Statistical regularities compress numerical representations

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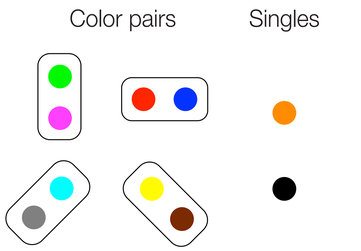
Question

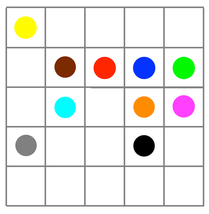
Numerical information can be perceived at multiple levels (e.g., two birds, or one pair of birds)

How do regularities in terms of object co-occurrences shape numerical representations?

Paradigm

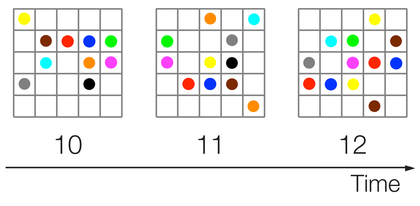


Stimulus array

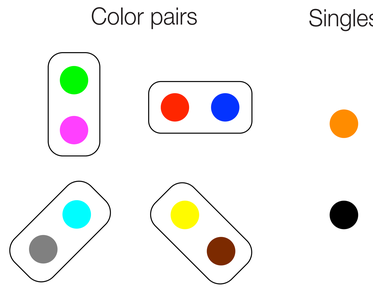


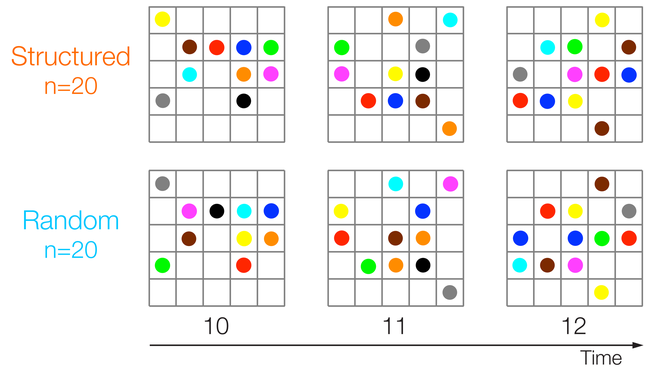
Task: numerosity estimation

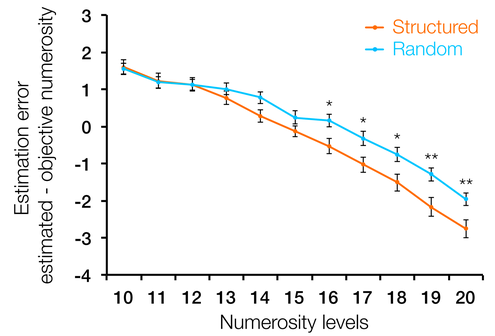
How many dots are there in each array?



Experiment 1: How do color pairs influence numerosity estimations?







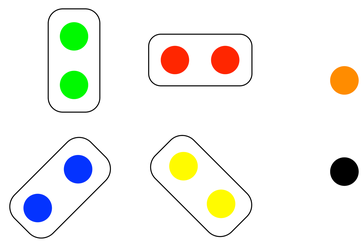
Interaction between condition and numerosity levels:

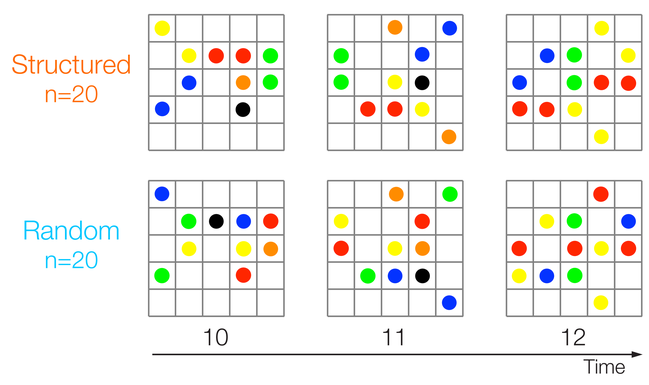
$F(10,380)=3.83$, $p<.001$, $\eta_p^2=.09$

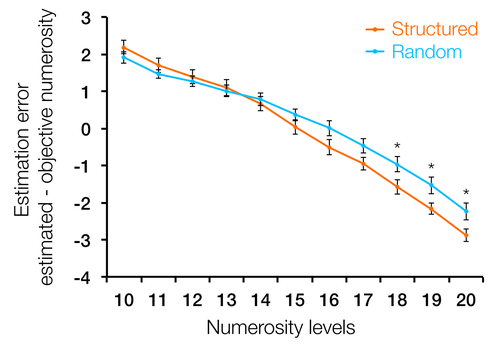
*$p<.05$
**$p<.01$

Regularities reduce numerical estimates

Experiment 2: Does grouping explain underestimation?







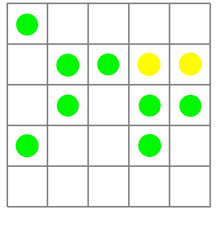
Interaction between condition and numerosity levels:

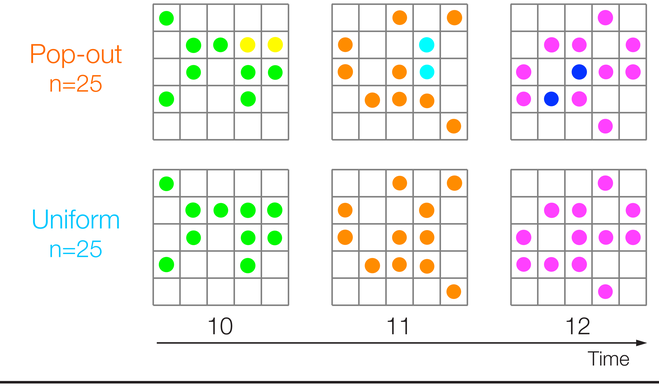
$F(10,380)=5.32$, $p<.001$, $\eta_p^2=.12$

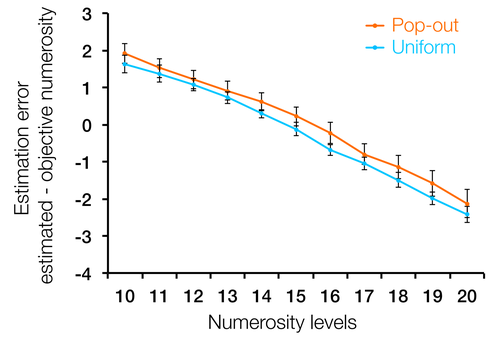
*$p<.05$

Underestimation can be explained by grouping

Experiment 3: Is underestimation due to local attention?







No Interaction between condition and numerosity levels:

$F(10,480)=0.20$, $p=.99$, $\eta_p^2=.004$

Underestimation is not due to local attention