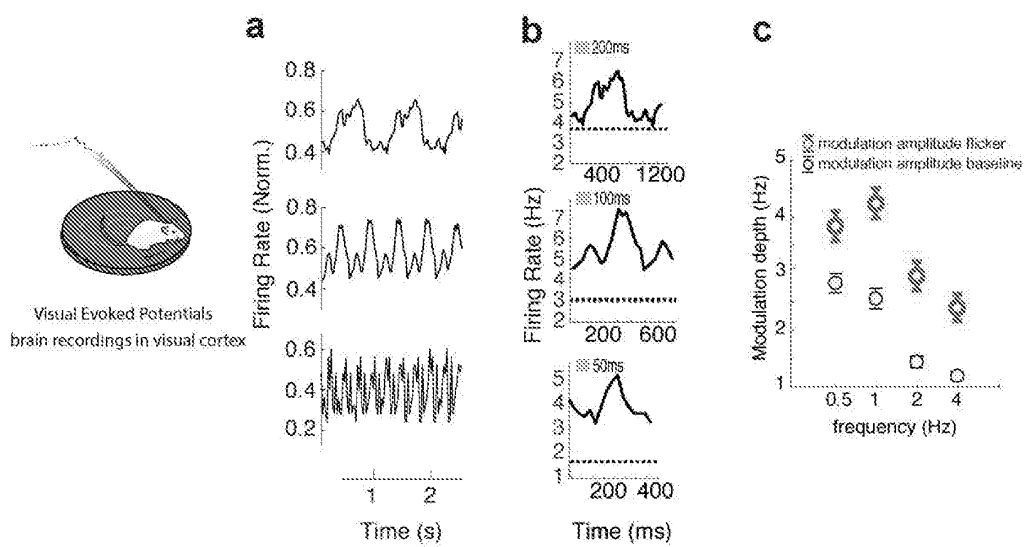
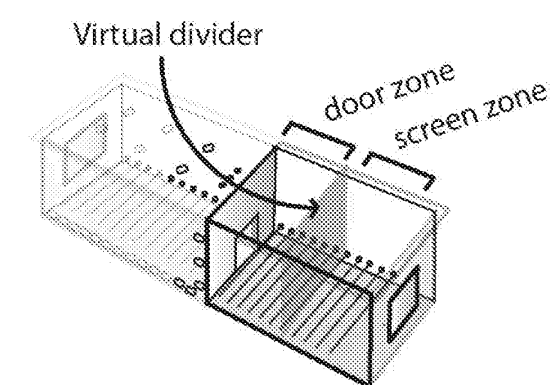


FIG. 22A-22B

a

$$\text{Ratio} = \frac{\text{Time spent in door zone}}{\text{Time spent in screen zone}}$$

b