Sequential Effects in Confidence & Performance Monitoring

Shannon M. Locke \(^1\) - Pascal Mamassian \(^3\) - Michael S. Landy \(^{1,2}\)

\(^1\) (1) Dept. of Psychology & (2) Center for Neural Science, New York University, New York, USA; (3) Laboratoire des Systèmes Perceptifs, Département d’Études Cognitives, École Normale Supérieure, PSL Research University, CNRS, 75005, Paris, France

Background
Confidence: our subjective sense of P(correct).
Confidence Sequential Effects (CSE): when Conf\(_n\) is correlated with Conf\(_{n-1}\) \(^3\)

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

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.

Conclusion

Binary Confidence: Orientation Discrimination
(see talk 54.13: 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 judgment
→ Priors & payoffs manipulated to measure criterion placement

Results:
Confidence Autocorrelations
Nested Model Comparison (AICc):
Logistic regression to predict confidence
\(\rightarrow \beta_1: \) intercept (confidence bias)
\(\rightarrow \beta_2: \) performance (correct/incorrect)
\(\rightarrow \beta_3: \) CSE (previous confidence)
\(\rightarrow \beta_4: \) feedback (previous performance)
\(\rightarrow \beta_5: \) reward prediction error (\(\$ - \$\))

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
\(\rightarrow \) Model 1: Performance only (relative RMSE)
\(\rightarrow \) Model 2: Performance & CSE
\(\rightarrow \) Model 3: Performance & CSE modulated by current trial duration

Confidence Forced-choice: Dot-Cloud Location Discrimination

Task:
→ Dots drawn from 2D dot distribution \(N(\mu, \sigma)\)
→ Discriminate horizontal location of mean, \(\mu\) (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: \(\sigma = 1.5, 2.5, 2.5\) deg

Results:
Confidence Autocorrelations
Model Comparison (AICc):
Logistic regression to predict confidence
\(\rightarrow \beta_1: \) intercept (interval bias)
\(\rightarrow \beta_2: \) performance (correct/incorrect)
\(\rightarrow \beta_3: \) trial difficulty (\(\mu\) in SNR units)
\(\rightarrow \beta_4: \) number of dots
\(\rightarrow \beta_5: \) cloud size, \(\sigma\)
\(\rightarrow \beta_6: \) CSE (previous confidence)

Bonus: Switch-Stay Strategy
Most observers had a stay strategy. This suggests CSE acts across and within trial pairs.


Correspondence: shannon.m.locke@nyu.edu