G34 803
VSS, 2007

Subitizing sets and set-based selection: Early visual features determine what counts

Justin Halberda, *The Johns Hopkins University*

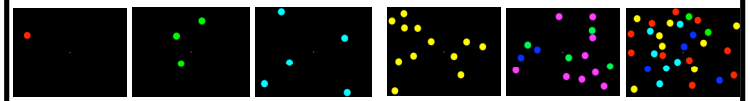
Introduction

Halberda, Sires & Feigenson (2006) found that approximately three spatially-overlapping sets can be attended, enumerated, and stored in parallel. When briefly shown dot arrays adults can approximate the total number of dots, the # of reds & the # of blues (3 sets in parallel). This motivates the following questions:
1) Do sets function as individuals for attention?
2) Is there a visual continuum between individual items and sets?
3) Which features support set selection?

Question 1: Do sets function as individuals for subitizing?

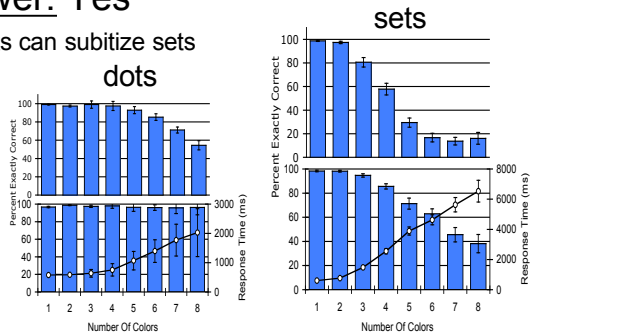
- Adults (N=12) attempted both data-limited (% correct) and free-viewing (RT) subitizing of individual dots and colored sets.

Dots (1-8) How many dots? VS Sets (1-8) How many colors?

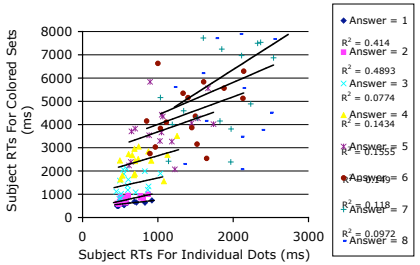


Answer: Yes

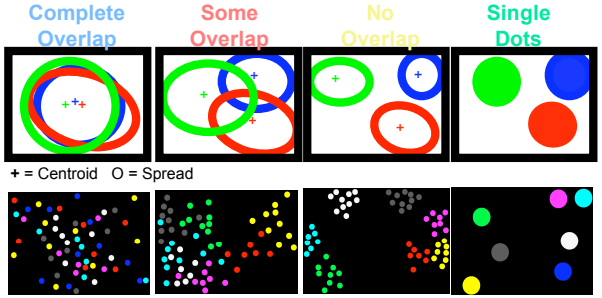
- Adults can subitize sets



Subitizing individual dots and subitizing sets may draw on a common mechanism as indicated by significant correlations across these blocks as a function of # of targets



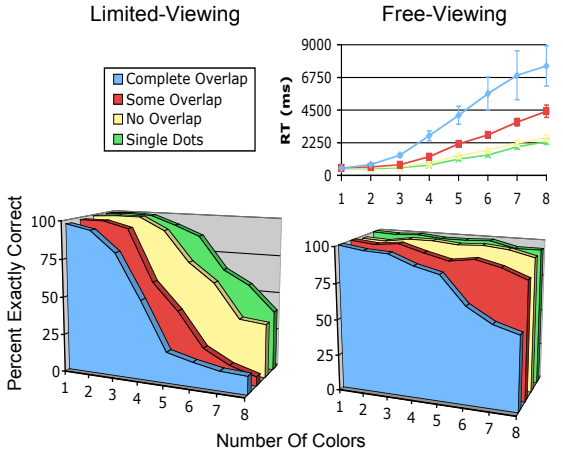
Question 2: Is there a visual continuum between dots and sets?



- Adults (N=12) attempted both data-limited (% correct) and free-viewing (RT) subitizing of four display types
- Tthese four display types varied the spread of the subsets (how distributed the sets are) and the distance between the centroids of the subsets
- The centroid may represent the position of a set in space and therefore separation in centroids may be crucial for subitizing

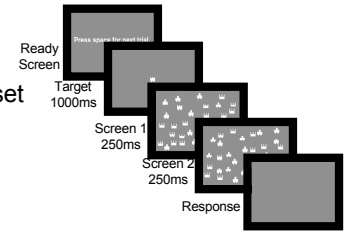
Answer: Yes

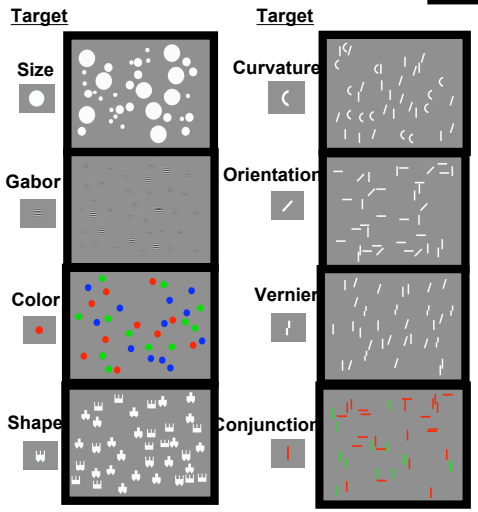
- Subitizing capacity increased smoothly up to a level of 3-4 subsets in parallel as a function of increasing centroid distance and decreasing spread



Question 3: Which features support set selection?

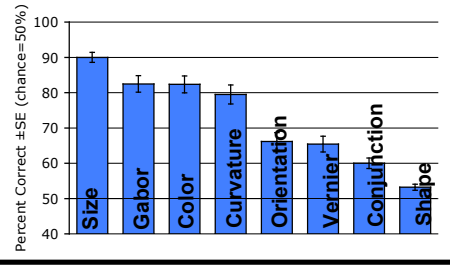
- Adults (N=12) enumerated a target set among distractors
- Task: Which screen (1st or 2nd) has more targets?





Answer:

The usual suspects



General Discussion

- An entire set of items function as a single individual for attention as evidenced by subitizing of sets and early feature-based selection

Reference

Halberda, J., Sires, S. F. & Feigenson, L. (2006). Multiple spatially overlapping sets can be enumerated in parallel. Psychological Science, 17(7), 572-576.,