

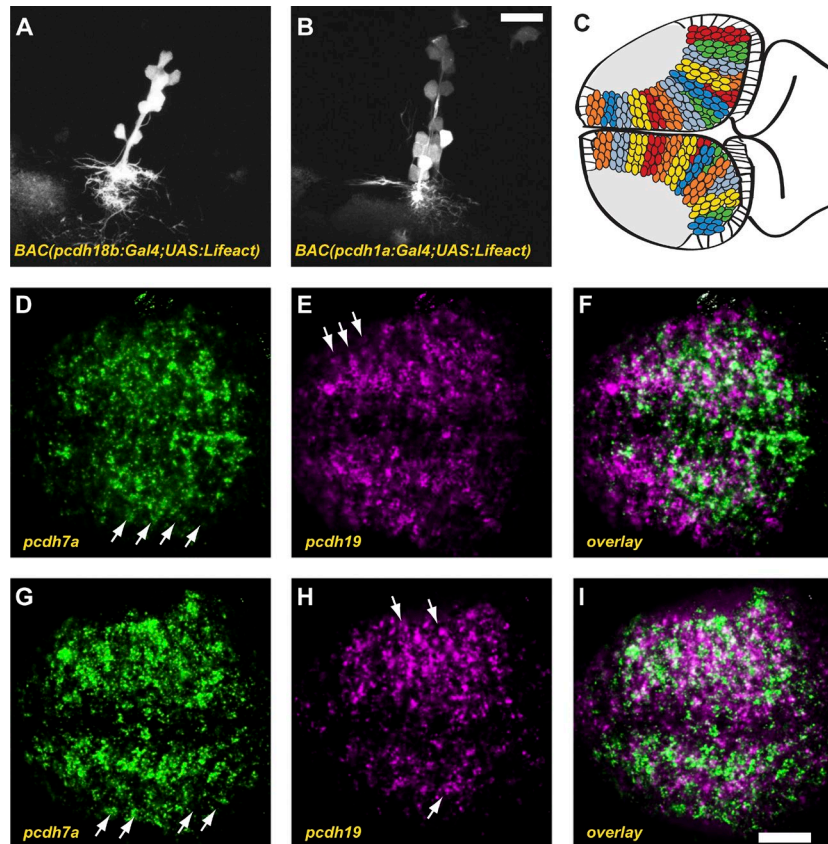
Cooper et al., <http://www.jcb.org/cgi/content/full/jcb.201507108/DC1>

Figure S1. **Partitioning of the optic tectum by  $\delta$ -pcdh expression.** (A and B) Injection of recombinant BAC clones for other  $\delta$ -pcdhs, such as *pcdh18b* (A) and *pcdh1a* (B), also labels columns, suggesting that these pcdhs also define neuronal columns that are derived from  $\delta$ -pcdh-specific progenitor cells. Bar, 20  $\mu$ m. (C) Model of organization of the zebrafish optic tectum. Each color represents the expression of a distinct  $\delta$ -pcdh. (D–I) Double FISH with riboprobes against *pcdh7a* (D and G) and *pcdh19* (E and H). Examples are from two different embryos. Columnar stripes of expression are apparent for both probes (arrows). Overlays (F and I) show that the expression of *pcdh7a* and *pcdh19* are largely nonoverlapping. Bar, 50  $\mu$ m.

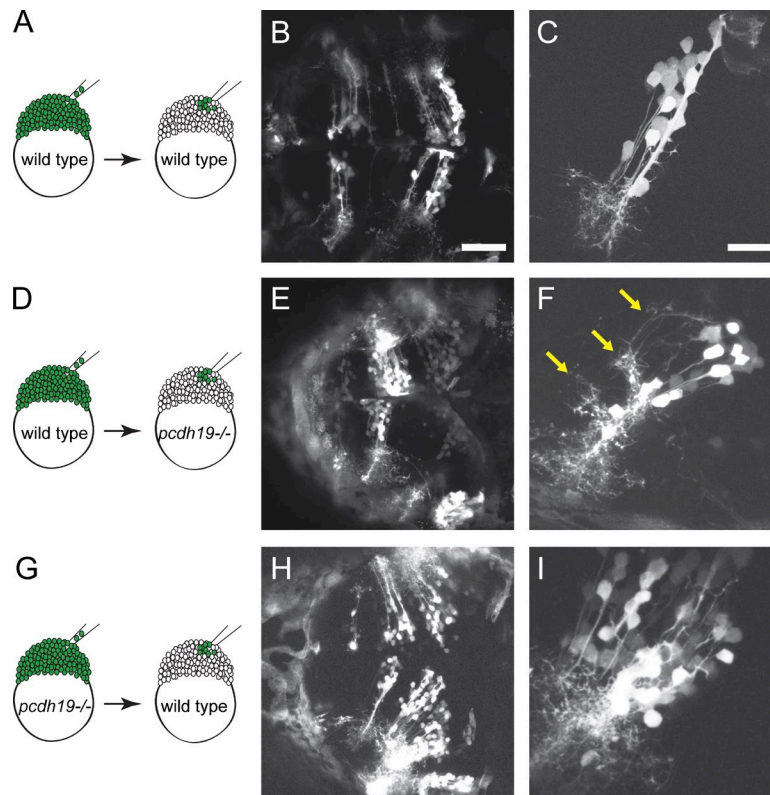


Figure S2. **Cell autonomous and noncell autonomous requirement for *Pcdh19*.** (A–C) Blastula-stage cell transplantation experiments were performed in which donor cells (20–40) were taken from *TgBAC[pcdh19:Gal4-VP16;UAS:Lifeact-GFP]* embryos and introduced into unlabeled WT hosts (A). (B) Maximum-intensity projection (five optical sections) of an optic tectum of a 4-dpf host larva, exhibiting extensive labeling of radial glia and columns of labeled neurons. (C) Maximum-intensity projection (10 optical sections) of an optic tectum of a 4-dpf host larva showing a labeled column of neurons and their adjacent arborization field. Bars: [B, E, and H] 75  $\mu\text{m}$ ; [C, F, and I] 20  $\mu\text{m}$ . (D–F) Blastula-stage cell transplantation experiments were performed in which donor cells (20–40) were taken from *TgBAC[pcdh19:Gal4-VP16;UAS:Lifeact-GFP]* embryos and introduced into unlabeled *pcdh19*<sup>-/-</sup> hosts (D). (E) Maximum-intensity projection (five optical sections) of an optic tectum of a 4-dpf *pcdh19*<sup>-/-</sup> host larva. Each block of labeled cells is larger and more disorganized. (F) Maximum-intensity projection (10 optical sections) of an optic tectum of a 4-dpf *pcdh19*<sup>-/-</sup> host larva. Transplanted cells exhibit aberrant patterns of arborization, with processes tending to clump and extend out of the synaptic neuropil (yellow arrows). (G–I) Blastula-stage cell transplantation experiments were performed in which donor cells (20–40) were taken from mutant *pcdh19*<sup>-/-</sup>; *TgBAC[pcdh19:Gal4-VP16;UAS:Lifeact-GFP]* embryos and introduced into unlabeled WT hosts (G). (H) Maximum-intensity projection (five optical sections) of an optic tectum of a 4-dpf *pcdh19*<sup>-/-</sup> host larva. Each block of labeled cells is larger and more disorganized. (I) Maximum-intensity projection (10 optical sections) of an optic tectum of a 4-dpf WT host larva. In addition to an increased number of labeled cells occupying a larger volume, transplanted cells exhibit exuberant arborization.

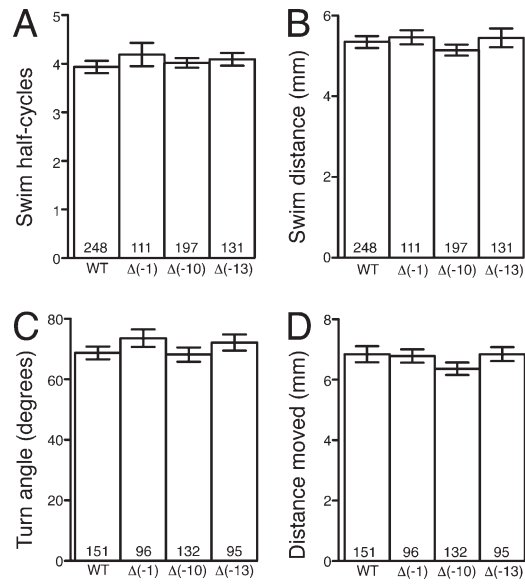


Figure S3. *pcdh19*<sup>-/-</sup> mutants show normal motor behavior in phototaxis assay. (A and B) Mean swim half-cycles [tail undulations [A] and distance moved [B] per swim bout]. (C and D) Mean head turning angle [C] and distance moved [D] per turning maneuver. *n* at bottom of bars indicates number of swimming and turning bouts. Error bars denote SEM.