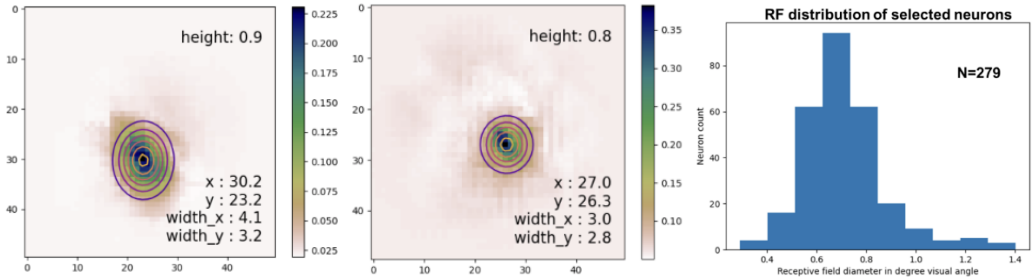

Figure 1: Receptive field properties of neurons and their population-level distribution. **Left and Center:** two sample neurons' response maps fitted with an elliptical Gaussian. **Right:** histogram showing the distribution of receptive field diameters (in degree visual angle) for 279 neurons.

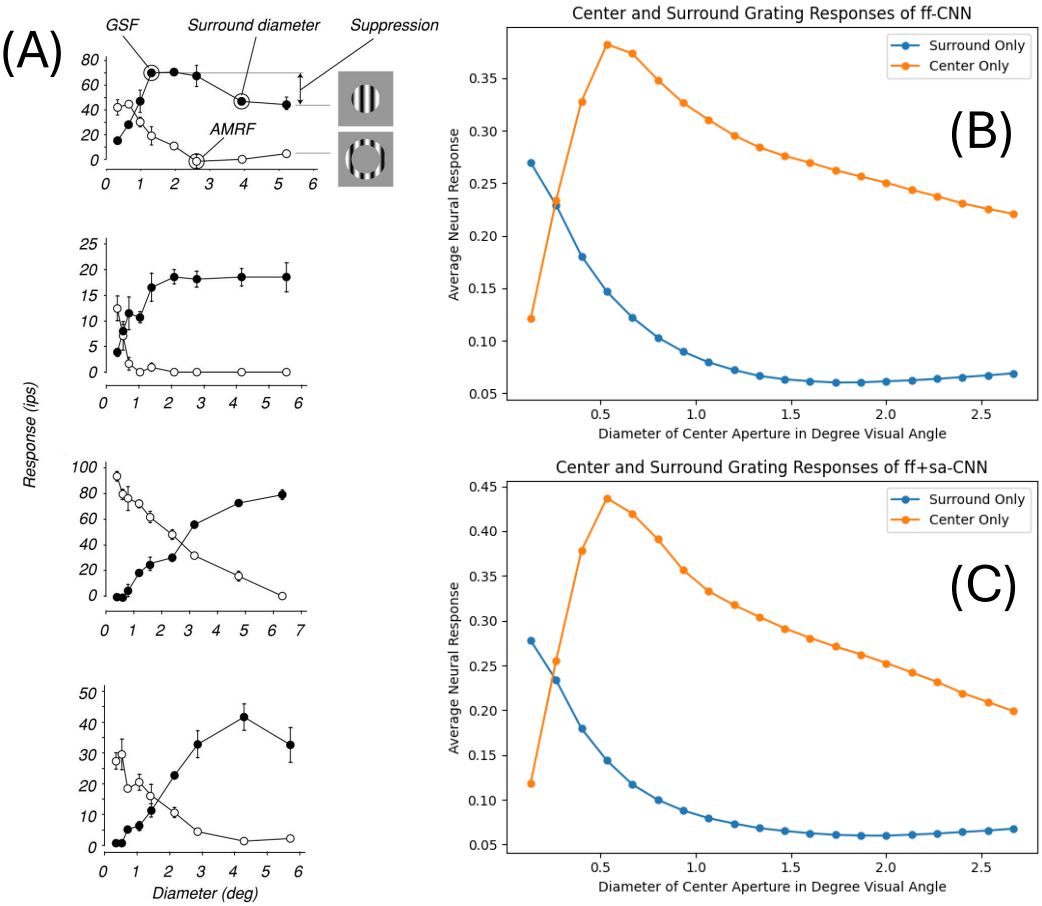

Figure 2: Capturing basic modulatory nature of extra-classical receptive fields. **(A)** shows four example neurons from Cavanaugh et al.'s (2002) study demonstrating the classical surround suppression phenomena. **(B), (C)** shows the average population response to the center only stimuli and the surround only stimuli for two models, `ff-CNN` and `ff+sa-CNN`.

Table 1: M2S1 Performance Metrics when Trained with 12.5% Data

Model	CORR	PT_S	PT_J
`ff-CNN`	0.260	0.000	0.000
`ff+sa-CNN`	0.272	0.000	0.000
Recurrent CNN (1 layer, 7 iterations)	0.291	2.174	1.304

(A)

Table 2: M2S1 Performance Metrics when Trained with 25% Data

Model	CORR	PT_S	PT_J
`ff-CNN`	0.295	0.000	0.000
`ff+sa-CNN`	0.317	0.033	0.013
Recurrent CNN (1 layer, 7 iterations)	0.298	2.174	1.304

(B)

Table 3: M2S1 Performance Metrics when Trained with 100% Data

Model	CORR	PT_S	PT_J
`ff-CNN`	0.474	17.333	8.667
`ff+sa-CNN`	0.498	19.667	11.000
Recurrent CNN (1 layer, 7 iterations)	0.435	5.667	3.333

(C)

Figure 3: Performance of `ff-CNN`, `ff+sa-CNN`, and recurrent CNN at varying data sizes. **(A)** shows performance metrics at 12.5% data. **(B)** shows performance metrics at 25% data. **(C)** shows performance metrics at 100% data