When Does the Aardvark Move to the Next Anthill? 
Foraging search with moving targets

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Problem
In complex search tasks, humans often resort to strategies like ‘reading’ static displays from upper left to lower right.

Question
How does search behavior (here, foraging search) change if the items in the display are in constant motion?

Background

Visual Foraging
- Visual search for multiple targets in the same display can be modeled as foraging behavior (e.g., Cain, Vul, Clark, & Mitroff, 2012; Wolfe, 2013)
- In particular, foraging models can predict search quitting behavior
- One limiting factor is that at large display sizes, systematic, ‘reading’ behavior supplants guided search behavior (cf. Gilchrist & Harvey, 2006)

Moving Object Displays
- Stimuli slowly moving around a display could discourage systematic, exhaustive search and reading behavior
- With large display sizes, it becomes possible to investigate more complex searches, such as Hybrid Foraging

Foraging with Multiple Target Types
- “Hybrid Search” refers to search for any of several target types held in memory (Wolfe, 2012)
- In ecological foraging situations, animals may be searching for multiple types of food (e.g., Stephens & Krebs, 1986); that is, “Hybrid Foraging”
- Human foraging studies have only used single target types. How do humans forage for multiple target types?

Results & Conclusions

Exp. 1: Dot Foraging With Preview

Task: Get a high rate of point accumulation
- Two patches of moving dots appear side-by-side
- Left patch is the active search display, right patch is a preview of the next trial
- Preview was absent on 25% of trials
- Initial set size of 48 dots/patch
- Dots were white O-16 points; greener was always better
- 30 different patches with different mean greenness
- “Next” button advanced the trial, with the preview moving left to the active side

How does the presence of a preview of the next trial affect foraging behavior?

Exp. 2: Hybrid Foraging

Task: Achieve a set point goal to complete the experiment
- Four target items:
  - Display sizes of 60, 80, 100, & 120
  - 20–30% initial target prevalence on each trial
  - Choosing an item removed it from the display, +2 points for Hits, –1 point for FAs

How do people forage if there are multiple types of targets to collect?

Results & Conclusions

Preview has No Effect on quitting behavior

Searchers quit earlier than the Marginal Value Theorem predicts

Patch leaving behavior was as predicted by the Marginal Value Theorem

Searchers made ‘runs’ of targets of the same type

Summary

- Moving item displays are an effective method for investigating visual foraging
- Moving item displays reduce spatial search systematicity
- Searchers ignored the quality of the upcoming trial when deciding when to quit
- In Hybrid Foraging, searchers make runs of one target type before switching to another target type
- Anecdotally, these experiments are way more fun than our usual static search experiments!

References


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