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| **MOUSE** | **STRAIN** | **EXPERIMENT** | **HOLD**  **TIME** | **TRACK GAIN** | **TARGET PROBABILITY** |  |
| 1 | VGAT-ChR2 | Optogenetic silencing | 0.6 sec | 0.45 | 0.33 |  |
| 2 | VGAT-ChR2 | Optogenetic silencing | 0.9 sec | 0.6 | 0.5 |  |
| 3 | VGAT-ChR2 | Optogenetic silencing Physiology | 0.6 sec | 0.6 | 0.5 |  |
| 4 | VGAT-ChR2 | Optogenetic silencing | 1.0 sec | 0.35 | 0.33 |  |
| 5 | VGAT-ChR2 | Optogenetic silencing | 1.0 sec | 0.3 | 0.25 |  |
| 6 | VGAT-ChR2 | Optogenetic silencing | 1.0 sec | 0.6 | 0.33 |  |
| 7 | VGAT-ChR2 | Optogenetic silencing | 1.0 sec | 0.2 | 0.5 |  |
| 8 | VGAT-ChR2 | Optogenetic silencing Physiology | 0.7 sec | 0.3 | 0.5 |  |
| 9 | VGAT-ChR2 | Optogenetic silencing Physiology | 1.1 sec | 0.3 | 0.5 |  |
| 10 | WT | Physiology | 1.1 sec | 0.35 | 0.5 |  |
| 11 | WT | Physiology | 0.9 sec | 0.35 | 0.5 |  |
| 12 | WT | Physiology | 0.6 sec | 0.35 | 0.5 |  |
| 13 | WT | Physiology | 0.6 sec | 0.5 | 0.5 |  |
| 14 | WT | Physiology | 1.1 sec | 0.3 | 0.5 |  |
| 15 | WT | Cortical ablation | 1.3 sec | 0.35 | 0.5 |  |
| 16 | WT | Cortical ablation | 0.9 sec | 0.3 | 0.5 |  |
| 17 | WT | Cortical ablation | 1.3 sec | 0.3 | 0.5 |  |
| 18 | WT | Cortical ablation | 0.9 sec | 0.3 | 0.5 |  |
| 19 | WT | Cortical ablation | 0.9 sec | 0.3 | 0.5 |  |
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**Supplementary File 1. Parameters for the behavioral task for each of the mice included in the main experiments.** Hold time is the minimal time that the target stimulus has to spend in the reward zone fora reward to be available. Track gain is the stimulus displacement on the monitor (cm) / running distance(cm). Target probability is the fraction of stimuli that are the target stimulus (stimuli are randomlyinterleaved).