Sequential Effects in Confidence & Performance Monitoring

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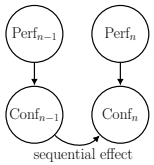


Background

Confidence: our subjective sense of P(correct).

Confidence Sequential Effects (CSE): when Conf$_n$ is correlated with Conf$_{n-1}$.[1]

Does feedback ameliorate CSE? **NO**

Do feedback & reward prediction error modulate CSE? **LIKELY**

Are there CSE in performance monitoring? **YES**

Does trial duration modulate CSE? **50/50**

Are there CSE in relative confidence judgements? **MINIMAL**

Conclusion

We found CSE for binary confidence and performance monitoring.

CSE was robust despite feedback and long trial durations.

The confidence forced-choice task had minimal CSE, indicating that relative judgements might mitigate CSE.

Binary Confidence: Orientation Discrimination

(see talk 54.12: Gaffin-Cahn et al., at 2:45pm Tue in Talk Room 1)

Task:

→ Discriminate orientation of tilted Gabors (left/right, d'=1)

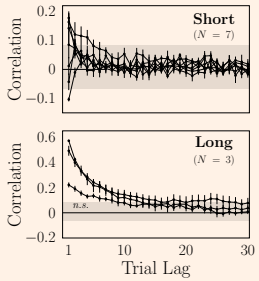
→ Report confidence (low/high)

→ Feedback and points/cash given for orientation judgement

→ Priors & payoffs manipulated to measure criterion placement

Results:

Confidence Autocorrelations



Nested Model Comparison (AICc):

Logistic regression to predict confidence

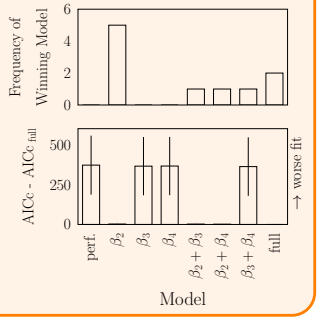
→ β_0: intercept (confidence bias)

→ β_1: performance (correct/incorrect)

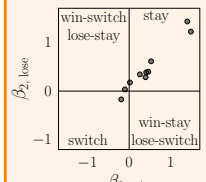
→ β_2: CSE (previous confidence)

→ β_3: feedback (previous performance)

→ β_4: reward prediction error ($\$ - \hat{\$}$)



Bonus: Switch-Stay Strategy



Fit simple CSE model ($\beta_0, \beta_1, \beta_2$), but split CSE for wins and losses:

win: × → "low", ✓ → "high"

loss: × → "high", ✓ → "low"

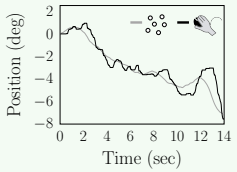
Performance Monitoring: Visuomotor Tracking

Task:

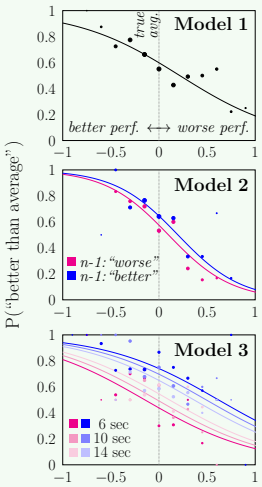
→ Mouse-track dot cloud centroid following a random 1D horizontal trajectory

→ Rate tracking performance as better/worse than average (performance monitoring)

→ Durations: 6, 10, 14 sec



Results:



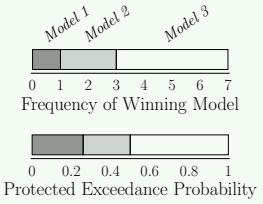
Bayesian Model Comparison:

Logistic regression to predict confidence

→ **Model 1:** Performance only (relative RMSE)

→ **Model 2:** Performance & CSE

→ **Model 3:** Performance & CSE modulated by current trial duration



Locke, Landy, Mamassian, & Simoncelli (2017) Journal of Vision, 17, 1166.

Confidence Forced-choice: Dot-Cloud Location Discrimination

Task:

→ Dots drawn from 2D dot distribution $N(\mu, \sigma)$

→ Discriminate horizontal location of mean, μ (left/right)

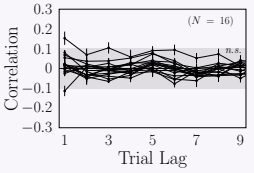
→ Report relative confidence for decision pairs: every 2 trials choose interval with higher confidence (1 or 2)

→ 7 stimulus locations: $\mu = -4, -2, -1, 0, 1, 2, 4$ deg

→ 6 interleaved conditions: # dots = 2, 5; cloud size: $\sigma = 1.5, 2, 2.5$ deg

Results:

Confidence Autocorrelations



Model Comparison (AICc):

Logistic regression to predict confidence

→ β_0: intercept (interval bias)

→ β_1: Δ performance (correct/incorrect)

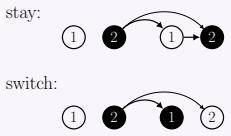
→ β_2: Δ trial difficulty (μ in SNR units)

→ β_3: Δ number of dots

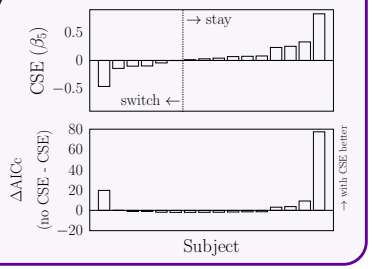
→ β_4: Δ cloud size, σ

→ β_5: CSE (previous confidence)

Bonus: Switch-Stay Strategy



Most observers had a stay strategy. This suggests CSE acts across and within trial pairs.



References: 1. Rahnev, Koizumi, McCurdy, Esposito, & Lau (2015) *Psych. Sci.*

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