**Figure 3—source data 1. Statistics**

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| **Panel** | **Comparison**  | **Mean & SEM** | **Test** | **Statistic** | **p-value** | **Correction** |
| B | Figure vs. Ground – Orientation(12 units from 3 mice) | n.a. (too many comparisons) | Clustered LME: *Normalized rate ~ stimulus + (1|mouse) + (1|session) + (1|unit)* | F(1, 22) | <0.05 from 80-103 ms | Clustered LME-statistic |
| Figure vs. Ground – Phase(14 units from 3 mice) | n.a. (too many comparisons) | Clustered LME: *Normalized rate ~ stimulus + (1|mouse) + (1|session) + (1|unit)* | F(1, 26) | No significant clusters | Clustered LME-statistic |
| D | Orientation decoder | n.a. (too many comparisons) | Binomial test, two-tailed | n.a.(N = 2000) | 0-50 ms: 110-60 ms: 0.468 20-70 ms: 130-80 ms: 140-190 ms: <0.001 \*\*\* 150-200 ms: 0.024 \*160-210 ms: 1170-220 ms: 1180-230 ms: 1190-240 ms: 0.025 \*200-250 ms: 0.230210-260 ms: 0.002 \*\*220-270 ms: 0.771230-280 ms: 1 | Bonferroni-Holm |
| Phase decoder | n.a. (too many comparisons) | Binomial test, two-tailed | n.a.(N = 2000) | 0-50 ms: 0.34510-60 ms: 0.118 20-70 ms: < 0.001 \*\*\*30-80 ms: 0.33640-90 ms: < 0.001 \*\*\*50-100 ms: < 0.001 \*\*\*60-110 ms: 0.12670-120 ms: 0.34580-130 ms: 0.25790-140 ms: 0.336 100-150 ms and later bins: < 0.001 \*\*\* | Bonferroni-Holm |
| E | Relative model weight of neurons with RF inside vs. RF edge, for each task | Ori / RF inside: 0.214 ± 0.035Ori / RF edge:0.220 ± 0.064 Phase / RF inside: 0.049 ± 0.059Phase / RF edge:0.149 ± 0.069 | LME: *Modelweight ~ Task + RF + (1|Unit) + (1|Session) + (1|Mouse)*  | **Main:**Task: F(1, 104) = 5.80RF: F(1, 104) = 0.27**Post Hoc:**RF (Orientation)F(1, 59) = 0.01RF (Phase)T(1, 44) = 0.97 | 0.018 \*0.6080.9410.329 | None  |
| F | Orientation mean d’ | Mean d’ = 0.302 | Bootstrap (n = 5000), two-tailed | CI 99.9%-0.147 – 0.137 | < 0.001 \*\*\* | None |
| Phase mean d’ | Mean d’ = 0.090 | Bootstrap (n = 5000), two-tailed | CI 95% -0.085 – 0.085 | < 0.05 \* | None |