Evaluating the independence of working memory for scene layout and simple features

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Background:
- In everyday life, we see discrete objects alongside the large, extended surfaces of a scene.
- Different brain regions specialized for processing scenes vs. objects—different memory stores? (sensory recruitment hypothesis)
- Most working memory experiments focus on discrete objects; the few that focus on scenes contain objects in their scenes, preventing a strong dissociation (e.g., Cohen et al., 2014).

Example trial

Main measure each condition: proportion of distance between all-or-none and unlimited-capacity models (“proportion independent”)

Unlimited-capacity model

All-or-none model

Performance on central colors

Performance on extra item

Experiment 1:
Continuous report (color performance)

TCC d-prime

Old/new (extra-item) performance

Gabor/scene performance

SOT d-prime

Extra item: gabor

Extra item: scene

Dual-task paradigm: How independent are representations of objects vs. large extended surfaces? (Less dual-task cost -> more independence)

Extra-item test: Old/New judgment

Single-task conditions:
Tested only on extra item or on central colors, depending on block

Dual-Task conditions:
Tested on either extra item or central colors (50% chance each)

Scene stimuli: Dilks, Julian, Paunov, & Kanwisher (2013 J Neuro)

Models from White, Palmer, & Boynton, 2018 Psych Science

Results

Raw performance (N=55)

Proportion Independent (N=55)

All error bars: within-subject SEM

No gabor-color difference
- Possibly due to noisy data
- Also consistent with recent questioning of separate representations of color/orientation (Garg et al., 2019 Science)
- Consistent with extra-item costs in WWM paradigms (even if features independent; Fougrie, Cormeira, & Alvarez, 2013 JEP:G)

Next step: Higher-powered investigation of gabor/color dual-task costs