Supplementary Table 1 (Statistical Results)

Figure	Description	Test	Statistic	p value	Number of samples	Multiple comparisons correction
Fig 1l	AP axis	One-way ANOVA	F(8, 4451) =13.56	One tailed $p<10^{-10}$	4460 neurons (excludes animal with cannula implant around lens, Materials and Methods)	Benjamini-Hochberg (BH) FDR for all 3 axes
Fig 1l	ML axis	One-way ANOVA	F(8, 4451) =14.82	One tailed $p<10^{-10}$	4460 neurons	BH for all 3 axes
Fig 1l	DV axis	One-way ANOVA	F(8, 4451) =16.94	One tailed $p<10^{-10}$	4460 neurons	BH for all 3 axes
Fig 2e	Difference in Onset t scores between CS+ and CS- trials during Day 1	One sample t test	t for all clusters = (2.26, -3.10, 1.78, -1.58, 1.56, 0.69, 2.81, -0.83, 1.50)	Two-tailed p values per cluster = (7.44×10^{-02}, 2.30×10^{-02}, 1.75×10^{-01}, 1.75×10^{-01}, 1.75×10^{-01}, 4.90×10^{-01}, 2.49×10^{-02}, 4.56×10^{-01}, 1.75×10^{-01})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH correction across clusters
Fig 2e	Difference in Trace t scores between CS+ and CS- trials during Day 1	One sample t test	t for all clusters = (-1.05, -0.11, 3.52, 1.82, 2.59, -0.86, 0.77, -1.66, -0.52)	Two-tailed p values per cluster = (5.32×10^{-01}, 9.15×10^{-01}, 5.42×10^{-03}, 2.11×10^{-01}, 4.64×10^{-02}, 5.66×10^{-01}, 5.66×10^{-01}, 2.20×10^{-01}, 6.76×10^{-01})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH correction across clusters
Fig 2e	Difference in Onset t scores between CS+ and CS- trials during Trained	One sample t test	t for all clusters = (9.45, 2.16, -1.53, -2.14, -3.26, -1.19, 1.98, 0.72, -1.68)	Two-tailed p values per cluster = (1.34×10^{-16}, 7.60×10^{-02}, 1.65×10^{-01}, 7.60×10^{-02}, 5.97×10^{-03}, 2.65×10^{-01}, 8.90×10^{-02}, 4.70×10^{-01}, 1.42×10^{-01})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH correction across clusters
Fig 2e	Difference in Trace t scores between CS+ and CS- trials during Trained	One sample t test	t for all clusters = (8.59, 7.09, 0.09, 0.13, 6.70, 2.37, 4.91, 0.23, -1.78)	Two-tailed p values per cluster = (3.08×10^{-14}, 8.91×10^{-10}, 9.29×10^{-01}, 9.29×10^{-01}, 8.91×10^{-10}, 3.38×10^{-02},	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH correction across clusters

				4.61×10^{-06}, 9.29×10^{-01}, 1.15×10^{-01})		
Fig 2h	Test for performance of groups on the day that the best group reached peak performance (Methods)	Bootstrap test (Methods)	See Figure for means of all groups	Two-tailed p value for eNpHR3.0 onset versus control = 0.028, eNpHR3.0 trace versus control = 0.77	Number of animals in eNpHR3.0 onset = 11, eNpHR3.0 trace = 12, mCherry control = 11	BH for two comparisons correction
Fig 2h	Test for mean performance difference between experimental and control groups on non-test days (Methods)	One sample t test (Methods)	$t(6) = -5.68$ for eNpHR3.0 onset versus control $t(6) = 1.02$ for eNpHR3.0 trace versus control	Two-tailed p value for eNpHR3.0 onset versus control = 0.0026, eNpHR3.0 trace versus control = 0.35	Number of sessions used for comparisons = 7 in both cases	BH for two comparisons correction
Fig 3c	Fractional split difference between OFC-CaMKII and OFC-VTA	Chi-squared test	$\chi^2(8) = 82.42$	One-tailed p value = 1.59×10^{-14}	Number of neurons OFC-CaMKII = 4813, OFC-VTA = 526	N/A
Fig 3g	Test for performance of groups on the day that the best group reached peak performance (Methods)	Bootstrap test (Methods)	See Figure for means of all groups	Two-tailed p value for eNpHR3.0 onset versus control = 0.94, eNpHR3.0 trace versus control = 0.24	Number of animals in eNpHR3.0 onset = 8, eNpHR3.0 trace = 7, mCherry control = 7	BH for two comparisons correction
Fig 4b	Test for significant mean slope for OFC-CaMKII	Wilcoxon signed-rank test	W for all clusters = (811, 418, 4144, 4716, 3387, 2207, 7068, 8819, 5117)	Two-tailed p values per cluster = (9.14×10^{-26}, 3.72×10^{-10}, $1.43\times10^{+01}$, $1.77\times10^{+01}$, 1.05×10^{-08}, 3.72×10^{-14}, $7.44\times10^{+00}$, 5.55×10^{-02}, 7.81×10^{-01})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	We wanted to be conservative in identifying clusters with significant learning effects. Hence, used Bonferroni correction across clusters, and Trace and Reward GLM variables (shown in Supplementary Fig 9b)
Fig 4b	Test for significant mean slope for OFC-VTA	Wilcoxon signed-rank test	W for all clusters = (97, 146, 38, 634, 420, 358)	Two-tailed p values per cluster = (2.15×10^{-02}, 9.03×10^{-01}, 2.06×10^{-03}, $4.20\times10^{+00}$, $3.25\times10^{+00}$, $5.82\times10^{+00}$)	Number of neurons per cluster = (32, 30, 28, 54, 45, 40)	Bonferroni correction across clusters, and Trace and Reward GLM variables
Fig 5g	Test for mean optimal lag in OFC-CaMKII neurons across	One sample t test	$t = -1.60$ for cluster 1 for Onset.	Two-tailed p values per cluster = 1.23×10^{-01} for	Number of neurons per cluster = (187, 92, 172, 171)	BH correction across clusters, and Onset, Trace ad

	the learning-related clusters		t = (-2.67, 4.67, 2.93 1.10) for clusters 1, 2, 5 and 6 for Trace	cluster 1 for Onset. Two-tailed p values per cluster = (1.46×10^{-02}, 1.16×10^{-04}, 1.05×10^{-02}, 2.73×10^{-01}) for clusters 1, 2, 5 and 6 for Trace	for clusters 1, 2, 5 and 6	Reward GLM variables (Supplementary Fig 9c)
Fig 5g	Test for mean optimal lag in OFC-VTA neurons across the learning-related clusters	One sample t test	t = 2.45 for cluster 1 for Onset. t = (-0.15, 1.97) for clusters 1 and 5	Two-tailed p values per cluster = 1.22×10^{-01} for cluster 1 for Onset. Two-tailed p values per cluster = (8.89×10^{-01}, 1.78×10^{-01})	Number of neurons per cluster = (32, 28) for clusters 1 and 5	BH correction across clusters, and Onset, Trace ad Reward GLM variables (Supplementary Fig 9c)
Fig 6d, f	OFC-CaMKII and OFC-VTA	See Supp Fig 10 results	See Supp Fig 10 results	See Supp Fig 10 results	See Supp Fig 10 results	See Supp Fig 10 results
Fig 7f	OFC-CaMKII and OFC-VTA	See Supp Fig 13b results	See Supp Fig 13b results	See Fig Supp 13b results	See Fig Supp 13b results	See Fig Supp 13b results
Fig 8a	eNpHR3.0 vs mCherry of Laser-PreLaser behavioral performance during cue inhibition	Welch's t test	t = 0.73	Two-tailed p value = 0.47	Number of experimental animals = 18, number of control animals = 10	N/A
Fig 8a	eNpHR3.0 vs mCherry of Laser-PreLaser behavioral performance during reward inhibition	Welch's t test	t = -0.22	Two-tailed p value = 0.83	Number of experimental animals = 18, number of control animals = 10	N/A
Fig 8b	Previously rewarded trials versus previously unrewarded trials	t-test	t = 4.91	Two-tailed p value = 1.12×10^{-06}	n=14 sessions from n=7 mice	N/A
Fig 8e	Laser during cue	Welch's t test	t = -1.26	Two-tailed p value = 0.23	Number of experimental animals = 18, number of control animals = 10	N/A
Fig 8e	Laser during reward	Welch's t test	t = -2.77	Two-tailed p value = 0.011	Number of experimental animals = 18, number of control animals = 10	N/A
Fig 8g	Pre-extinction	Welch's t test for eNpHR3.0 experimental animals compared against	t = 0.52	Two-tailed p value = 0.61	Number of experimental animals = 15, number of control animals = 6	N/A

		mCherry/eYFP controls				
Fig 8g	Extinction	Welch's t test for eNpHR3.0 experimental animals compared against mCherry/eYFP controls	Early t = 2.55, Late t = 0.98	Two-tailed p values = (0.043, 0.34)	Number of experimental animals = 15, number of control animals = 6	BH correction for early and late comparisons
Fig 8g	Extinction recall	Welch's t test for eNpHR3.0 experimental animals compared against mCherry/eYFP controls	t = 3.08	Two-tailed p value = 0.008	Number of experimental animals = 15, number of control animals = 6	N/A
Supp Fig 6b	CS+ Onset Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (4.81, 4.61, 8.33, 3.03, 5.86, 5.07, 3.99, 2.16, 3.17)	Two-tailed p values per cluster = (6.27×10^{-06}, 2.36×10^{-05}, 6.03×10^{-13}, 3.83×10^{-03}, 6.87×10^{-08}, 2.30×10^{-06}, 1.54×10^{-04}, 3.91×10^{-02}, 2.45×10^{-03})	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables
Supp Fig 6b	CS+ Onset Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (21.21, 19.29, 19.31, 8.21, 9.78, 10.00, 4.87, 1.79, 1.95)	Two-tailed p values per cluster = (1.49×10^{-69}, 3.02×10^{-60}, 2.42×10^{-61}, 2.97×10^{-15}, 3.51×10^{-20}, 6.36×10^{-21}, 2.13×10^{-06}, 8.07×10^{-02}, 5.87×10^{-02})	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables
Supp Fig 6b	CS- Onset Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (2.65, 4.95, 5.86, 4.40, 4.97, 5.49, 2.05, 2.56, 1.82)	Two-tailed p values per cluster = (1.15×10^{-02}, 6.58×10^{-06}, 1.02×10^{-07}, 3.50×10^{-05}, 3.20×10^{-06}, 3.52×10^{-07}, 4.89×10^{-02}, 1.39×10^{-02}, 7.96×10^{-02})	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables
Supp Fig 6b	CS- Onset Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (13.66, 16.49, 26.25, 8.20, 12.57, 9.80, -0.15, -0.84, 5.12)	Two-tailed p values per cluster = (1.52×10^{-35}, 1.33×10^{-47}, 1.18×10^{-94}, 3.18×10^{-15}, 1.70×10^{-30},	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables

				3.08×10^{-20}, 8.78×10^{-01}, 4.06×10^{-01}, 6.41×10^{-7})		
Supp Fig 6b	CS+ Trace Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (-4.69, -1.00, -1.07, -1.73, 1.58, -5.97, -1.61, -3.29, -3.73)	Two-tailed p values per cluster = (9.85×10^{-06}, 3.27×10^{-01}, 3.01×10^{-01}, 9.56×10^{-02}, 1.24×10^{-01}, 4.44×10^{-08}, 1.17×10^{-01}, 1.64×10^{-03}, 3.90×10^{-04})	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables
Supp Fig 6b	CS+ Trace Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (16.46, 19.34, -13.46, 2.41, 10.44, 7.64, -1.85, -5.13, -3.62)	Two-tailed p values per cluster = (9.68×10^{-48}, 2.09×10^{-60}, 6.25×10^{-35}, 1.99×10^{-02}, 2.05×10^{-22}, 2.77×10^{-13}, 7.36×10^{-02}, 6.12×10^{-07}, 4.42×10^{-04})	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables
Supp Fig 6b	CS- Trace Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (-3.72, -0.74, -6.62, -3.75, -2.14, -3.73, 2.02, 1.03, -2.12)	Two-tailed p values per cluster = (3.90×10^{-04}, 4.59×10^{-01}, 3.19×10^{-09}, 3.90×10^{-04}, 4.10×10^{-02}, 3.92×10^{-04}, 5.16×10^{-02}, 3.16×10^{-01}, 4.19×10^{-02})	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables
Supp Fig 6b	CS- Trace Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (7.34, -5.59, -9.82, -2.70, 1.84, 2.39, -16.79, -4.41, 5.15)	Two-tailed p values per cluster = (1.72×10^{-12}, 6.51×10^{-08}, 1.42×10^{-20}, 8.88×10^{-03}, 7.39×10^{-02}, 2.07×10^{-02}, 2.51×10^{-51}, 1.73×10^{-05}, 5.88×10^{-07})	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables
Supp Fig 6b	Reward Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (8.93, 10.19, 8.09, 5.05, 11.75, 9.77, 5.59, 6.19, 5.81)	Two-tailed p values per cluster = (2.79×10^{-15}, 8.22×10^{-16}, 2.98×10^{-12}, 2.88×10^{-06}, 8.95×10^{-23}, 4.10×10^{-17}, 2.06×10^{-07},	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables

				9.13×10^{-09}, 8.11×10^{-08})		
Supp Fig 6b	Reward Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (-4.16, 27.06, -16.47, 3.56, 17.17, 13.92, -3.59, -1.99, -1.40)	Two-tailed p values per cluster = (5.19×10^{-05}, 1.15×10^{-95}, 3.67×10^{-48}, 5.23×10^{-04}, 1.25×10^{-49}, 5.65×10^{-36}, 4.72×10^{-04}, 5.49×10^{-02}, 1.69×10^{-01})	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables
Supp Fig 6b	Reward Late Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (10.98, 7.37, 7.25, 5.75, 8.69, 13.22, 3.19, 6.87, 6.47)	Two-tailed p values per cluster = (5.88×10^{-21}, 2.76×10^{-10}, 1.60×10^{-10}, 1.41×10^{-07}, 1.53×10^{-14}, 1.87×10^{-26}, 2.33×10^{-03}, 2.52×10^{-10}, 3.29×10^{-09})	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables
Supp Fig 6b	Reward Late Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (7.36, 15.22, 5.09, 9.98, 11.19, 33.72, 0.98, 1.73, -4.27)	Two-tailed p values per cluster = (1.50×10^{-12}, 5.12×10^{-42}, 7.76×10^{-07}, 2.24×10^{-21}, 3.63×10^{-25}, 3.95×10^{-120}, 3.38×10^{-01}, 8.97×10^{-02}, 3.23×10^{-05})	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables
Supp Fig 6b	Lick Bout Onset Day 1; all recorded cells on Day 1 across all animals	One-sample t test each for 9 clusters	t values per cluster = (8.01, 4.58, 5.66, 4.47, 6.99, 5.39, 4.49, 3.36, 2.57)	Two-tailed p values per cluster = (6.38×10^{-13}, 2.53×10^{-05}, 2.27×10^{-07}, 2.68×10^{-05}, 2.42×10^{-10}, 5.36×10^{-07}, 2.31×10^{-05}, 1.31×10^{-03}, 1.39×10^{-02})	Number of neurons per cluster = (202, 96, 137, 150, 190, 179, 201, 245, 190)	BH across all clusters and variables
Supp Fig 6b	Lick Bout Onset Trained; all recorded cells in a trained state across all planes and animals	One-sample t test each for 9 clusters	t values per cluster = (16.09, 13.98, 13.72, 10.13, 10.15, 13.82, 3.35, 6.29, 2.46)	Two-tailed p values per cluster = (4.05×10^{-46}, 1.26×10^{-36}, 5.65×10^{-36}, 6.70×10^{-22}, 2.19×10^{-21}, 1.40×10^{-35}, 1.09×10^{-03}, 9.81×10^{-10}, 1.74×10^{-02})	Number of neurons per cluster = (476, 461, 499, 580, 422, 424, 606, 699, 646)	BH across all clusters and variables

Supp Fig 6d	Decoding for each animal	Leave one out cross validation	R^2 defined as 1-(sum of squares from model/sum of squares from mean) for each animal = (0.53, -0.08, 0.35, 0.65, 0.48)	N/A	N/A	N/A
Supp Fig 6d	Cluster weights CS+ Onset	One-sample t test each for 9 clusters	t values per cluster = (6.66, 3.52, 3.05, 0.13, 2.39, -0.04, -1.35, -0.72, -0.56)	Two-tailed p values per cluster = (2.04×10^{-09}, 1.86×10^{-03}, 6.28×10^{-03}, 9.29×10^{-01}, 3.23×10^{-02}, 9.69×10^{-01}, 2.42×10^{-01}, 5.77×10^{-01}, 6.80×10^{-01})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH across all clusters and variables
Supp Fig 6d	Cluster weights CS+ Late	One-sample t test each for 9 clusters	t values per cluster = (11.17, 3.66, -0.90, 0.45, 3.12, 3.46, -1.71, 2.06, 2.58)	Two-tailed p values per cluster = (4.70×10^{-21}, 1.43×10^{-03}, 4.74×10^{-01}, 7.37×10^{-01}, 5.22×10^{-03}, 1.86×10^{-03}, 1.33×10^{-01}, 6.87×10^{-02}, 2.24×10^{-02})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH across all clusters and variables
Supp Fig 6d	Cluster weights CS+ Trace	One-sample t test each for 9 clusters	t values per cluster = (8.19, 5.25, -3.65, -0.30, 6.88, 6.66, 1.36, 1.85, 2.55)	Two-tailed p values per cluster = (5.37×10^{-13}, 4.51×10^{-06}, 1.43×10^{-03}, 8.27×10^{-01}, 9.88×10^{-10}, 2.04×10^{-09}, 2.42×10^{-01}, 1.04×10^{-01}, 2.24×10^{-02})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH across all clusters and variables
Supp Fig 6e	Decoding for each animal	Leave one out cross validation	R^2 defined as 1-(sum of squares from model/sum of squares from mean) for each animal = (0.78, 0.45, 0.24, 0.16, 0.06, 0.57, 0.76)	N/A	N/A	N/A
Supp Fig 6e	Cluster weights CS+ Onset	One-sample t test each for 9 clusters	t values per cluster = (3.08, 0.22, 1.04, -0.92, -2.10, -0.38)	Two-tailed p values per cluster = (2.55×10^{-02}, 8.25×10^{-01}, 5.02×10^{-01},	Number of neurons per cluster = (33, 30, 28, 54, 45, 40)	BH across all clusters and variables

				5.35×10^{-01}, 1.32×10^{-01}, 7.72×10^{-01})		
Supp Fig 6e	Cluster weights CS+ Late	One-sample t test each for 9 clusters	t values per cluster = (5.24, -2.11, 2.61, -0.56, -1.99, 1.47)	Two-tailed p values per cluster = (1.78×10^{-04}, 1.32×10^{-01}, 6.57×10^{-02}, 7.26×10^{-01}, 1.36×10^{-01}, 2.70×10^{-01})	Number of neurons per cluster = (33, 30, 28, 54, 45, 40)	BH across all clusters and variables
Supp Fig 6e	Cluster weights CS+ Trace	One-sample t test each for 9 clusters	t values per cluster = (3.69, 0.35, 1.86, -1.73, -0.52, -0.88)	Two-tailed p values per cluster = (7.43×10^{-03}, 7.72×10^{-01}, 1.67×10^{-01}, 1.77×10^{-01}, 7.26×10^{-01}, 5.35×10^{-01})	Number of neurons per cluster = (33, 30, 28, 54, 45, 40)	BH across all clusters and variables
Supp Fig 7e	OFC-CaMKII: Onset vs Control of Laser-PreLaser behavioral performance	Welch's t test	t = 0.10	Two-tailed p value = 0.92	Number of experimental animals = 7, number of control animals = 7	These null results are prior to correction.
Supp Fig 7e	OFC-CaMKII: Trace vs Control of Laser-PreLaser behavioral performance	Welch's t test	t = -0.10	Two-tailed p value = 0.92	Number of experimental animals = 8, number of control animals = 7	These null results are prior to correction.
Supp Fig 7e	OFC-VTA: Onset vs Control of Laser-PreLaser behavioral performance	Welch's t test	t = -0.88	Two-tailed p value = 0.40	Number of experimental animals = 8, number of control animals = 6	These null results are prior to correction.
Supp Fig 7e	OFC-VTA: Trace vs Control of Laser-PreLaser behavioral performance	Welch's t test	t = -0.29	Two-tailed p value = 0.78	Number of experimental animals = 7, number of control animals = 6	These null results are prior to correction.
Supp Fig 7f	OFC-CaMKII: eNpHR3.0 vs mCherry of Laser-PreLaser behavioral performance	Welch's t test	t = 1.54	Two-tailed p value = 0.14	Number of experimental animals = 15, number of control animals = 7	These null results are prior to correction.
Supp Fig 7f	OFC-VTA: eNpHR3.0 vs mCherry of Laser-PreLaser behavioral performance	Welch's t test	t = -1.48	Two-tailed p value = 0.16	Number of experimental animals = 18, number of control animals = 10	These null results are prior to correction.
Supp Fig 9b	Test for significant mean slope for OFC-CaMKII	Wilcoxon signed-rank test	W for all clusters = (622, 1813, 341, 2621, 6688,	Two-tailed p values per cluster = (5.55×10^{-27}, $3.68\times10^{+00}$,	Number of neurons per cluster = (187, 92, 130, 137,	Bonferroni correction across clusters, and Trace and Reward GLM

			6717, 2678, 6450, 3009)	1.62×10^{-18}, 1.09×10^{-04}, $4.52\times10^{+00}$, $5.88\times10^{+00}$, 2.18×10^{-12}, 4.55×10^{-07}, 2.43×10^{-07})	172, 171, 174, 214, 158)	variables (see results in Fig 4b).
Supp Fig 9b	Test for significant mean slope for OFC-VTA	Wilcoxon signed-rank test	W for all clusters = (89, 140, 172, 337, 359, 176)	Two-tailed p values per cluster = (1.28×10^{-02}, 6.85×10^{-01}, $5.76\times10^{+00}$, 5.77×10^{-03}, 8.83×10^{-01}, 1.99×10^{-02})	Number of neurons per cluster = (32, 30, 28, 54, 45, 40)	Bonferroni correction across clusters, and Trace and Reward GLM variables (see results in Fig 4b)
Supp Fig 9c	Test for mean optimal lag in OFC-CaMKII neurons across the learning-related clusters	One sample t test	t = (-3.72, -2.80, 2.64, 1.74, 3.62, 2.26) for clusters 1, 3, 4, 7, 8 and 9	Two-tailed p values per cluster = (1.36×10^{-03}, 1.31×10^{-02}, 1.46×10^{-02}, 1.02×10^{-01}, 1.36×10^{-03}, 3.43×10^{-02})	Number of neurons per cluster = (187, 130, 137, 174, 214, 158)	BH correction across clusters, and Onset, Trace ad Reward GLM variables (see results in Fig 5g)
Supp Fig 9c	Test for mean optimal lag in OFC-VTA neurons across the learning-related clusters	One sample t test	t = (-1.23, 0.50, 0.14) for clusters 1, 7 and 9	Two-tailed p values per cluster = (4.54×10^{-01}, 8.89×10^{-01}, 8.89×10^{-01})	Number of neurons per cluster = (32, 54, 40)	BH correction across clusters, and Onset, Trace ad Reward GLM variables (Fig 5g)
Supp Fig 10a	50%-Trained Trace	One sample t-test	t values per cluster = (-1.37, -7.94, 8.77, -1.29, -1.46, 0.92, 2.25, 5.73, 2.05)	Two-tailed p values per cluster = (2.22×10^{-01}, 7.25×10^{-14}, 2.56×10^{-16}, 2.24×10^{-01}, 2.17×10^{-01}, 3.60×10^{-01}, 5.58×10^{-02}, 4.42×10^{-08}, 7.28×10^{-02})	Number of neurons per cluster (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters
Supp Fig 10a	Background-after Background Trace	One sample t-test	t values per cluster = (-0.96, 0.39, 3.27, -0.77, -2.52, -2.81, 2.66, 0.42, 0.87)	Two-tailed p values per cluster = (5.69×10^{-01}, 6.94×10^{-01}, 1.21×10^{-02}, 5.69×10^{-01}, 2.80×10^{-02}, 2.50×10^{-02}, 2.56×10^{-02}, 6.94×10^{-01}, 5.69×10^{-01})	Number of neurons per cluster (196, 94, 138, 151, 193, 178, 204, 242, 191) Not all planes of cells were imaged during Background sessions	BH across all clusters
Supp Fig 10a	50%-Trained Onset	One sample t-test	t values per cluster = (-1.59, -0.35, -3.22, 2.62, 3.86, 2.33, 2.71, 3.22, 3.25)	Two-tailed p values per cluster = (1.25×10^{-01}, 7.29×10^{-01}, 3.08×10^{-03},	Number of neurons per cluster (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters

				1.36×10^{-02}, 1.19×10^{-03}, 2.58×10^{-02}, 1.25×10^{-02}, 3.08×10^{-03}, 3.08×10^{-03})		
Supp Fig 10a	Background-after Background Onset	One sample t-test	t values per cluster = (-4.49, 2.53, -2.90, -1.38, -2.11, -4.40, 0.77, 0.73, 0.45)	Two-tailed p values per cluster = (8.46×10^{-05}, 2.98×10^{-02}, 1.30×10^{-02}, 2.53×10^{-01}, 6.48×10^{-02}, 8.46×10^{-05}, 5.21×10^{-01}, 5.21×10^{-01}, 6.51×10^{-01})	Number of neurons per cluster (196, 94, 138, 151, 193, 178, 204, 242, 191) Not all planes of cells were imaged during Background sessions	BH across all clusters
Supp Fig 10b	50%-Trained Trace	One sample t-test	t values per cluster = (-1.25, 0.14, -0.08, 1.61, 1.62, 0.51)	Two-tailed p values per cluster = (4.34×10^{-01}, 9.37×10^{-01}, 9.37×10^{-01}, 3.36×10^{-01}, 3.36×10^{-01}, 9.15×10^{-01})	Number of neurons per cluster (66, 78, 45, 88, 89, 87)	BH across all clusters
Supp Fig 10b	Background-after Background Trace	One sample t-test	t values per cluster = (-0.09, -0.65, -0.62, 1.81, -0.24, 2.45)	Two-tailed p values per cluster = (9.30×10^{-01}, 8.14×10^{-01}, 8.14×10^{-01}, 2.33×10^{-01}, 9.30×10^{-01}, 1.14×10^{-01})	Number of neurons per cluster (28, 27, 24, 45, 42, 39) Not all planes of cells were imaged during Background sessions	BH across all clusters
Supp Fig 10b	50%-Trained Onset	One sample t-test	t values per cluster = (-0.93, -0.58, 1.85, 0.64, 2.20, -0.74)	Two-tailed p values per cluster = (5.66×10^{-01}, 5.66×10^{-01}, 2.13×10^{-01}, 5.66×10^{-01}, 1.83×10^{-01}, 5.66×10^{-01})	Number of neurons per cluster (66, 78, 45, 88, 89, 87)	BH across all clusters
Supp Fig 10b	Background-after Background Onset	One sample t-test	t values per cluster = (-0.57, -0.71, -2.04, 1.42, -0.53, 0.81)	Two-tailed p values per cluster = (6.02×10^{-01}, 6.02×10^{-01}, 3.15×10^{-01}, 4.89×10^{-01}, 6.02×10^{-01}, 6.02×10^{-01})	Number of neurons per cluster (28, 27, 24, 45, 42, 39) Not all planes of cells were imaged during Background sessions	BH across all clusters
Supp Fig 11a	See Figure	Two-sample t test	t = 7.20	Two-tailed p value = 1.14×10^{-12}	n=20 sessions from a total of n=5 mice	N/A
Supp Fig 11b	See Figure	One sample t-test	t values per cluster = (-0.26, 1.26, -6.76, -	Two-tailed p values per cluster =	Number of neurons per cluster (470,	BH across all clusters

			0.45, 1.88, 0.42, -2.01, -2.81, 0.84)	(7.96×10^{-01}, 3.76×10^{-01}, 3.52×10^{-10}, 7.58×10^{-01}, 1.37×10^{-01}, 7.58×10^{-01}, 1.35×10^{-01}, 2.26×10^{-02}, 6.05×10^{-01})	458, 497, 571, 415, 423, 596, 692, 636)	
Supp Fig 11c	See Figure (Reproduced from Supplementary Fig 6b)	One sample t-test	t values for clusters 3 and 8 = (-13.46, -5.13)	Two-tailed p values for clusters 3 and 8 = (5.95×10^{-35}, 5.68×10^{-07})	Number of neurons in clusters 3 and 8 = (499, 699)	BH across all clusters
Supp Fig 11d	See Figure	One sample t-test	t values for clusters 3 and 8 = (8.66, 3.41)	Two-tailed p values for clusters 3 and 8 = (2.01×10^{-16}, 1.04×10^{-03})	Number of neurons in clusters 3 and 8 = (497, 692)	BH across all clusters
Supp Fig 11e	See Figure	One sample t-test	t values for clusters 3 and 8 = (9.58, 2.88)	Two-tailed p values for clusters 3 and 8 = (2.02×10^{-19}, 5.24×10^{-03})	Number of neurons in clusters 3 and 8 = (497, 692)	BH across all clusters
Supp Fig 11g	See Figure	Pearson's correlation	See Figure	Two-tailed p values for clusters 3 and 8 = (5.85×10^{-01}, 8.31×10^{-01})	Number of neurons in clusters 3 and 8 = (130, 213)	BH across all clusters
Supp Fig 12a	Reward Omission	One sample t-test	t values per cluster = (7.56, 9.81, 4.76, 5.20, 5.62, 9.84, 2.21, 1.36, 1.31)	Two-tailed p values per cluster = (6.43×10^{-13}, 4.84×10^{-20}, 3.82×10^{-06}, 4.93×10^{-07}, 7.96×10^{-08}, 4.84×10^{-20}, 3.51×10^{-02}, 1.90×10^{-01}, 1.90×10^{-01})	Number of neurons per cluster = (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters
Supp Fig 12a	Reward Receipt	One sample t-test	t values per cluster = (4.66, 11.44, -0.08, 4.43, 9.11, 6.97, 1.80, 0.57, 1.12)	Two-tailed p values per cluster = (9.28×10^{-06}, 7.27×10^{-26}, 9.37×10^{-01}, 2.01×10^{-05}, 1.62×10^{-17}, 3.74×10^{-11}, 1.09×10^{-01}, 6.38×10^{-01}, 3.39×10^{-01})	Number of neurons per cluster = (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters
Supp Fig 12b	Reward Omission Late	One sample t-test	t values per cluster = (5.06, -3.36, 3.31, 4.00, 2.79, 5.15, -0.67, 1.24, -0.44)	Two-tailed p values per cluster = (2.71×10^{-06}, 1.82×10^{-03}, 1.82×10^{-03}, 2.15×10^{-04}, 8.16×10^{-03}, 2.71×10^{-06},	Number of neurons per cluster = (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters

				5.64×10^{-01}, 2.76×10^{-01}, 6.63×10^{-01})		
Supp Fig 12b	Reward Receipt Late	One sample t-test	t values per cluster = (5.97, 6.93, 2.64, 5.73, 3.87, 10.89, 0.39, -1.92, -0.03)	Two-tailed p values per cluster = (1.42×10^{-08}, 6.65×10^{-11}, 1.28×10^{-02}, 3.57×10^{-08}, 2.31×10^{-04}, 1.46×10^{-23}, 7.80×10^{-01}, 7.17×10^{-02}, 9.76×10^{-01})	Number of neurons per cluster = (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters
Supp Fig 12c	Omission minus Receipt	One sample t-test	t values per cluster = (2.89, -4.81, 4.15, -0.72, -6.66, 2.06, 0.10, 0.52, 0.03)	Two-tailed p values per cluster = (9.11×10^{-03}, 9.23×10^{-06}, 1.17×10^{-04}, 7.09×10^{-01}, 8.02×10^{-10}, 7.25×10^{-02}, 9.76×10^{-01}, 7.74×10^{-01}, 9.76×10^{-01})	Number of neurons per cluster = (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters
Supp Fig 12c	Omission minus Receipt Late	One sample t-test	t values per cluster = (-2.25, -7.88, -0.16, -2.46, -2.12, -6.64, -0.93, 2.47, -0.26)	Two-tailed p values per cluster = (4.50×10^{-02}, 2.13×10^{-13}, 8.70×10^{-01}, 3.21×10^{-02}, 5.13×10^{-02}, 4.43×10^{-10}, 4.54×10^{-01}, 3.21×10^{-02}, 8.70×10^{-01})	Number of neurons per cluster = (470, 458, 497, 572, 416, 423, 596, 693, 638)	BH across all clusters
Supp Fig 12d	Reward Omission	One sample t-test	t values per cluster = (1.82, 0.48, 1.63, -1.09, -1.48, -0.06)	Two-tailed p values per cluster = (2.84×10^{-01}, 7.55×10^{-01}, 2.84×10^{-01}, 4.21×10^{-01}, 2.84×10^{-01}, 9.54×10^{-01})	Number of neurons per cluster = (67, 78, 46, 89, 89, 87)	BH across all clusters
Supp Fig 12d	Reward Receipt	One sample t-test	t values per cluster = (0.72, 1.52, 3.96, 0.87, -0.81, 0.55)	Two-tailed p values per cluster = (5.71×10^{-01}, 3.96×10^{-01}, 1.61×10^{-03}, 5.71×10^{-01}, 5.71×10^{-01}, 5.81×10^{-01})	Number of neurons per cluster = (67, 78, 46, 89, 89, 87)	BH across all clusters
Supp Fig 12e	Reward Omission Late	One sample t-test	t values per cluster = (0.75, 2.70, 0.66, -0.70, -0.92, -0.86)	Two-tailed p values per cluster = (5.12×10^{-01}, 5.06×10^{-02},	Number of neurons per cluster = (67, 78, 46, 89, 89, 87)	BH across all clusters

				5.12×10^{-01}, 5.12×10^{-01}, 5.12×10^{-01}, 5.12×10^{-01})		
Supp Fig 12e	Reward Receipt Late	One sample t-test	t values per cluster = (1.95, 2.33, 2.29, 0.89, -1.58, 0.64)	Two-tailed p values per cluster = (1.10×10^{-01}, 8.12×10^{-02}, 8.12×10^{-02}, 4.51×10^{-01}, 1.78×10^{-01}, 5.25×10^{-01})	Number of neurons per cluster = (67, 78, 46, 89, 89, 87)	BH across all clusters
Supp Fig 12f	Omission minus Receipt	One sample t-test	t values per cluster = (0.45, -1.70, -3.24, -1.35, -0.37, -0.67)	Two-tailed p values per cluster = (7.12×10^{-01}, 2.78×10^{-01}, 1.35×10^{-02}, 3.61×10^{-01}, 7.12×10^{-01}, 7.12×10^{-01})	Number of neurons per cluster = (67, 78, 46, 89, 89, 87)	BH across all clusters
Supp Fig 12f	Omission minus Receipt Late	One sample t-test	t values per cluster = (-1.10, -0.33, -1.57, -1.05, 0.48, -1.21)	Two-tailed p values per cluster = (4.46×10^{-01}, 7.45×10^{-01}, 4.46×10^{-01}, 4.46×10^{-01}, 7.45×10^{-01}, 4.46×10^{-01})	Number of neurons per cluster = (67, 78, 46, 89, 89, 87)	BH across all clusters
Supp Fig 13b	OFC-CaMKII Cluster 1	Permutation test (Methods)	See Figure for decoding accuracies of all groups	First day of extinction $p < 0.0015$ Last day of extinction $p = 0.015$ Reinstatement $p < 0.0015$	n = 184 tracked neurons	BH across all test sessions. We did not correct across clusters here since each individual learning-related cluster is of interest by itself
Supp Fig 13b	OFC-CaMKII Cluster 2	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction $p = 0.026$ Last day of extinction $p = 0.083$ Reinstatement $p = 0.026$	n = 89 tracked neurons	BH across all test sessions.
Supp Fig 13b	OFC-CaMKII Cluster 5	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction $p < 0.001$ Last day of extinction $p < 0.001$ Reinstatement $p < 0.001$	n = 169 tracked neurons	BH across all test sessions.
Supp Fig 13b	OFC-CaMKII Cluster 6	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction $p = 0.003$	n = 165 tracked neurons	BH across all test sessions.

				Last day of extinction p = 0.169 Reinstatement p = 0.003		
Supp Fig 13b	OFC-VTA Cluster 1	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p < 0.001 Last day of extinction p < 0.001 Reinstatement p < 0.001	n = 27 tracked neurons	BH across all test sessions.
Supp Fig 13b	OFC-VTA Cluster 5	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p < 0.0015 Last day of extinction p = 0.088 Reinstatement p < 0.0015	n = 23 tracked neurons	BH across all test sessions.
Supp Fig 13d	OFC-CaMKII Cluster 1	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p = 0.003 Last day of extinction p = 0.083 Reinstatement p = 0.048	n = 159 tracked neurons	BH across all test sessions.
Supp Fig 13d	OFC-CaMKII Cluster 2	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p = 0.075 Last day of extinction p = 0.123 Reinstatement p = 0.272	n = 86 tracked neurons	BH across all test sessions.
Supp Fig 13d	OFC-CaMKII Cluster 5	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p = 0.004 Last day of extinction p < 0.0015 Reinstatement p < 0.0015	n = 131 tracked neurons	BH across all test sessions.
Supp Fig 13d	OFC-CaMKII Cluster 6	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p = 0.006 Last day of extinction p = 0.171 Reinstatement p = 0.003	n = 150 tracked neurons	BH across all test sessions.
Supp Fig 13d	OFC-VTA Cluster 1	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction p < 0.001 Last day of extinction p = < 0.001 Reinstatement p < 0.001	n = 26 tracked neurons	BH across all test sessions.

Supp Fig 13d	OFC-VTA Cluster 5	Permutation test	See Figure for decoding accuracies of all groups	First day of extinction $p < 0.0015$ Last day of extinction $p = 0.08$ Reinstatement $p < 0.0015$	n = 23 tracked neurons	BH across all test sessions.
Supp Fig 14b	OFC-CaMKII Cluster 1	Permutation test	See Figure for decoding accuracies of all groups	50% $p < 0.00167$ Day before Trained $p < 0.00167$ Day 1 $p = 0.7$ Background $p = 0.53$ After Background $p < 0.00167$	n = 179 tracked neurons	BH across all test sessions.
Supp Fig 14b	OFC-CaMKII Cluster 2	Permutation test	See Figure for decoding accuracies of all groups	50% $p < 0.0025$ Day before Trained $p < 0.0025$ Day 1 $p = 0.438$ Background $p = 0.029$ After Background $p = 0.028$	n = 90 tracked neurons	BH across all test sessions.
Supp Fig 14b	OFC-CaMKII Cluster 5	Permutation test	See Figure for decoding accuracies of all groups	50% $p < 0.00167$ Day before Trained $p < 0.00167$ Day 1 $p = 0.275$ Background $p = 0.0725$ After Background $p < 0.00167$	n = 169 tracked neurons	BH across all test sessions.
Supp Fig 14b	OFC-CaMKII Cluster 6	Permutation test	See Figure for decoding accuracies of all groups	50% $p < 0.0025$ Day before Trained $p < 0.0025$ Day 1 $p = 0.431$ Background $p = 0.235$ After Background $p = 0.0117$	n = 165 tracked neurons	BH across all test sessions.
Supp Fig 14b	OFC-VTA Cluster 1	Permutation test	See Figure for decoding accuracies of all groups	50% $p < 0.00125$ Day before Trained $p < 0.00125$ Day 1 $p = 0.019$ Background $p < 0.00125$ After Background $p < 0.00125$	n = 26 tracked neurons	BH across all test sessions.

Supp Fig 14b	OFC-VTA Cluster 5	Permutation test	See Figure for decoding accuracies of all groups	50% $p < 0.00167$ Day before Trained $p < 0.00167$ Day 1 $p = 0.29$ Background $p = 0.00375$ After Background $p < 0.00167$	n = 24 tracked neurons	BH across all test sessions.
Supp. Fig 14c	OFC-CaMKII Trace Day 1→Day 2 compared to Day before Trained →Trained	Difference in z scores from Fisher's r to z transformation[55]	z = -7.68	Two-tailed p value = 1.55×10^{-14} (uncorrected) 3.88×10^{-14} (BH corrected)	n = 1435 neurons	BH correction across 5 comparisons for Trace OFC-CaMKII responses
Supp. Fig 14c	OFC-CaMKII Trace Day 1 →Trained compared to Day before Trained→Trained	Steiger's test[56]	z = -10.62	Two-tailed p value = $<10^{-100}$ (uncorrected) $<10^{-100}$ (BH corrected)	n = 1435 neurons	BH correction across 5 comparisons for Trace OFC-CaMKII responses
Supp. Fig 14c	OFC-CaMKII Trace Trained →50% compared to Day before Trained→Trained	Steiger's test[56]	z = -4.26	Two-tailed p value = 2.14×10^{-05} (uncorrected) 2.68×10^{-05} (BH corrected)	n = 1426 neurons	BH correction across 5 comparisons for Trace OFC-CaMKII responses
Supp. Fig 14c	OFC-CaMKII Trace Day before extinction →Last day of extinction compared to Day before Trained→Trained	Difference in z scores from Fisher's r to z transformation[55]	z = -7.18	Two-tailed p value = 6.72×10^{-13} (uncorrected) 1.12×10^{-12} (BH corrected)	n = 1408 and n = 1435 neurons	BH correction across 5 comparisons for Trace OFC-CaMKII responses
Supp. Fig 14c	OFC-CaMKII Trace Day before extinction → Reinstatement compared to Day before Trained→Trained	Difference in z scores from Fisher's r to z transformation[55]	z = -1.18	Two-tailed p value = 2.38×10^{-01} (uncorrected) 2.38×10^{-01} (BH corrected)	n = 1408 and n = 1435 neurons	BH correction across 5 comparisons for Trace OFC-CaMKII responses
Supp. Fig 14c	OFC-VTA Trace Day 1→Day 2 compared to Day before Trained →Trained	Difference in z scores from Fisher's r to z transformation[55]	z = -5.29	Two-tailed p value = 1.25×10^{-07} (uncorrected) 3.13×10^{-07} (BH corrected)	n = 225 neurons	BH correction across 5 comparisons for Trace OFC-VTA responses
Supp. Fig 14c	OFC-VTA Trace Day 1 →Trained compared to Day before Trained→Trained	Steiger's test[56]	z = -7.01	Two-tailed p value = 2.77×10^{-11} (uncorrected) 1.39×10^{-10} (BH corrected)	n = 225 neurons	BH correction across 5 comparisons for Trace OFC-VTA responses
Supp. Fig 14c	OFC-VTA Trace Trained →50% compared to Day	Steiger's test[56]	z = -2.78	Two-tailed p value =	n = 220 neurons	BH correction across 5 comparisons for

	before Trained→Trained			5.89×10^{-03} (uncorrected) 7.36×10^{-03} (BH corrected)		Trace OFC-VTA responses
Supp. Fig 14c	OFC-VTA Trace Day before extinction →Last day of extinction compared to Day before Trained→Trained	Difference in z scores from Fisher's r to z transformation[55]	z = -3.27	Two-tailed p value = 1.07×10^{-03} (uncorrected) 1.78×10^{-03} (BH corrected)	n = 225 and n =184 neurons	BH correction across 5 comparisons for Trace OFC-VTA responses
Supp. Fig 14c	OFC-VTA Trace Day before extinction → Reinstatement compared to Day before Trained→Trained	Difference in z scores from Fisher's r to z transformation[55]	z = -1.86	Two-tailed p value = 6.28×10^{-02} (uncorrected) 6.28×10^{-02} (BH corrected)	n = 225 and n = 183 neurons	BH correction across 5 comparisons for Trace OFC-VTA responses
Supp Fig 15a	Mean change in lick rate between CS+ to reward/omission time vs baseline across animals	Paired t test	t = (-1.92, -4.16) for 50% and Background versus Trained	Two-tailed p value = (8.33×10^{-02}, 3.89×10^{-03})	n = 11 animals One OFCVTA animal had no Background session and was removed from this analysis	BH correction for the 2 comparisons, viz. 50% vs Trained and Background vs Trained
Supp Fig 15a	Mean lick rate during reward consumption period (0-3 s after first lick after reward) across animals	Paired t test	t = (1.07, -0.39) for 50% and Background versus Trained	Two-tailed p value = (6.20×10^{-01}, 7.04×10^{-01})	n = 11 animals One OFCVTA animal had no Background session and was removed from this analysis	BH correction for the 2 comparisons, viz. 50% vs Trained and Background vs Trained
Supp Fig 15a	Mean change in lick rate between CS- to omission time vs baseline across animals	Paired t test	t = (-1.55, -3.52) for 50% and Background versus Trained	Two-tailed p value = (1.52×10^{-01}, 1.11×10^{-02})	n = 11 animals One OFCVTA animal had no Background session and was removed from this analysis	BH correction for the 2 comparisons, viz. 50% vs Trained and Background vs Trained
Supp Fig 15b	Difference in Onset coefficients between CS+ and CS- trials on Trained session	One sample t test	t for all clusters = (6.99, 2.15, -1.64, -1.60, -2.91, -0.62, 0.81, 1.15, -1.99)	Two-tailed p values per cluster = (4.33×10^{-10}, 1.02×10^{-01}, 1.69×10^{-01}, 1.69×10^{-01}, 1.83×10^{-02}, 5.39×10^{-01}, 4.72×10^{-01}, 3.25×10^{-01}, 1.08×10^{-01})	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH correction across clusters
Supp Fig 15b	Difference in Trace coefficients between CS+ and CS- trials on Trained session	One sample t test	t for all clusters = (4.95, 5.10, 0.42, 0.44, 4.39, 2.58, 2.61, -0.10, -1.99)	Two-tailed p values per cluster = (8.30×10^{-06}, 8.30×10^{-06}, 7.58×10^{-01}, 7.58×10^{-01},	Number of neurons per cluster = (187, 92, 130, 137, 172, 171, 174, 214, 158)	BH correction across clusters

				5.87×10^{-05}, 1.95×10^{-02}, 1.95×10^{-02}, 9.24×10^{-01}, 7.21×10^{-02})		
Supp Fig 15d	Test for mean optimal lag in OFC-CaMKII neurons across the learning-related clusters	One sample t test	t = -1.12 for cluster 1 for Onset. t = (-2.25, 4.49, 2.01 1.55) for clusters 1, 2, 5 and 6 for Trace	Two-tailed p values per cluster = 3.22×10^{-01} for cluster 1 for Onset. Two-tailed p values per cluster = (4.69×10^{-02}, 2.27×10^{-04}, 7.29×10^{-02}, 1.68×10^{-01}) for clusters 1, 2, 5 and 6 for Trace	Number of neurons per cluster = (187, 92, 172, 171) for clusters 1, 2, 5 and 6	BH correction across clusters, and Onset, Trace ad Reward GLM variables
Supp Fig 15d	Test for mean optimal lag in OFC-VTA neurons across the learning-related clusters	One sample t test	t = 3.56 for cluster 1 for Onset. t = (0.28, 2.49) for clusters 1 and 5	Two-tailed p values per cluster = 7.55×10^{-03} for cluster 1 for Onset. Two-tailed p values per cluster = (7.85×10^{-01}, 5.83×10^{-02})	Number of neurons per cluster = (32, 28) for clusters 1 and 5	BH correction across clusters, and Onset, Trace ad Reward GLM variables
Supp Fig 15e	Test for mean optimal lag in OFC-CaMKII neurons across the learning-related clusters	One sample t test	t = (-2.78, -3.40, 0.85, 2.76, 3.49, 0.44) for clusters 1, 3, 4, 7, 8 and 9	Two-tailed p values per cluster = (1.40×10^{-02}, 3.35×10^{-03}, 4.37×10^{-01}, 1.40×10^{-02}, 3.25×10^{-03}, 6.63×10^{-01})	Number of neurons per cluster = (187, 130, 137, 174, 214, 158)	BH correction across clusters, and Onset, Trace ad Reward GLM variables
Supp Fig 15e	Test for mean optimal lag in OFC-VTA neurons across the learning-related clusters	One sample t test	t = (-0.92, 1.50, -0.35) for clusters 1, 7 and 9	Two-tailed p values per cluster = (5.50×10^{-01}, 2.78×10^{-01}, 7.85×10^{-01})	Number of neurons per cluster = (32, 54, 40)	BH correction across clusters, and Onset, Trace ad Reward GLM variables