# Contextual control over stimulus-response sets

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## *Contextual control over cognitive processes*

**Contextual information can cue the retrieval and reinstatement of cognitive processes used previously in those contexts.**

Evidence can be found across learning, (Balsam and Tomie, 2014), memory (Smith and Vela, 1992), and attention (Bugg and Crump, 2012) literatures.

### Task-switching

Switching between tasks is known to slow performance and increase errors (see Keisel et al, 2010).

However, contextual information cuing a task-switch or task-repetition has been found to reduce task-switch costs (e.g., Mayr and Brick, 2005, 2007; Crump and Logan, 2010).

These results suggests that the task set representations may be retrieved and reinstated through associated contextual information.

**What is a "task set"?**

Task set is a catch-all term that refers to any and all cognitive processes and mental representations required to carry out the task (Keisel, et al., 2010).

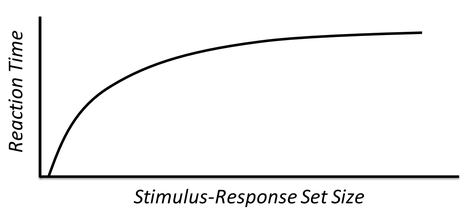
The current study investigates whether a particular aspect of the task set can become context-dependent.

**Can contextual cues gain control over the creation and retrieval of stimulus-response sets?**

## *Choice reaction time tasks*

Choice reaction time (CRT) tasks require distinct responses to each possible stimulus. For example, the subject could be asked to press the left button if the light is green and press the right button if the light is red.

A well-known finding is that reaction times increase as a function of stimulus-response set size (see, Welford, 1980; Luce, 1986)

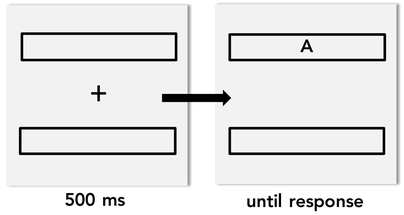



**If the context cues the retrieval of a set or subset of responses, reaction times should be quicker when the context cues a two-choice response set as compared to a four-choice response set.**

## *Experiment 1*

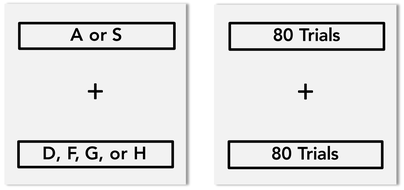
***Six keys were randomly chosen from the home row and assigned to the 2-choice or 4-choice location in all experiments. Locations were also randomly assigned as above or below the fixation.**

Stimulus could appear above or below the fixation



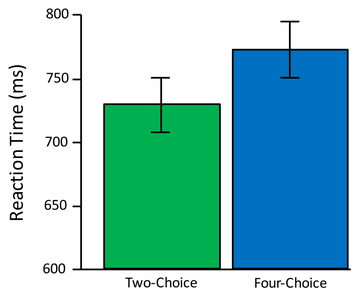

Asked to identify one of six possible letters

Response sets are context-specific




Item Frequency
A = 40 Trials
S = 40 Trials

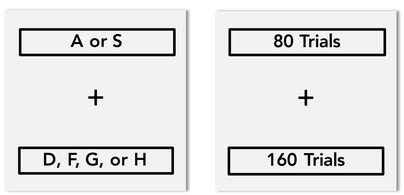
D = 20 Trials
F = 20 Trials
G = 20 Trials
H = 20 Trials




**Subjects had more practice responding to the two-choice items which could account for the performance benefit**

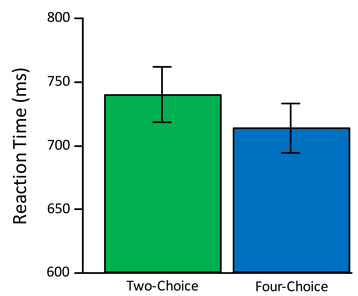
## *Experiment 2*

Controlling for item frequency




Item Frequency
A = 40 Trials
S = 40 Trials

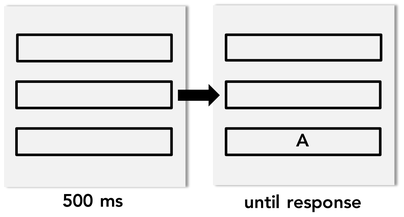
D = 40 Trials
F = 40 Trials
G = 40 Trials
H = 40 Trials




**Subjects may have learned to expect the four-choice location causing a performance benefit for the four-choice location.**

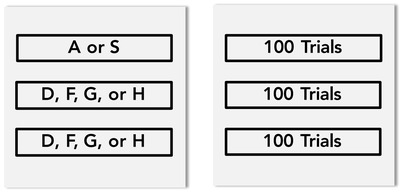
## *Experiment 3*

Stimulus could appear in one of three locations



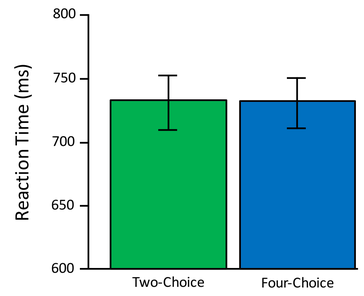

Asked to identify one of six possible letters

Controlling for item and location frequency




Item Frequency
A = 50 Trials
S = 50 Trials

D = 50 Trials
F = 50 Trials
G = 50 Trials
H = 50 Trials




**No performance benefit for the two-choice location when the frequency biases are controlled for.**

## *Conclusions*

Although Experiments 1 and 2 found location-specific performance benefits, both can be explained by frequency-driven learning.

The location-specific performance benefit in Experiment 1 can be explained by item-specific frequency effects and the performance benefit in Experiment 2 by location expectancy effects.

When these frequency biases were controlled for, no context-dependent control over the creation and retrieval of response sets were found.

**Questions?**
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