**Table A: Contrasts between rule-based and residual choices across pseudopopulations.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **OFC**  | **VS** | **DS** |
| **Between Types****(across-within)** | avg. difference = 1.05CI: [0.87, 1.24]\*\*\* | avg. difference = 0.90CI: [0.74, 1.08]\*\*\* | avg. difference = 0.90CI: [0.73, 1.09]\*\*\* |
| **Compression****(based-free)** | avg. difference = 1.09CI: [0.62, 1.52]**\*\*\*** | avg. difference = -0.60CI: [-1.11, -0.06] \*\*\* | avg. difference = -0.02CI: [-0.57, 0.55] n.s. |
| **Rule-based****(shared-not)** | avg. difference = 1.08CI: [0.86, 1.36]\*\*\* | avg. difference = 1.08CI: [0.85, 1.32] \*\*\* | avg. difference = 1.42CI: [1.17, 1.71] \*\*\* |
| **Residual****(shared-not)** | avg. difference = -0.05CI: [-0.30, 0.18] n.s. | avg. difference = 0.12CI: [-0.10, 0.34] n.s. | avg. difference = -0.05CI: [-0.30, 0.20] n.s. |

Average difference between the indicated blocks of the representational similarity matrix shown in Figure 5B. CI = 95% confidence intervals across 1000 pseudopopulations. Asterisks indicate significant difference, \*\*\* p < 0.001, bootstrap test.

**Table B: Contrasts between color and shape rules within the example pseudopopulation.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **OFC** *mean ± STE* | **VS** *mean ± STE* | **DS** *mean ± STE* |
| ***Color dim.*** | ***Shape dim.*** | ***Color dim.*** | ***Shape dim.*** | ***Color dim.*** | ***Shape dim.*** |
| **Color Rule** | -0.12 ± 0.17 | -2.01 ± 0.15 | 0.41 ± 0.36 | -1.65 ± 0.27 | 0.49 ± 0.21 | -2.61 ± 0.11 |
| t = 8.13, [1.40, 2.38] \*\*\* | t = 4.53, [1.10, 3.02] \*\* | t = 12.88, [2.59, 3.61]\*\*\* |
| **Shape Rule** | -1.76 ± 0.31 | 0.45 ± 0.30 | -1.92 ± 0.14 | 0.11 ± 0.14 | -2.10 ± 0.09 | 0.16 ± 0.15 |
| t = 5.11, [1.29, 3.12]\*\* | t = 19.26, [1.61, 2.45]\*\*\* | t = 12.87, [1.88, 2.62]\*\*\* |

Quantification of the results shown in Figure 6C. Asterisks indicate significant difference between color and shape, \*\*\* p < 0.0001, \*\* p < 0.001, \* p < 0.01, all two-sample t-tests: t(1,16) = t-statistic, [95% CI for effect size]. All results survive correction for multiple comparisons.

**Table C: Contrasts between color and shape rules across pseudopopulations.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **OFC**  | **VS** | **DS** |
| **Between Types****(across-within)** | avg. difference = 0.65CI: [0.55, 0.74]\*\* | avg. difference = 0.47CI: [0.39, 0.55]\*\* | avg. difference = 0.61CI: [0.53, 0.69]\*\* |
| **Shape Rule****(color-shape)** | avg. difference = 2.23CI: [1.99, 2.48]**\*\*** | avg. difference = 2.30CI: [2.10, 2.50] \*\* | avg. difference = 3.03CI: [2.84, 3.23]\*\* |
| **Color Rule****(shape-color)** | avg. difference = 2.51CI: [2.30, 2.71]\*\* | avg. difference = 1.88CI: [1.69, 2.07] \*\* | avg. difference = 2.18CI: [1.95, 2.40] \*\* |

Average difference between the indicated blocks of the representational similarity matrix shown in Figure 5B. CI = 95% confidence intervals across 1000 pseudopopulations. Asterisks indicate significant difference between color and shape, \*\* p < 0.001, bootstrap test. All results survive correction for multiple comparisons.

**Table D: Choice predictive subspace projections across pseudotrials.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Condition** | **OFC** *mean (min, max)* | **VS** *mean (min, max)* | **DS** *mean (min, max)* |
| Unchosen feature axis | -0.89 (-0.98, -0.83) | -0.75 (-0.96, -0.49) | -1.05 (-1.17, -0.99) |
| Chosen feature axis | 0.97 (0.62, 1.32) | 0.88 (0.62, 0.97) | 1.13 (1.02, 1.23) |
|  Rule-relevant (RR) |  2.11 (1.24, 2.39) |  2.00 (1.47, 2.78) |  2.47 (2.08, 3.13) |
|  Residual (res.) |  0.50 (0.25, 0.72) |  0.49 (-0.04, 0.81) |  0.68 (0.53, 0.57) |
|  Rule-irrelevant (IR) |  0.29 (0.03, 0.58) |  0.14 (-0.15, 0.55) |  0.22 (-0.04, 0.70) |

Quantification of the results shown in Figure 7E. All units in log odds of choice, as decoded from the example neuronal pseudopopulation in each region.

**Table E: Statistical comparisons of subspace projections across pseudotrials.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **OFC** *t-stat, 95% CI* | **VS** *t-stat, 95% CI* | **DS** *t-stat, 95% CI* |
| Chosen ≠Unchosen | t = 44.8, [1.78, 1.94]\*\*\* | t = 36.0, [1.53, 1.71]\*\*\* | t = 48.1, [2.09, 2.27]\*\*\* |
| RR ≠ res. | t = 21.8, [1.46, 1.75] \*\*\* | t = 20.0, [1.36, 1.65] \*\*\* | t = 23.4, [1.64, 1.94] \*\*\* |
| RR ≠ IR | t = 25.6, [1.68, 1.95] \*\*\* | t = 24.0, [1.70, 2.00] \*\*\* | t = 31.0, [2.10, 2.38] \*\*\* |
| IR ≠ res. | t = 2.9, [0.07, 0.35] \*\* | t = 4.49, [0.20, 0.50] \*\*\* | t = 6.2, [0.31, 0.60] \*\*\* |

Statistical tests for the results shown in Figure 7E. Asterisks indicate significant contrasts, \*\*\* p < 0.0001, \*\* p < 0.01, all two-sample t-tests: t(1,718) = t-statistic, [95% CI for effect size], except chosen/unchosen, where t(1,3238). All effects survive correction for multiple comparisons.

**Table F: Differences in choice predictive subspace projections across pseudopopulations.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **OFC** *mean δ, [95% CI]* | **VS** *mean δ, [95% CI]* | **DS** *mean δ, [95% CI]* |
| Chosen -Unchosen | δ = 1.84, [1.76, 1.92] \*\* | δ = 1.63, [1.55, 1.70] \*\* | δ = 2.24, [2.16, 2.32] \*\* |
| RR – res. | δ = 1.43, [1.25, 1.61] \*\* | δ = 1.47, [1.28, 1.65] \*\* | δ = 1.84, [1.67, 2.01] \*\* |
| RR – IR | δ = 1.76, [1.62, 1.91] \*\* | δ = 1.84, [1.70, 2.00] \*\* | δ = 2.29, [2.13, 2.44] \*\* |
| res. – IR | δ = 0.33, [0.17, 0.50] \*\* | δ = 0.38, [0.22, 0.55] \*\* | δ = 0.45, [0.28, 0.61] \*\* |

Average of the comparisons shown in **Table S5** across 1000 bootstrapped pseudopopulations. Related to Figure 7F and Supplemental Figure 5. Asterisks indicate significant contrasts, \*\* p < 0.001, bootstrap test. All effects survive correction for multiple comparisons.