



SERC #150124

# Spatial Occasion Setting Using Spatially Stable and Unstable Occasion Setters in a Touch Screen Task with Pigeons

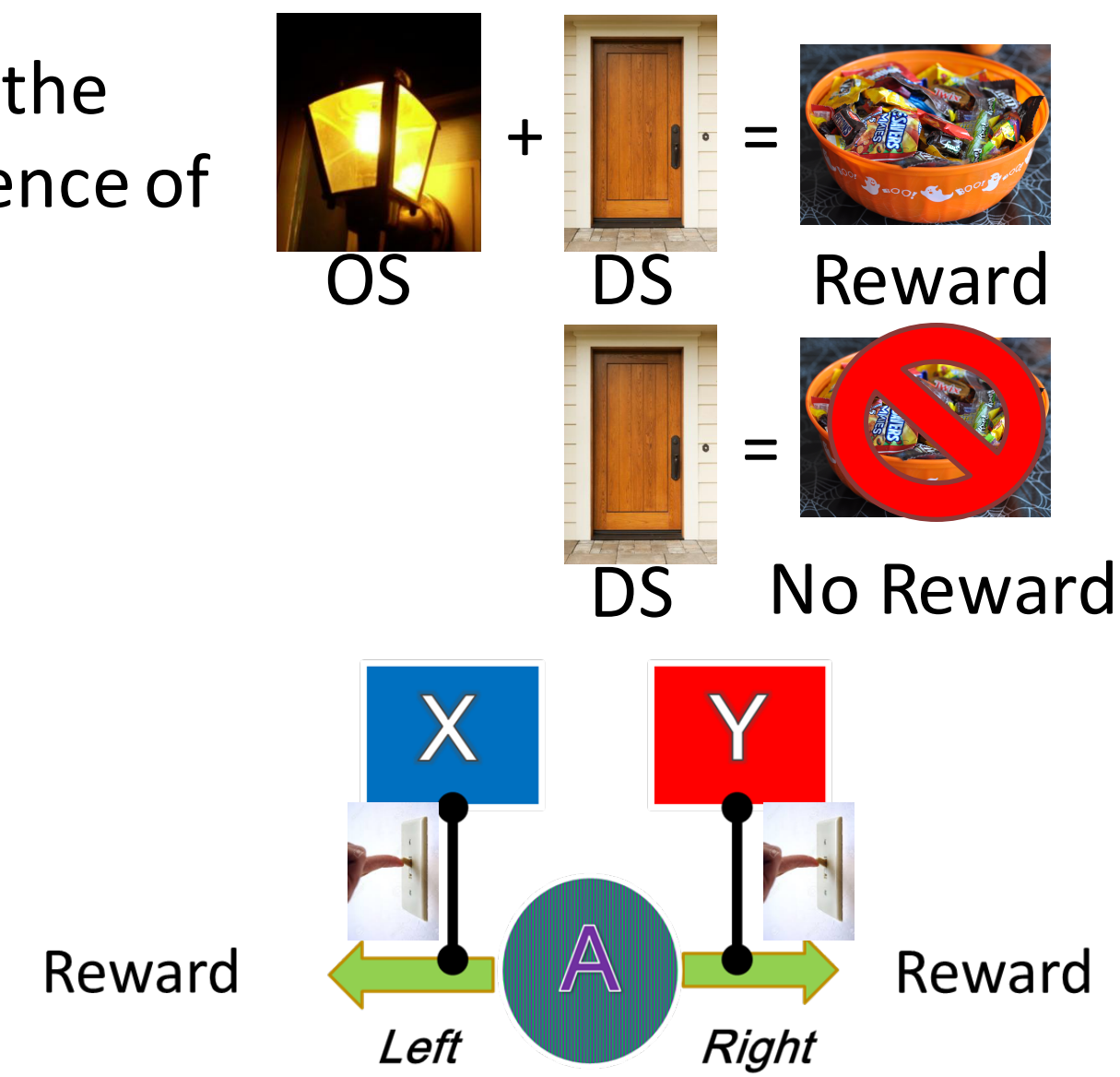
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## Introduction

- Learning when a response (e.g., knocking on a door while trick-or-treating) will be reinforced (e.g., candy) requires sensitivity to stimuli (e.g., porch light on vs. off) in whose presence the response-reward relationship operates.
- Occasion setting is a form of discrimination learning in which one stimulus, the occasion setter (OS), signals whether responses (e.g., knocking) in the presence of a discriminative stimulus (DS. e.g., door) will be reinforced.

### Occasion setting of spatial information:

- Spatial occasion setting involves an occasion setter (OS. e.g., time of day) that has the ability to signal whether one of multiple responses (e.g., turning left or right) in the presence of a discriminative stimulus (DS. e.g., stop sign) will be reinforced (e.g., avoiding traffic).
- In a recent study, pigeons learned that a colored background (W, X, Y, or Z) set the occasion for where a hidden goal was located in relation to a dynamic landmark (A, B or C) (Ruprecht, Wolf, Quintana, & Leising, 2014).



## Aim of Study

To examine the effect of spatial stability of an occasion setter on its ability to control responding to a landmark. This experiment further examines whether hierarchical or configural theories more accurately explaining spatial occasion setting.

## General Method

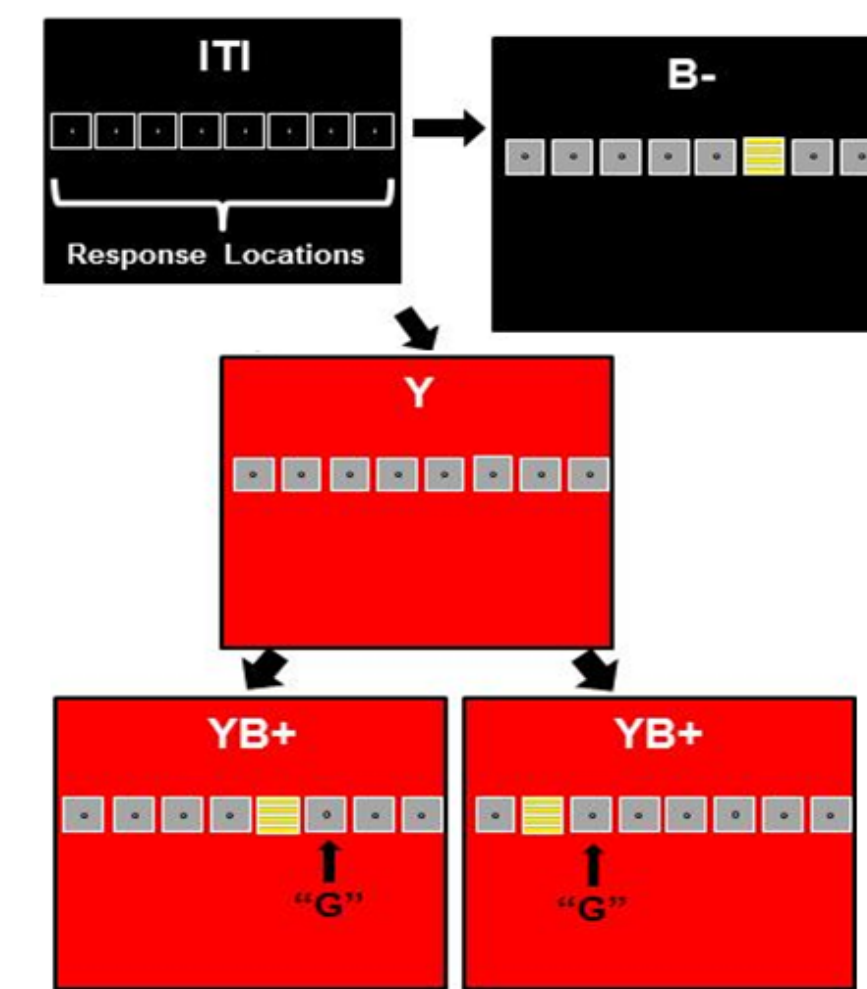
**Subjects:** Twelve (Experiment 1) and Eight (Experiment 2) experimentally naive pigeons.

**Apparatus:** Testing was conducted in a flat-black Plexiglas chamber. All stimuli were presented by computer on a color LCD monitor. Pecks to the monitor were detected by an infrared touch screen. Reward was delivered via an automated hopper below the viewing screen.



### Procedure:

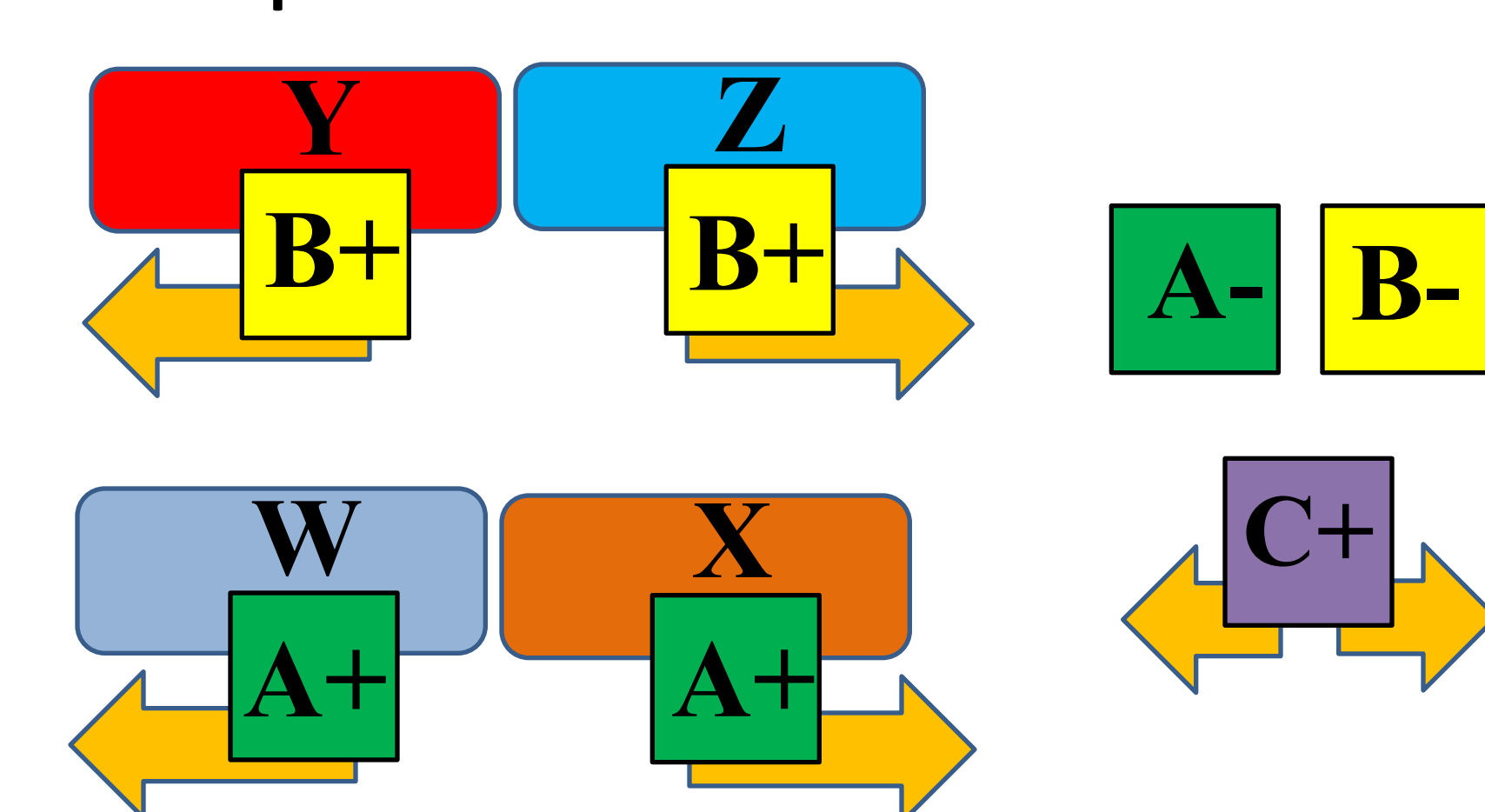
- An array of eight response locations were presented in the center of the monitor.
- Three trial types were presented (YB+, ZB+, B-).
- On *occasion setting trials*, an occasion setter (e.g., Y, colored background) was presented for 40 s. The landmark (patterned object displayed at a response location) followed 5-15 s after the onset of the occasion setter. Pecks to a “goal” (“G”) location to the left or right of B (depending on the occasion setter) were rewarded with access to mixed grain.
- On nonreinforced *landmark-only trials*, B was presented for 30-s without the opportunity for reward. A 20-s inter-trial interval (ITI) separated all trials.
- The location of the landmark varied across trials.
- The duration of the occasion setter was gradually shortened (in intervals 5 s or 2.5 s) until on one trial the occasion setter co-terminated with the onset of the landmark, and on another a 5-s gap occurred between them.
- Experiment 1: Five trial types were trained (YB+. ZB+, B-, WA+, XA+, A-, C+).
- Experiment 2: Five trial types were trained (WA+, WB+, XA+, YB+, C+).



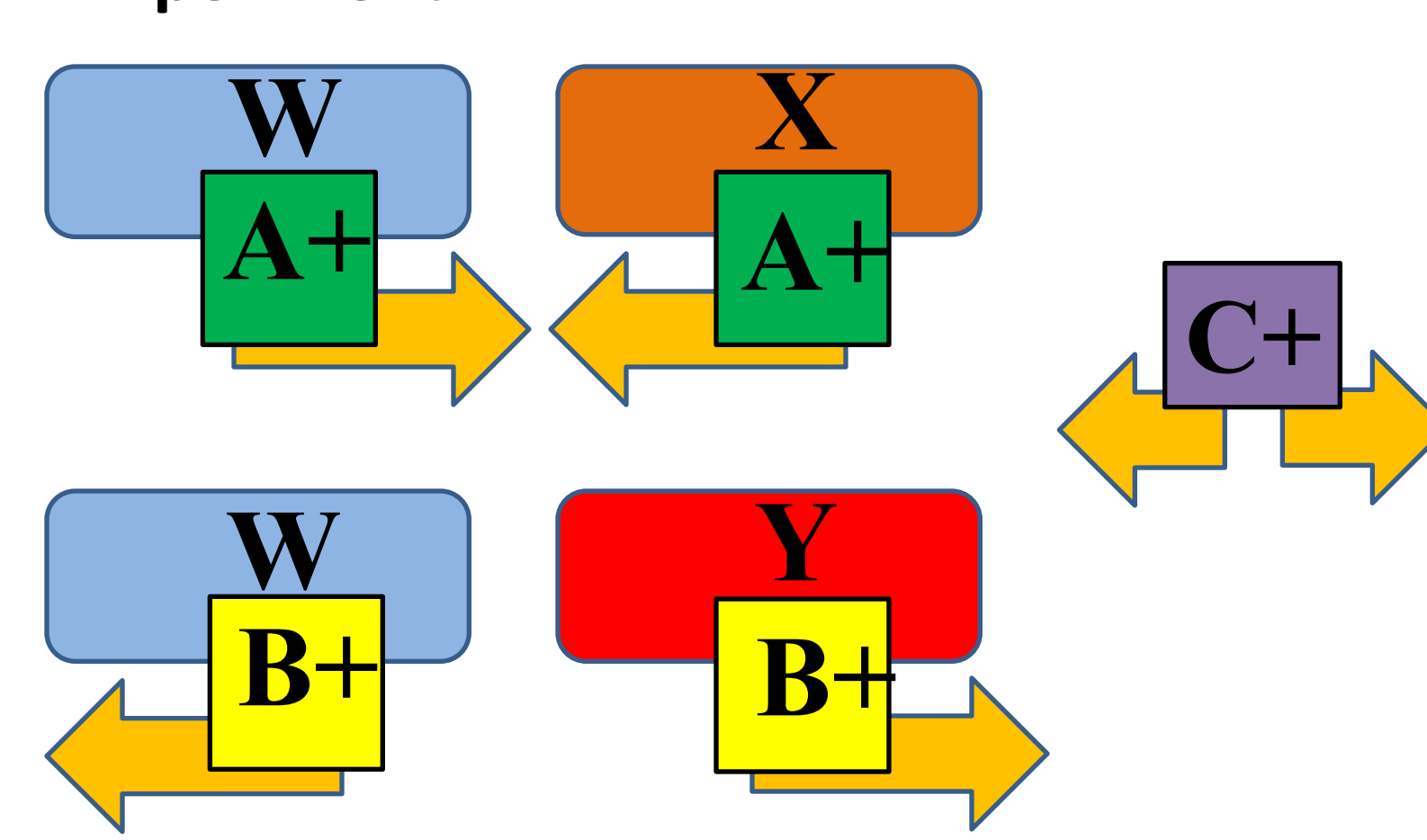
### Measures

- Number of responses – the number of responses to any location
- Spatial occasion setting – the number of responses at the “G” predicted by Y or Z compared with responding at the location on the other side of the landmark.

## Experiment 1



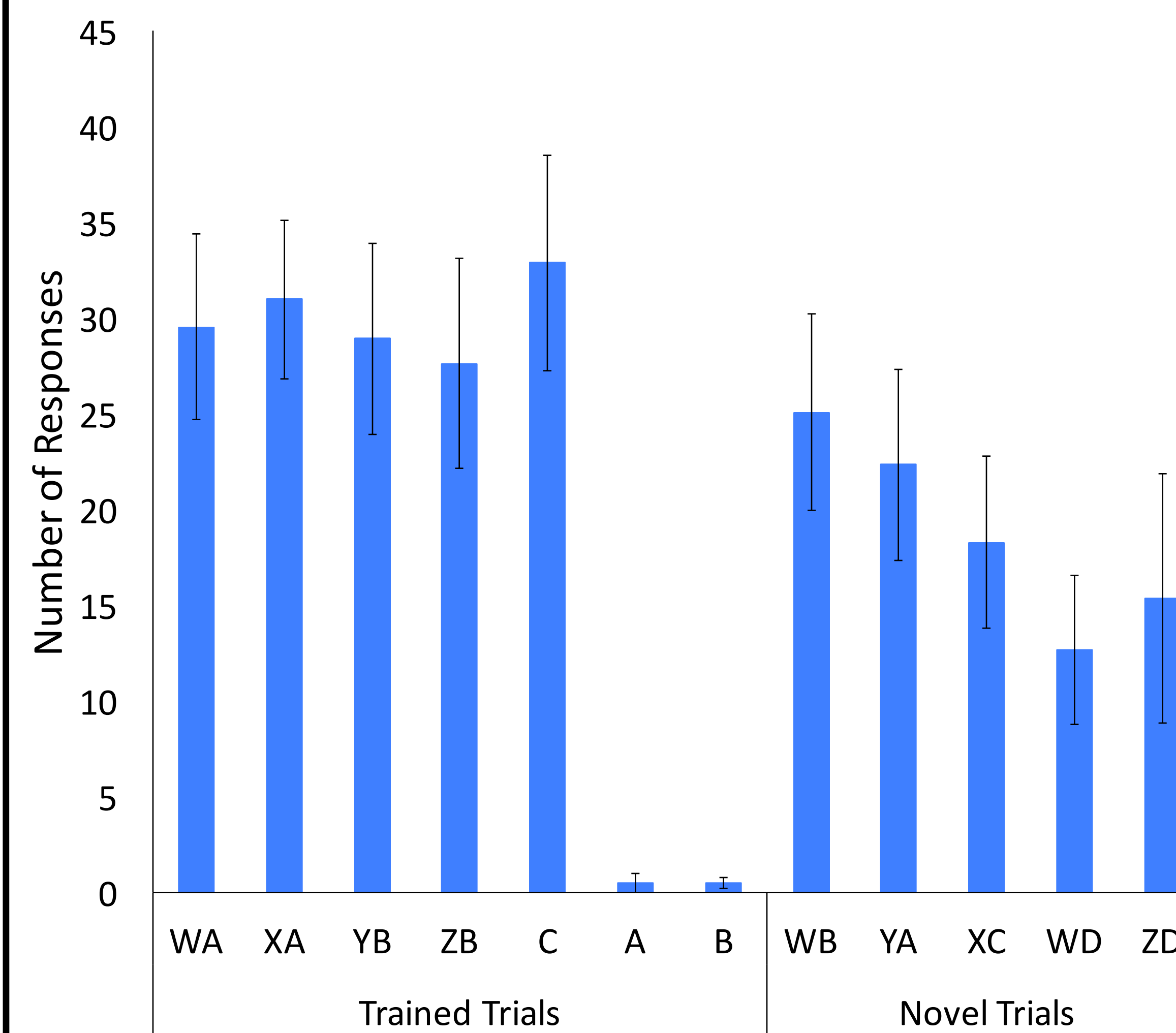
## Experiment 2



## Results – Experiment 1

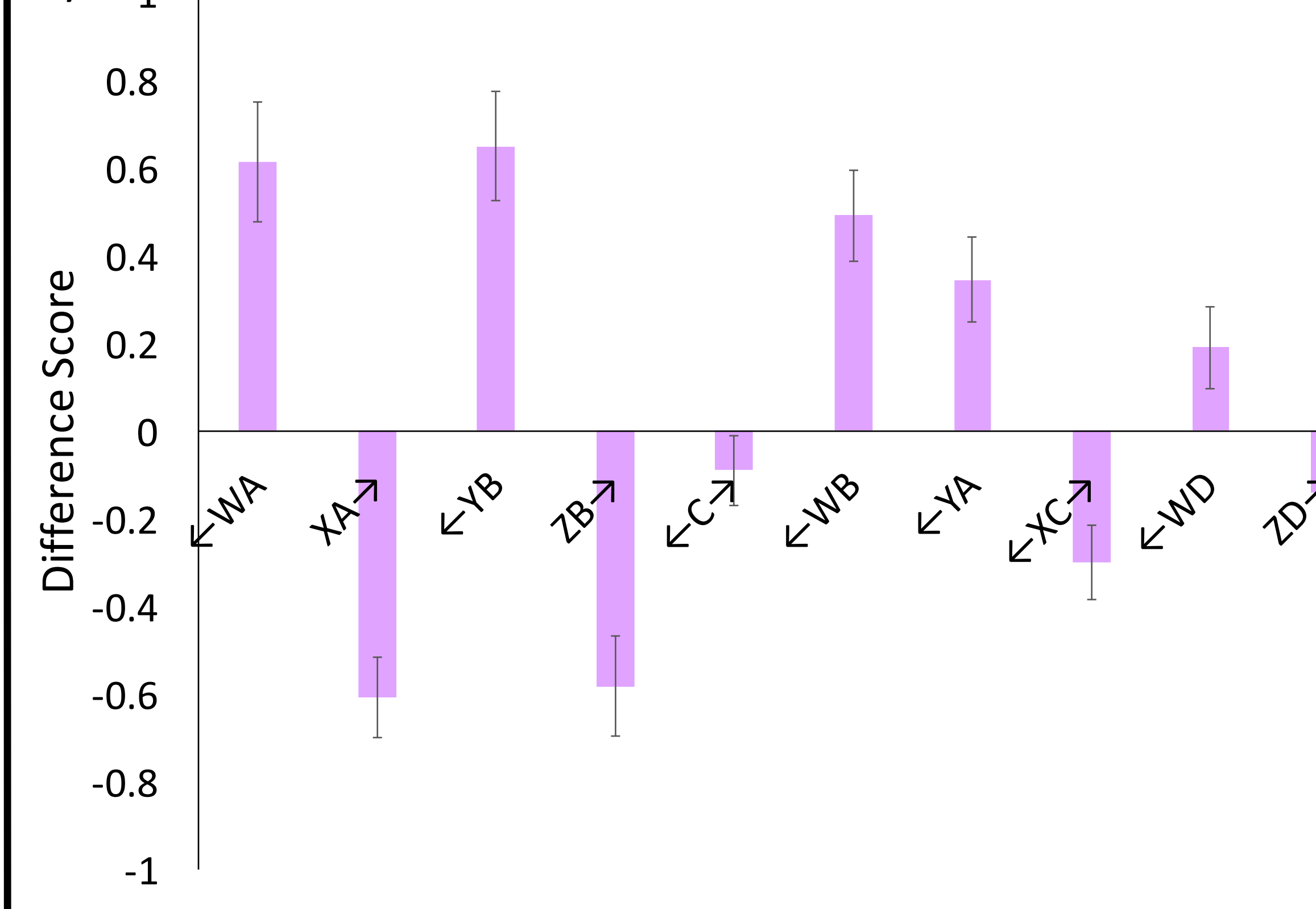
### Response Occasion Setting

A repeated measures ANOVA conducted on the total number of responses found a main effect of Trial Type,  $F(9, 81) = 2.72, p < .001$ . Pigeons responded more to the trained trials (WA-, XA-, YB-, ZB-, and C-) than to transfer trials with using stimuli previously trained in an occasion setting relationship (WB- and YA-), trials with the excitatory landmark (XC-), and trials with a novel landmark (WD- and ZD-).



### Spatial Occasion Setting

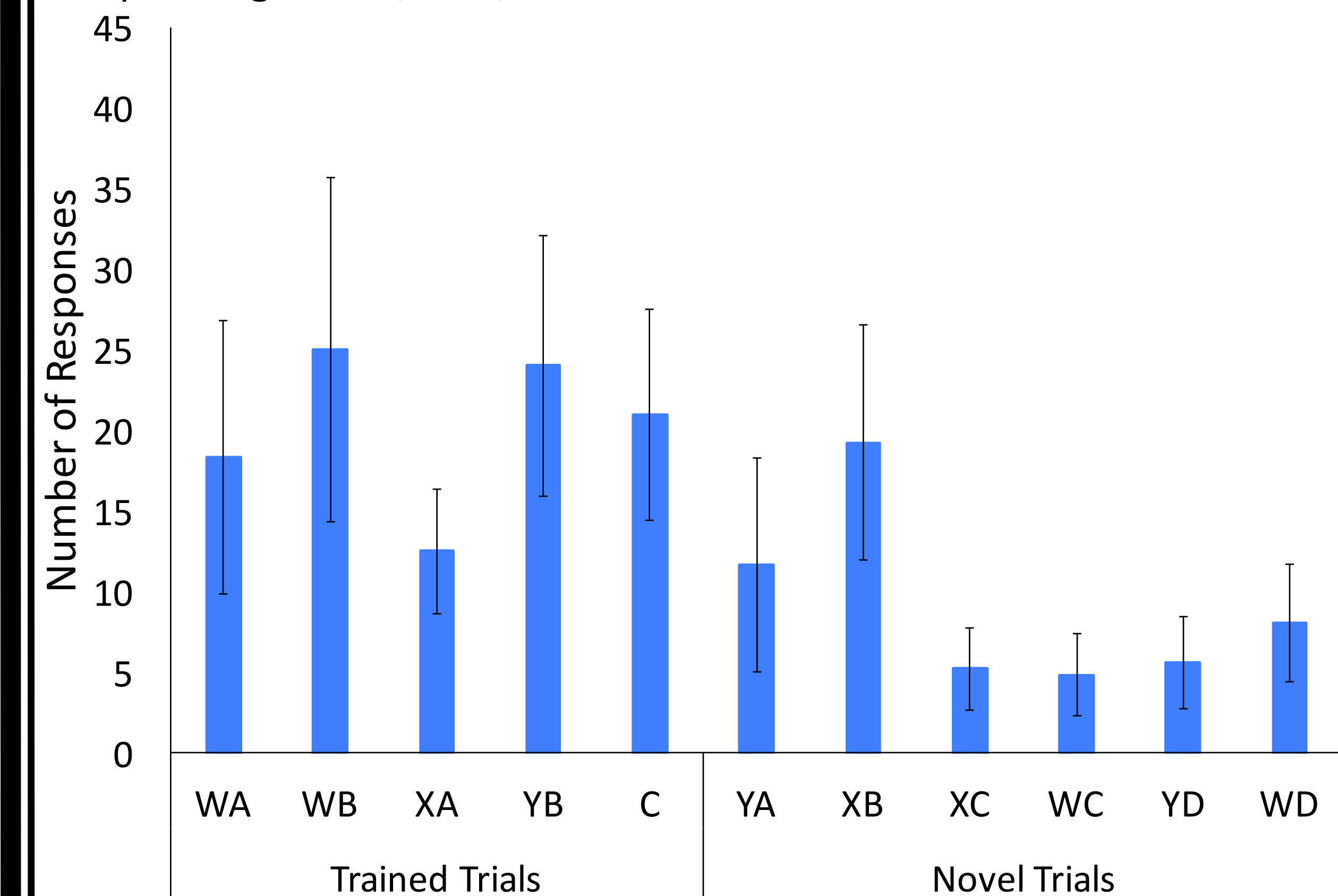
A difference score was calculated by taking the proportion of pecks to the left of the landmark and subtracting it from the proportion of pecks to the right of the landmark. Difference scores above zero indicate more responding to the left of the landmark, while difference scores less than zero indicates more responding to the right of the landmark. A repeated measures ANOVA revealed that pigeons responded more in the trained direction on the trained trials than in the opposite direction. There was transfer of spatial occasions setting, with pigeons responding in the direction indicated by the occasion setter on WB- and YA- trials.



## Results – Experiment 2

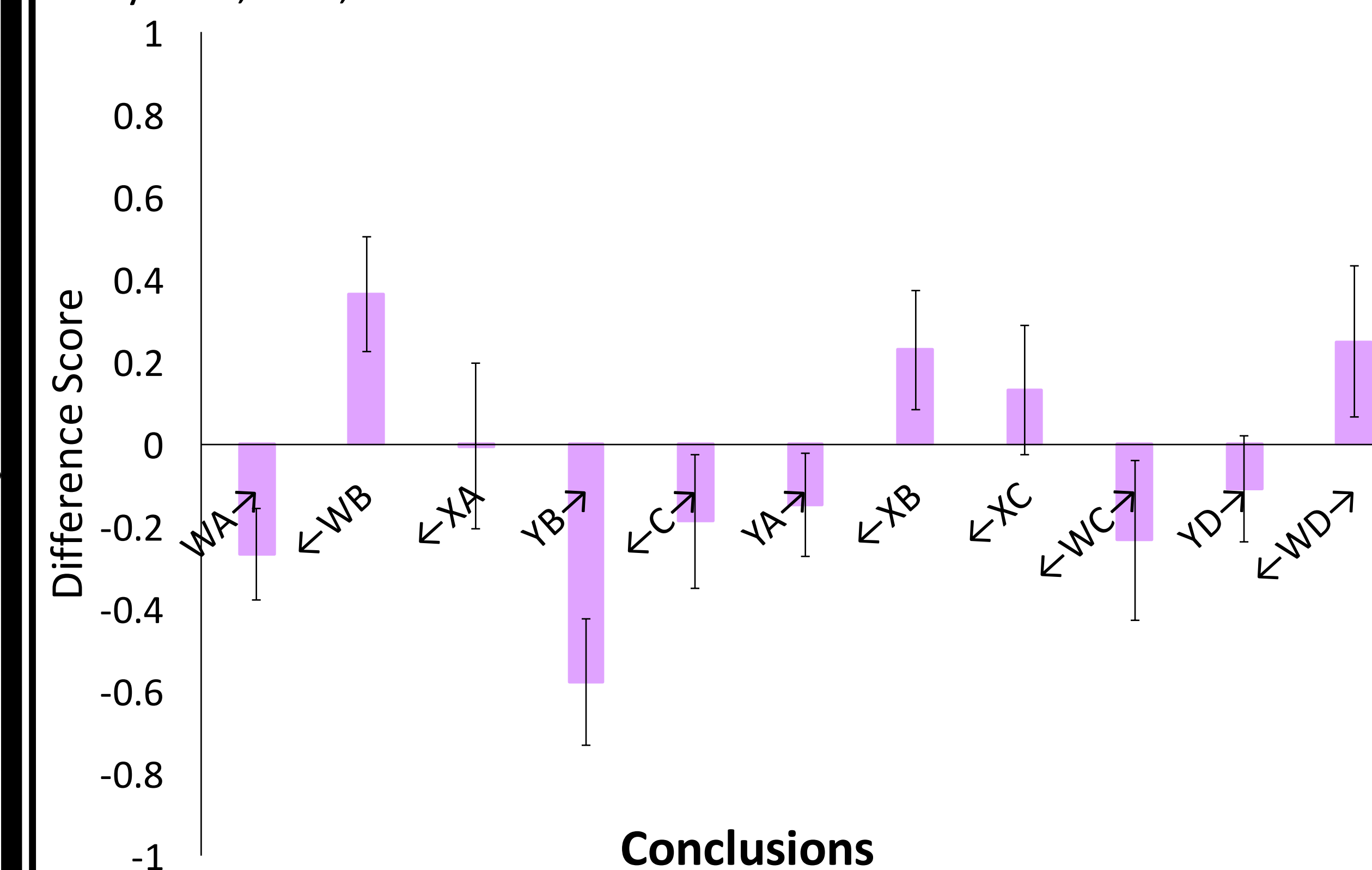
### Response Occasion Setting

A repeated measures ANOVA conducted on the total number of responses found a main effect of Trial Type,  $F(10, 110) = 2.72, p = .005$ . Pigeons responded more to WB- than on WA- and WC- trials. Responding was higher on YB- trials than on XC-, WC-, YD-, and WD-, and the same is true for C- trials. Responding to XB- was higher than responding on XC-, WC-, and YD- trials.



### Spatial Occasion Setting

A difference score was calculated by taking the proportion of pecks to the left of the landmark and subtracting it from the proportion of pecks to the right of the landmark. Differences scores were tested against zero. Only WA-, WB-, and YB trials differed from zero.



## Conclusions

The occasion setters were not able to control spatial responding in Exp. 2, as they did in Exp. 1. This could be due to the lack of response ambiguity as there were no landmark alone trials in Exp 2. Another explanation is that it could be possible that a spatially unstable occasion setter lead to a different type of learning (configural rather than heirarchical learning) than was seen in Exp 1.

## References

- Bonardi, C., Bartle, C., & Jennings, D. (2012). US specificity of occasion setting: Hierarchical or configural learning?. *Behavioural processes*, 90, 311-322.
- Ruprecht, C.M., Wolf, J.E., Quintana, N.I, & Leising, K.J. (2014). Feature positive discriminations during a spatial search task with humans. *Learning & Behavior*, 42 (215-230).