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Fundamental Properties of Simple Emergent Feature Processing

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**Motivation**

The presence of emergent features in perceptual stimuli has long been associated with gains in processing efficiency, but the nature of the underlying processing has been unclear. We begin to investigate the hierarchy of emergent features from the simplest case: pairs of dots.

**Method**

- Adapted the odd-quadrant task from Portillo & Pomerantz (2005)
- Same/different task: participant is asked whether any dot changed position
- Investigated changes in Orientation and Proximity

**Results**

**Capacity Coefficient**

- Measure of efficiency as workload increases (Townsend & Nozawa, 1995). Ratio of whole to sum of parts.
  \[ C(t) = \frac{1 - H(t)}{R_t(1-R_0)} \]
  - \( C(t) = 1 \): standard independent parallel model (UCIP)
  - \( C(t) < 1 \): super capacity (facilitation or coactivation)
  - \( C(t) > 1 \): limited capacity

**Conclusion**

- Successfully replicated Portillo & Pomerantz (2005) results with a same/different task.
  - Significantly super capacity when emergent feature is present.
  - Significantly limited capacity when emergent feature is not present, even when amount of location information is the same.
  - Standard two-channel UCIP model cannot account for this.
  - Model must include emergent feature information.

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**References**
