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# The effects of attention on temporal crowding

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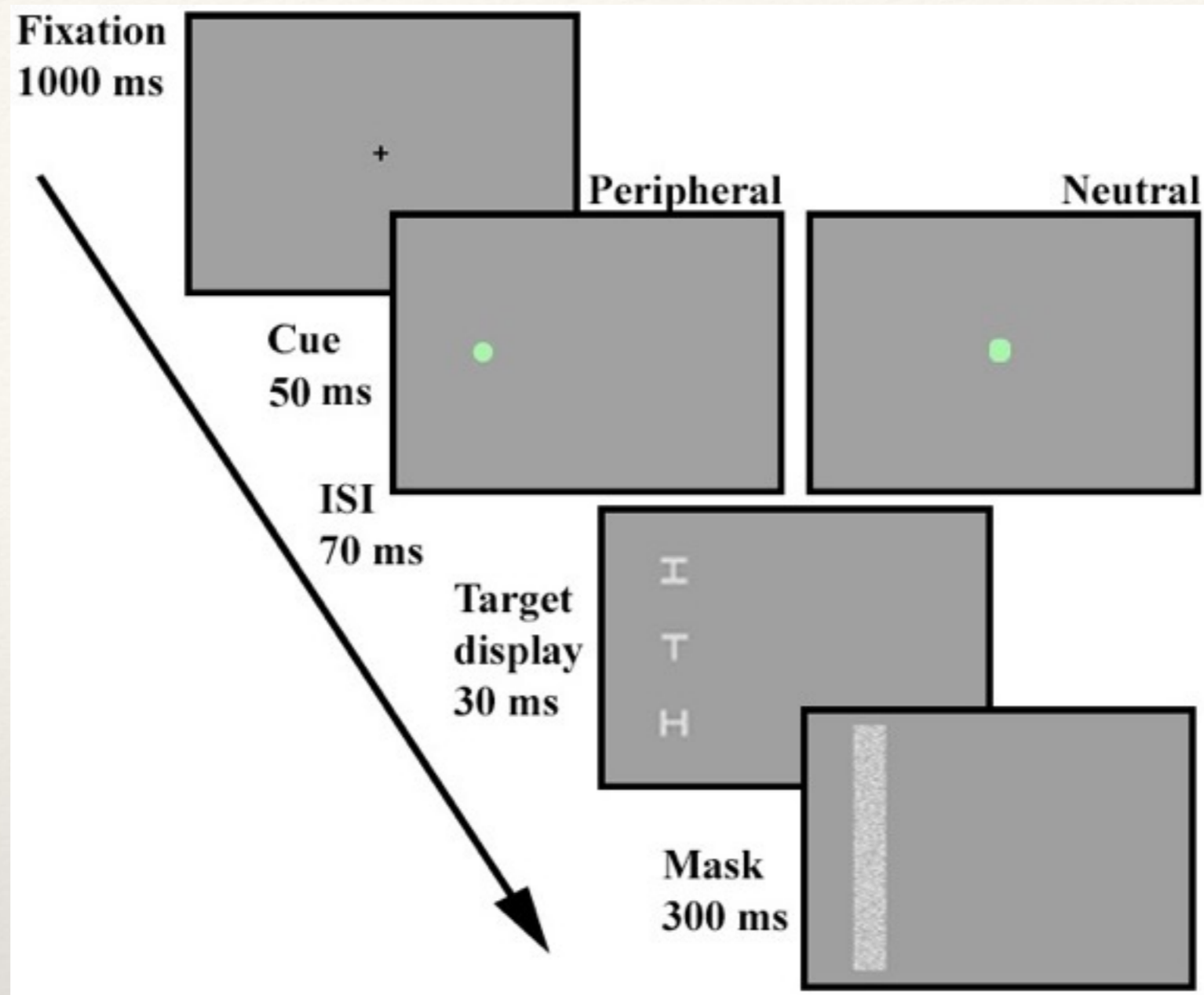
# Spatial attention

- ❖ The selective processing of information at a given location.
- ❖ Directing spatial attention to the target location via peripheral cues improves performance with many tasks (e.g., Cheal & Lyon, 1991; Eriksen & Hoffman, 1972; Posner, 1980; Prinzmetal, Presti, & Posner, 1986).

# Spatial attention & Spatial crowding

The goal was to examine the effects of spatial attention on overall performance and the critical distance with spatial crowded displays (Yeshurun & Rashal, 2010).



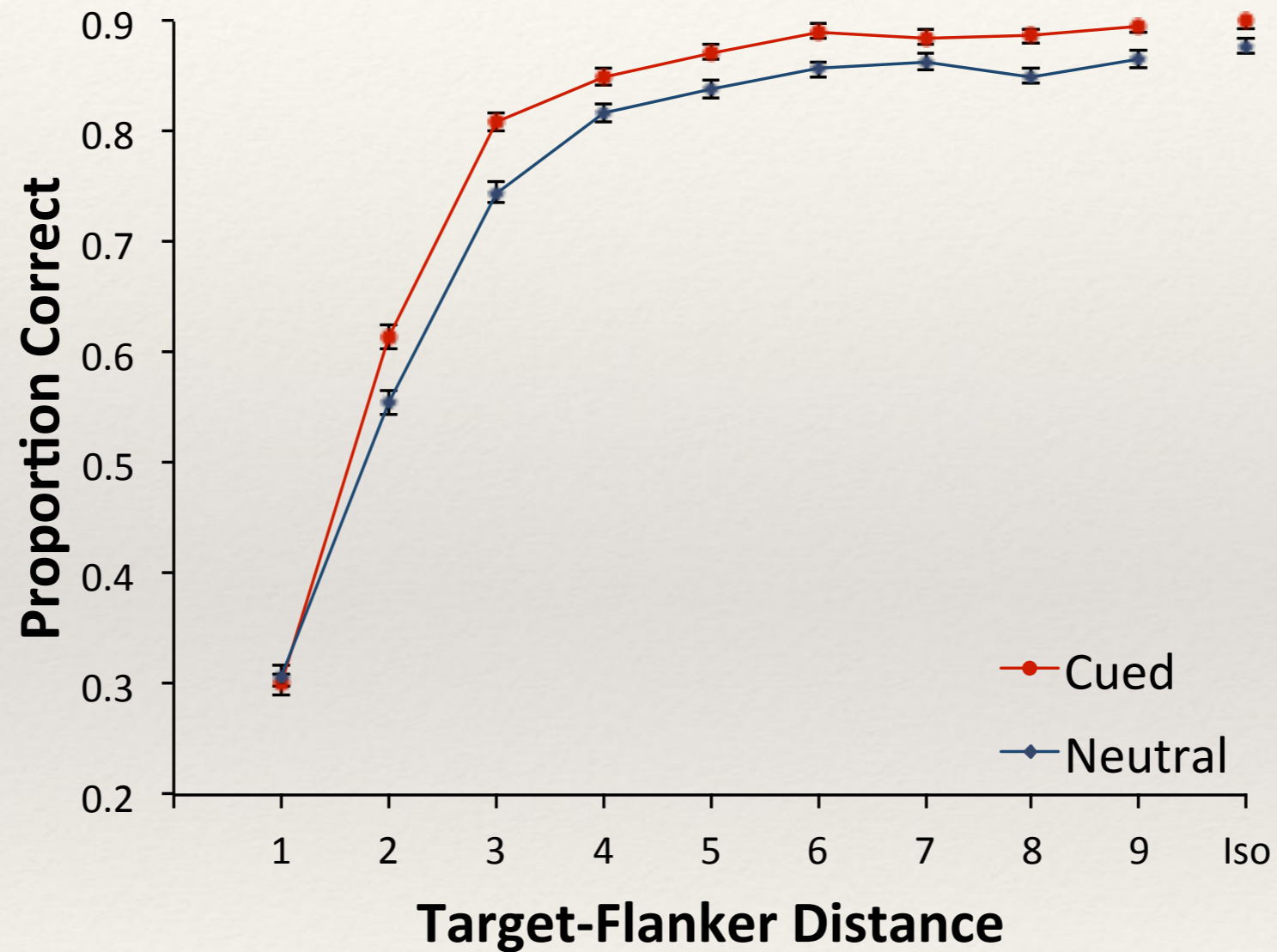


**Target:** T - 0°, 90°, 180°, 270°  
(1x1°, 10% contrast)

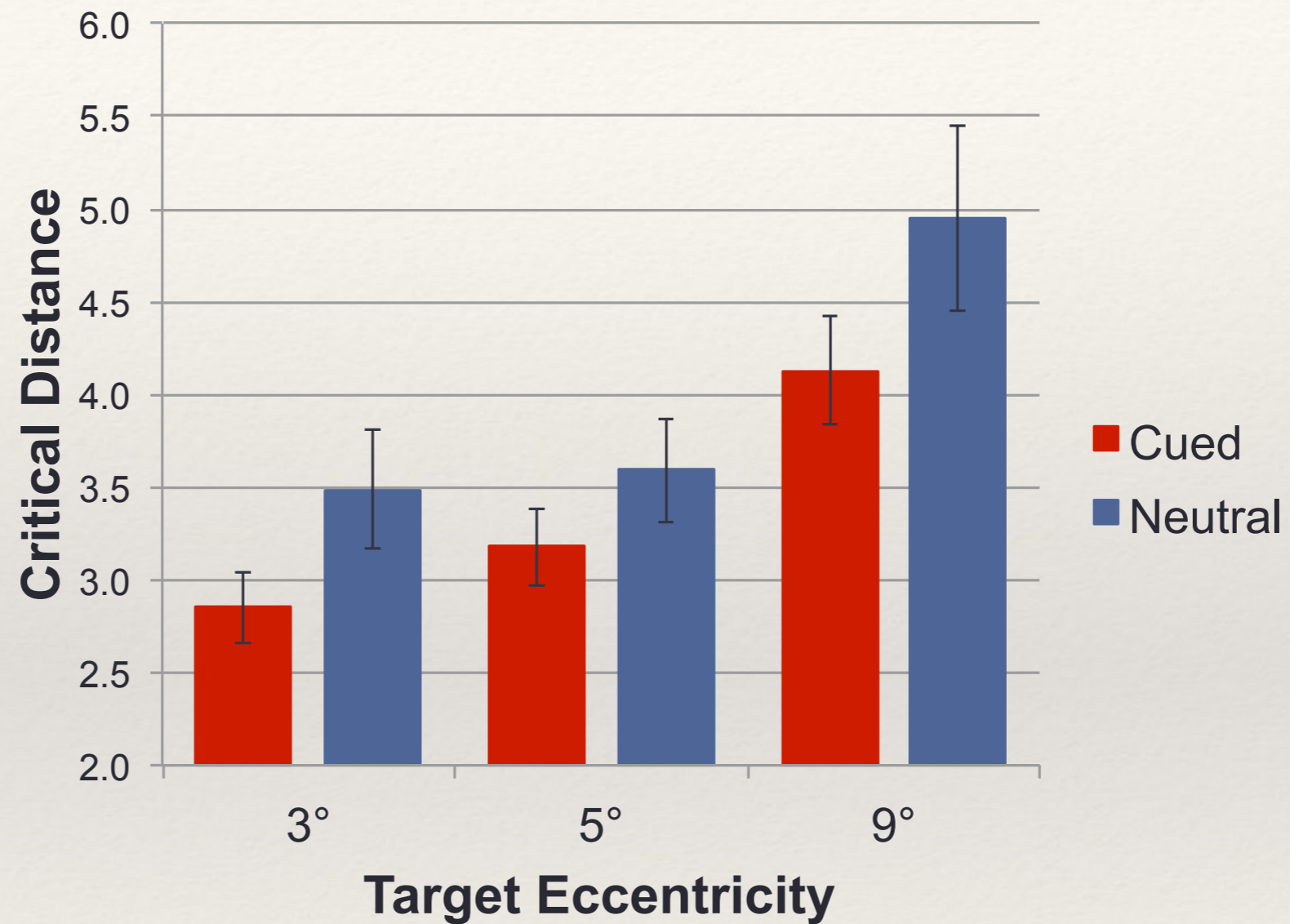
**Task:** Indicate target orientation

**Cueing:** 50% Peripheral cue; 50% neutral cue

# The effects of attention on overall performance

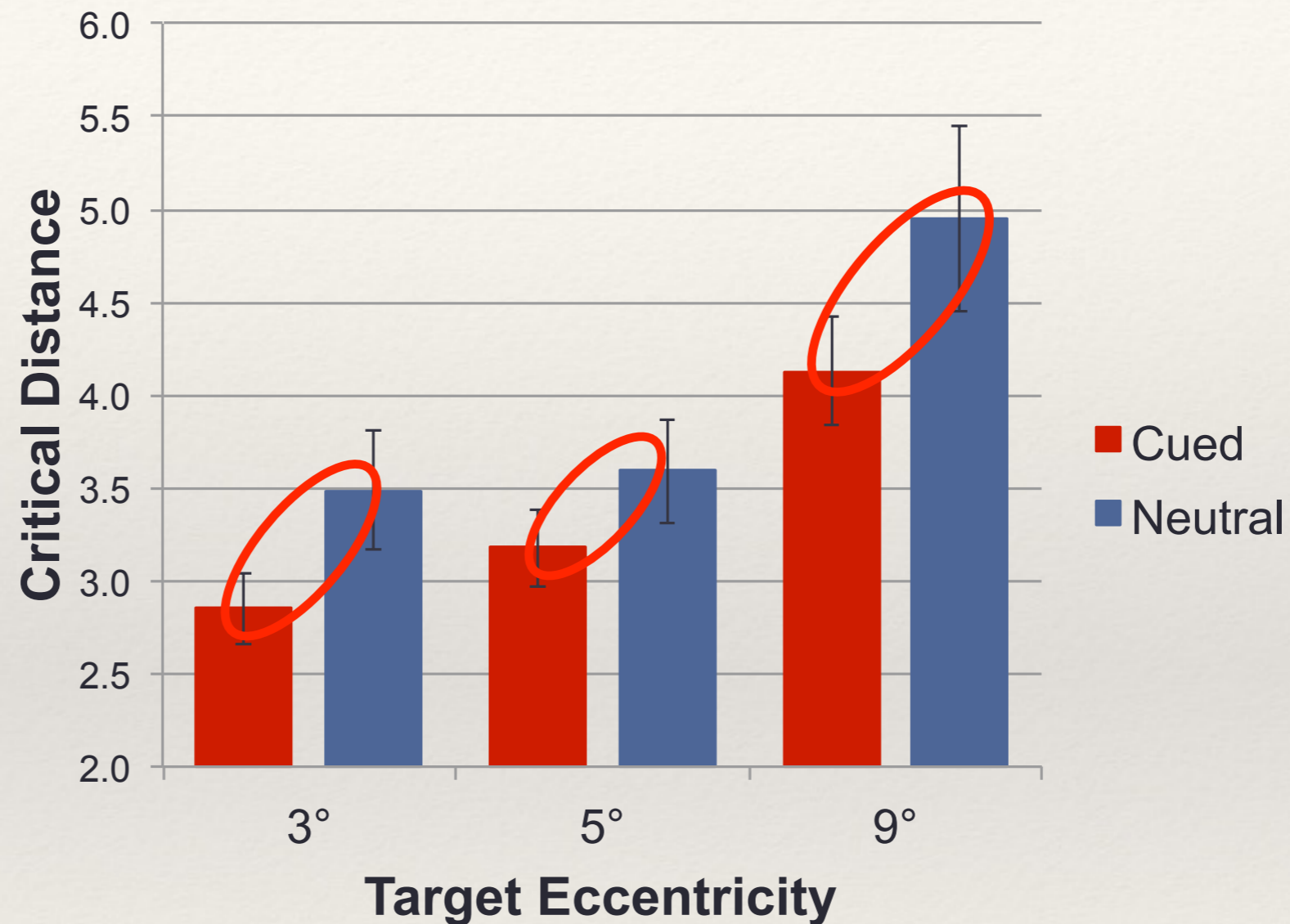


# The effects of attention on the critical distance





# The effects of attention on the critical distance



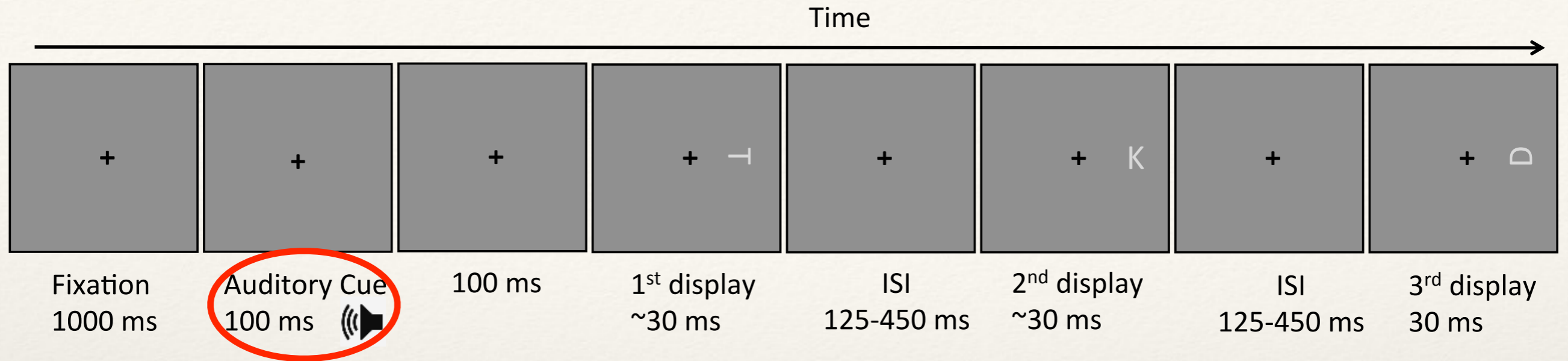
Spatial attention alleviates spatial crowding

# Spatial attention & Temporal crowding

Can spatial attention also affect temporal crowding?



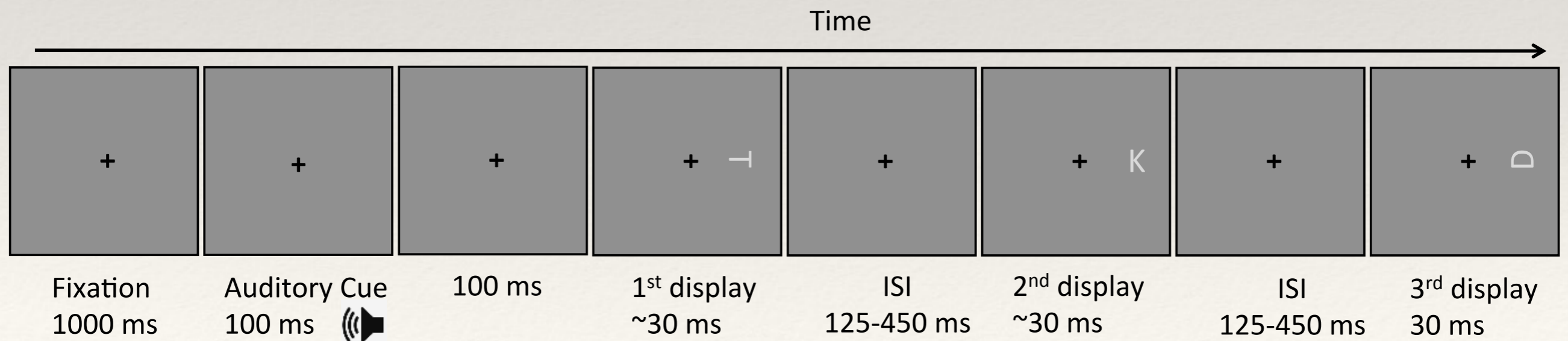
# Experiment 1: Method



- ❖ Stimuli: A sequence of three rotated letters
- ❖ ISI: 125-450 ms
- ❖ Target: T (0°, 90°, 180°, or 270°)
- ❖ Task: Orientation identification of the letter T.
- ❖ Cue: White-noise presented to one (right, left) or both ears.
  - ❖ Valid: Cue indicates letters' side (right/left).
  - ❖ Neutral: Cue does not indicate a side.

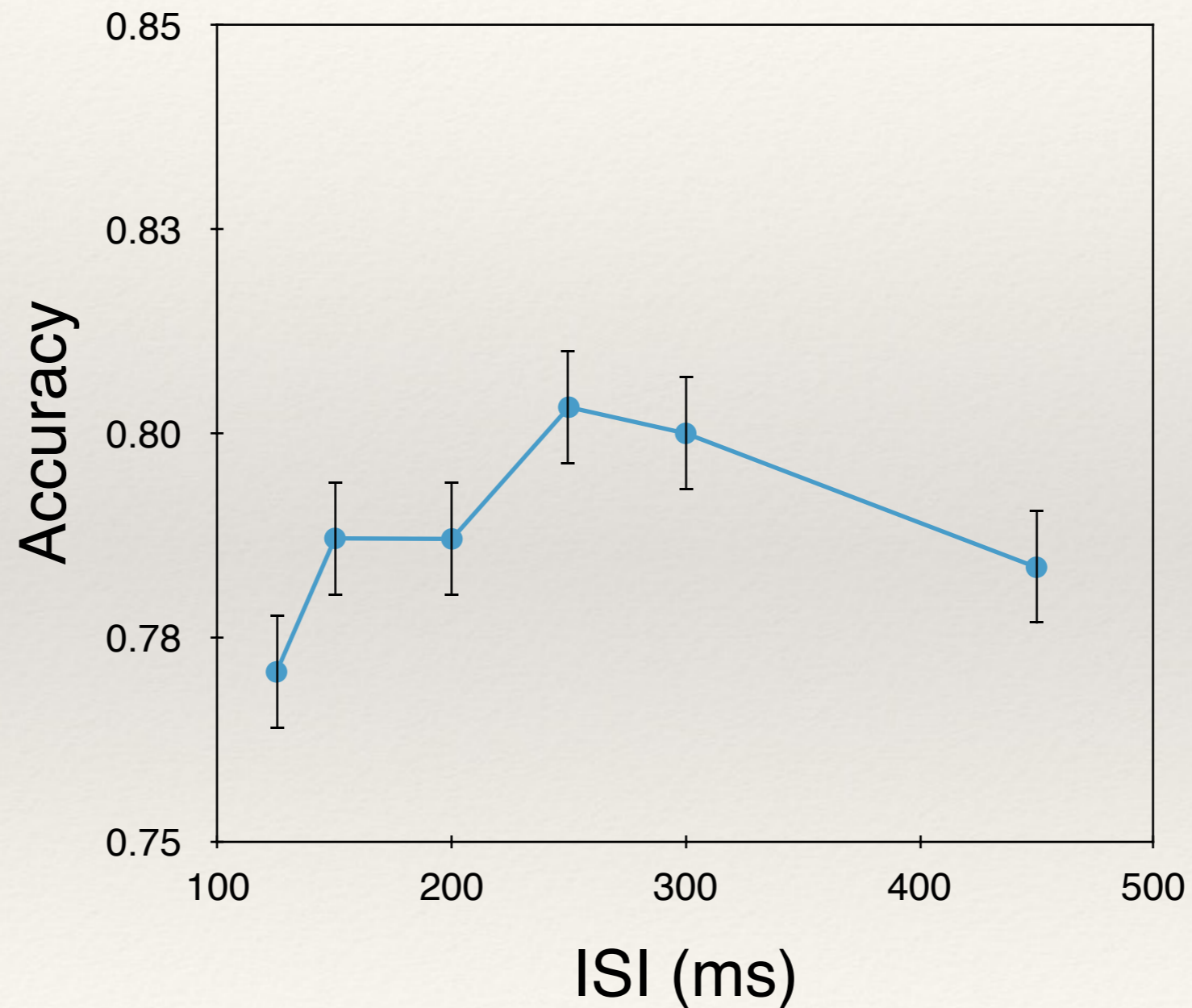
# Experiment 1- predictions:

- ❖ If attention affects temporal crowding, overall performance in the valid condition should be better than in the neutral condition, especially when the target appears in the first display.
- ❖ If attention reduces temporal crowding, there should be a Cue X ISI interaction: the ISI effect should be smaller in the valid than neutral condition.



# Temporal crowding: ISI effects

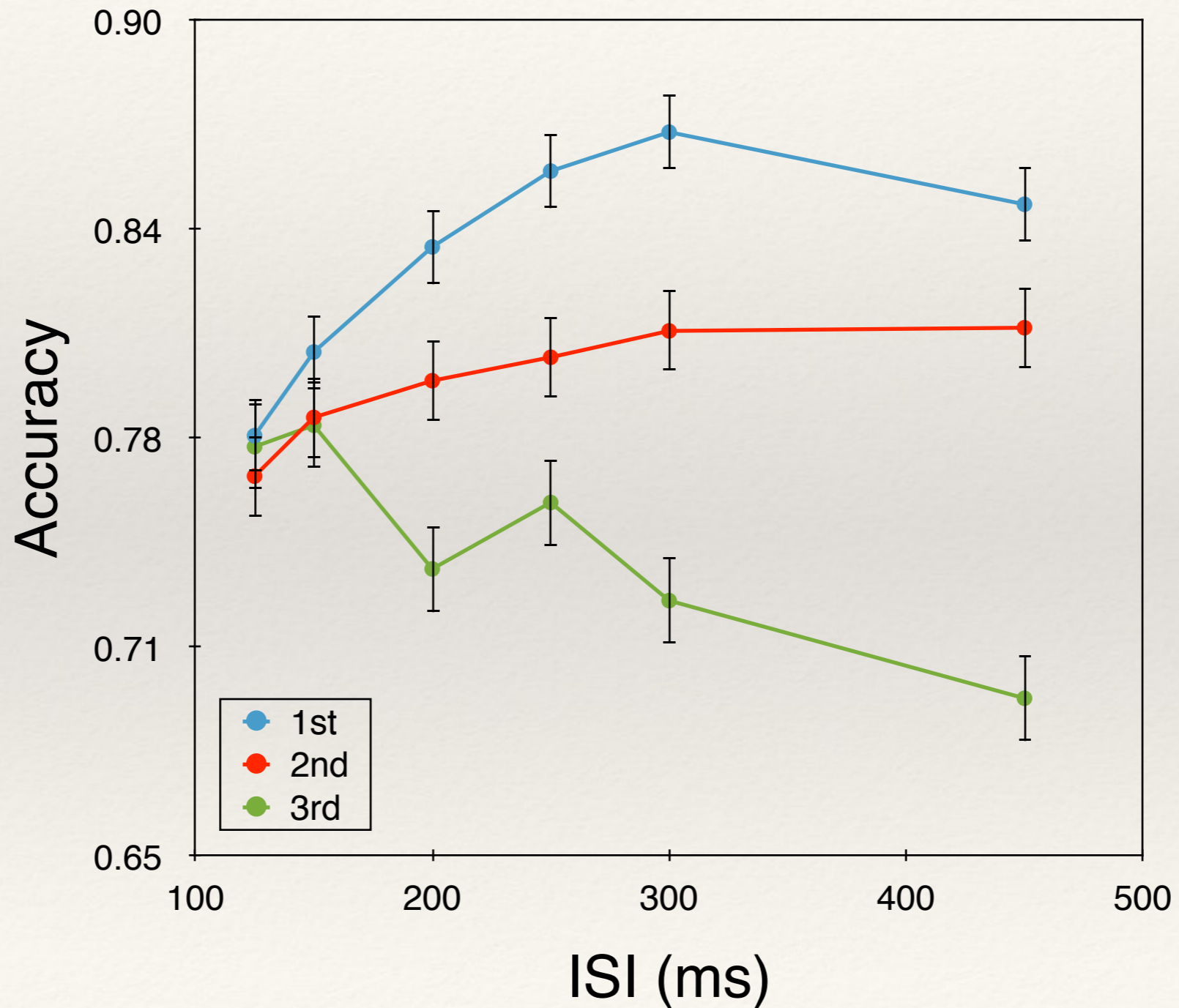
A significant effect of ISI





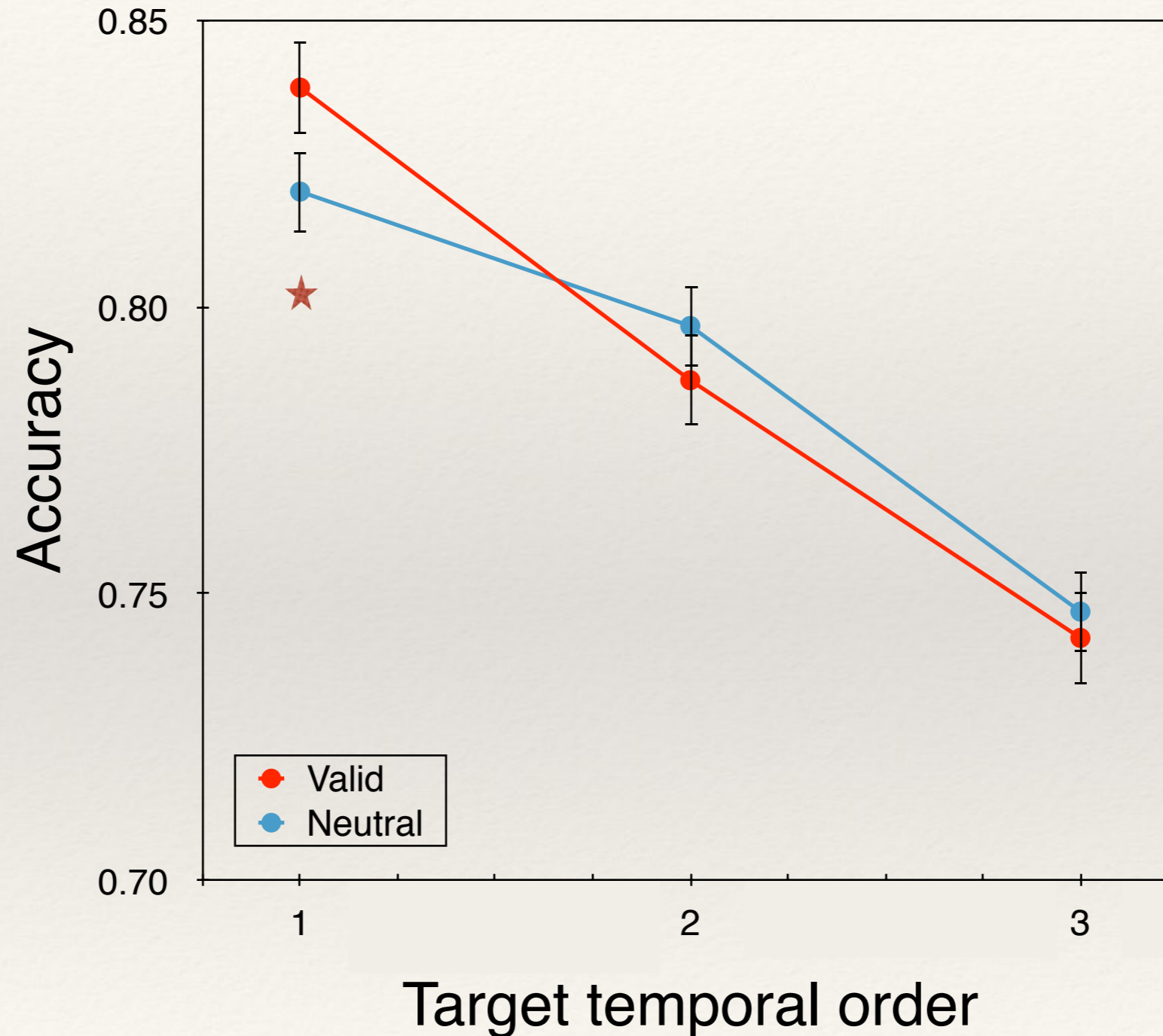
# Temporal crowding: ISI effects

A significant ISI x Target temporal order interaction

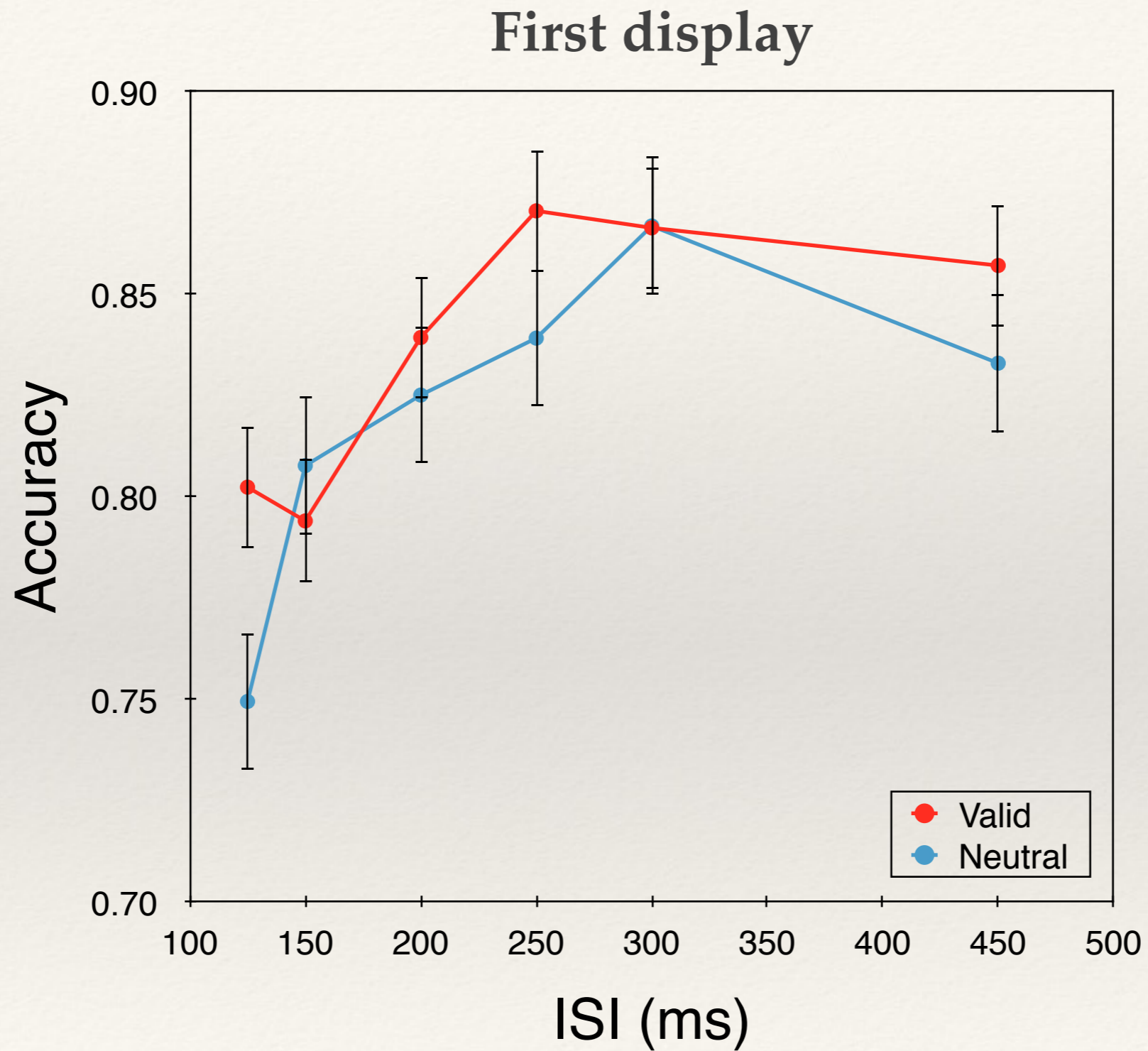


# Cueing effects

A marginally significant Cue type x Target temporal order interaction



# Cueing effects

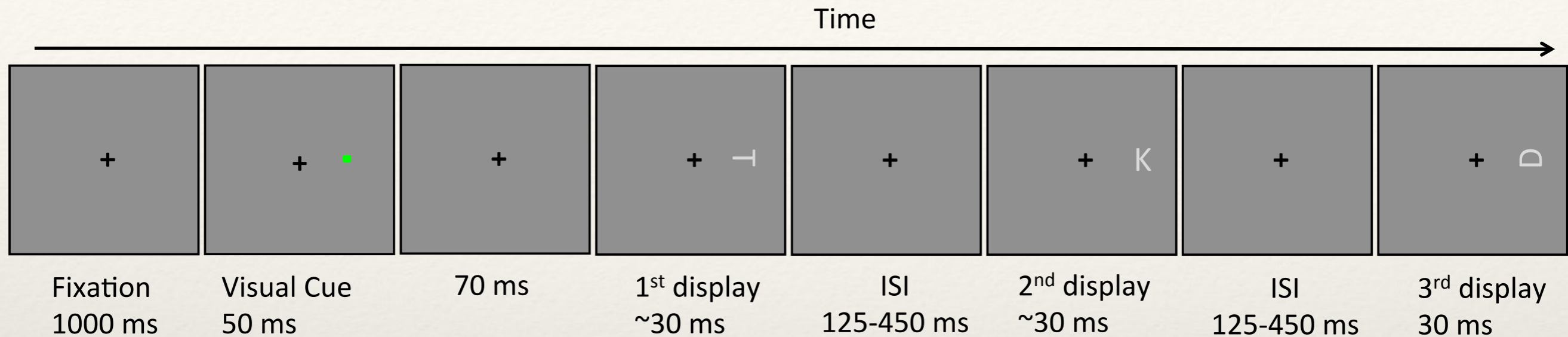




# Summary

- ❖ Directing spatial attention to the target location improved performance only when the target appeared in the first display.
- ❖ Spatial attention did not reduce temporal crowding.

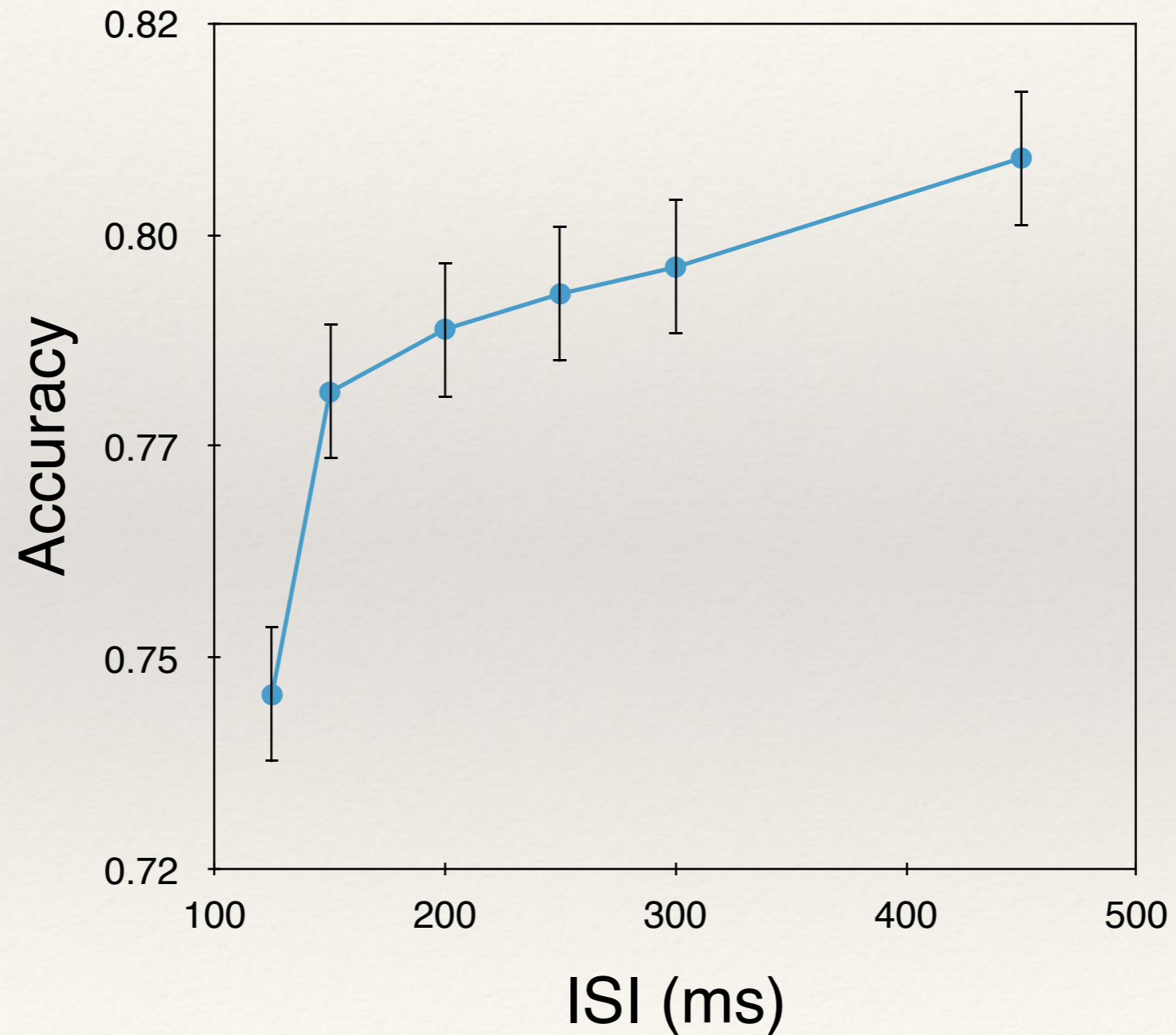
# Experiment 2: Method



- ❖ Cue: A green dot.
  - ❖ Valid: The dot indicates the target location.
  - ❖ Neutral: The dot does not indicate a location.

# Temporal crowding: ISI effects

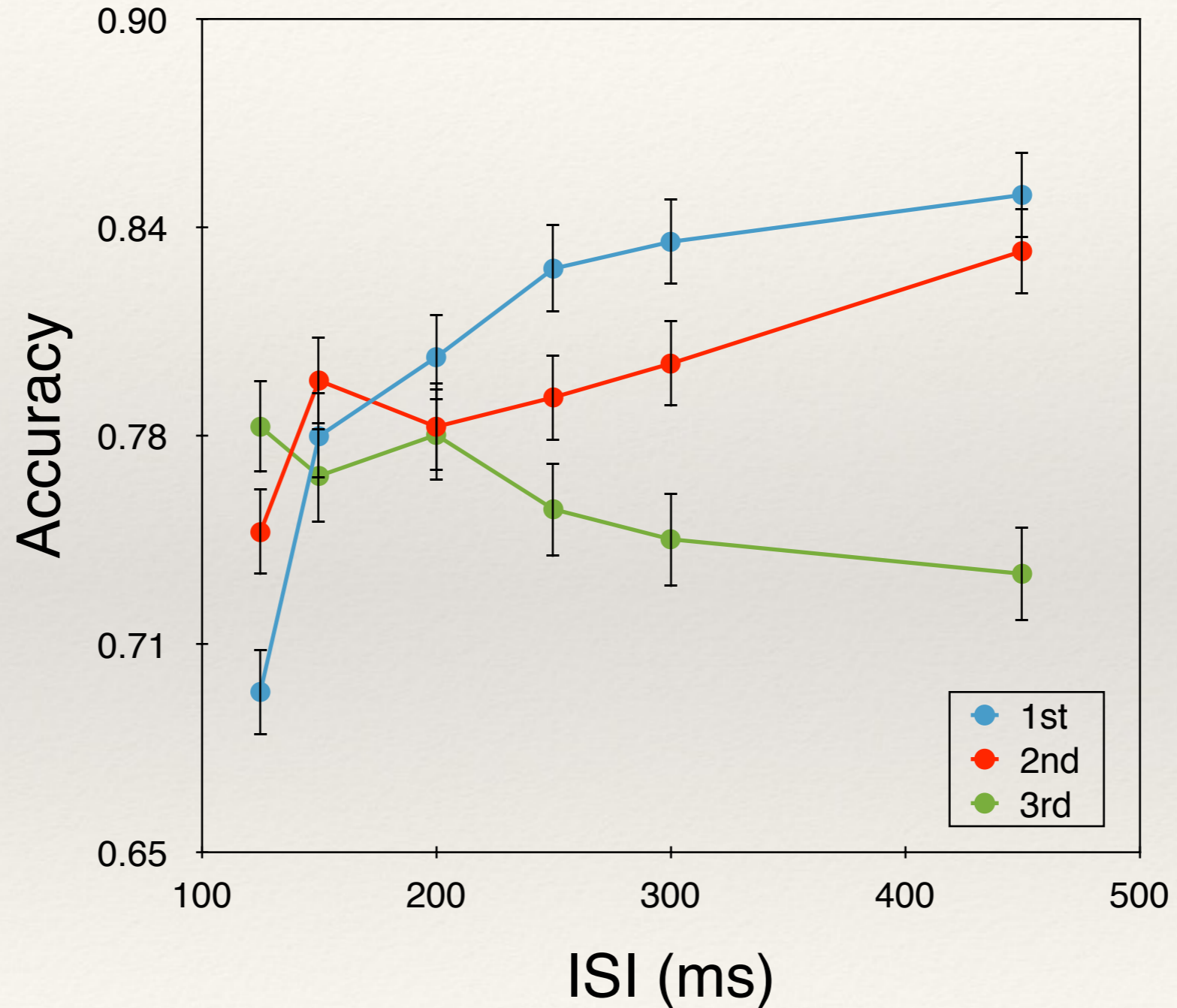
A significant effect of ISI





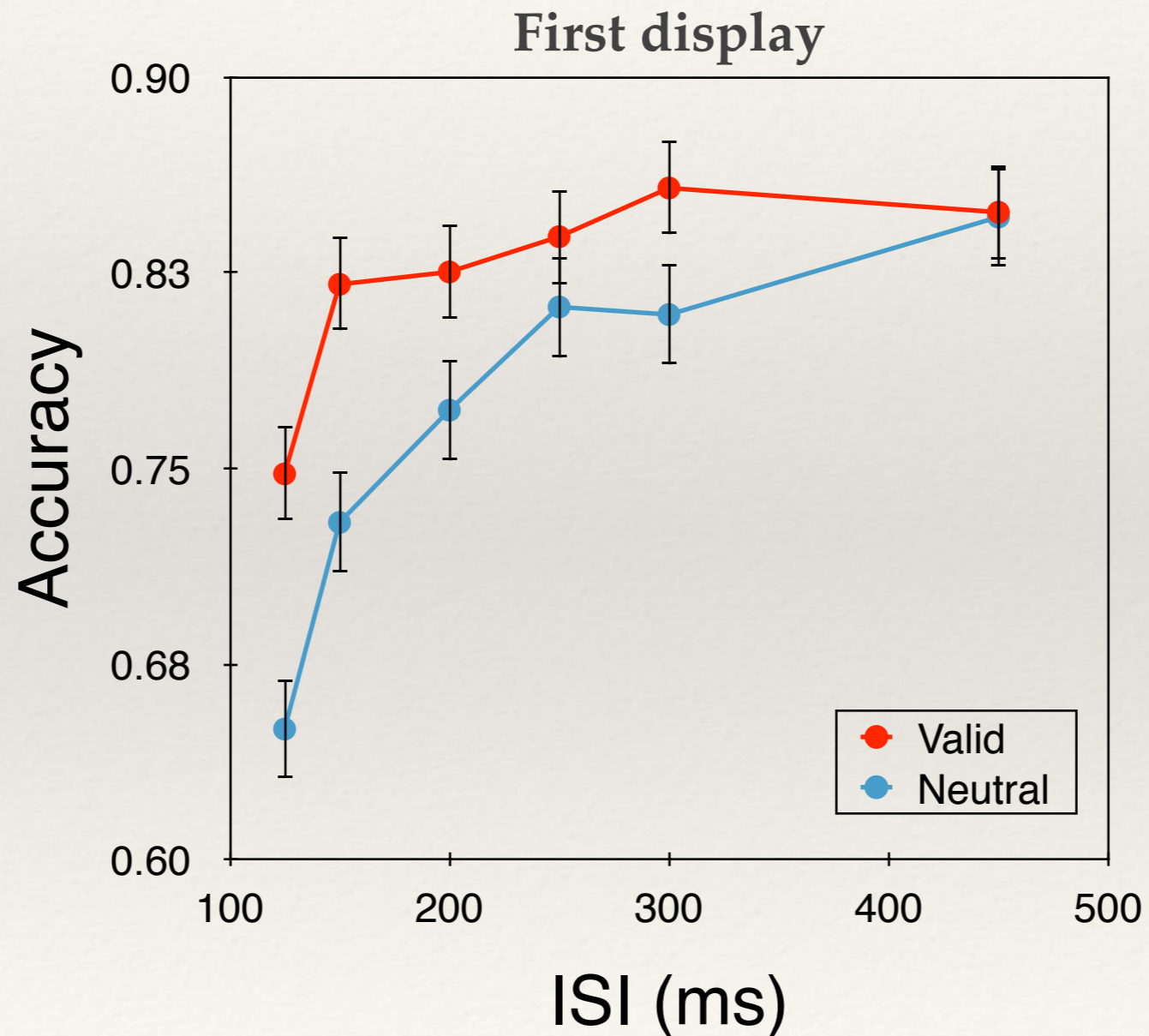
# Temporal crowding: ISI effects

A significant ISI x Target temporal order interaction



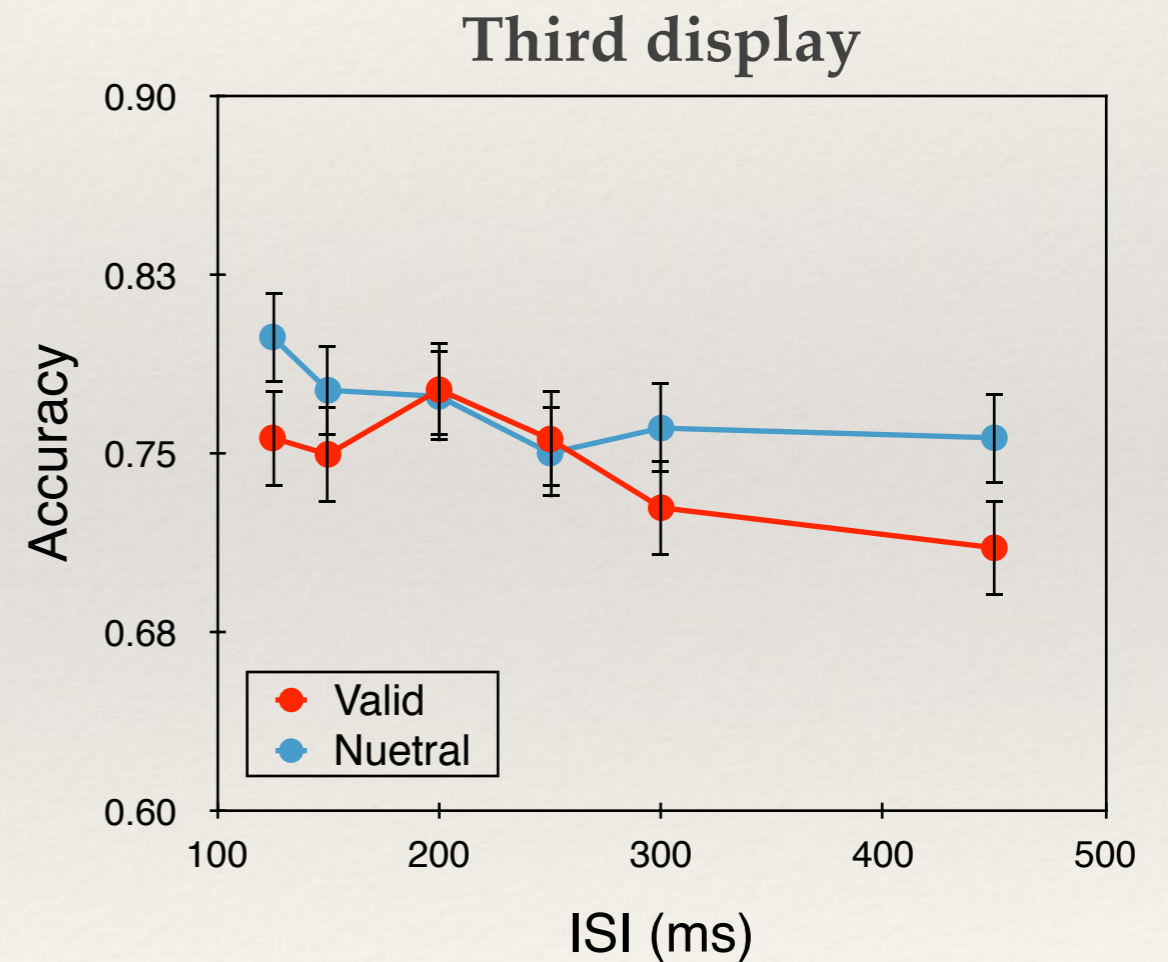
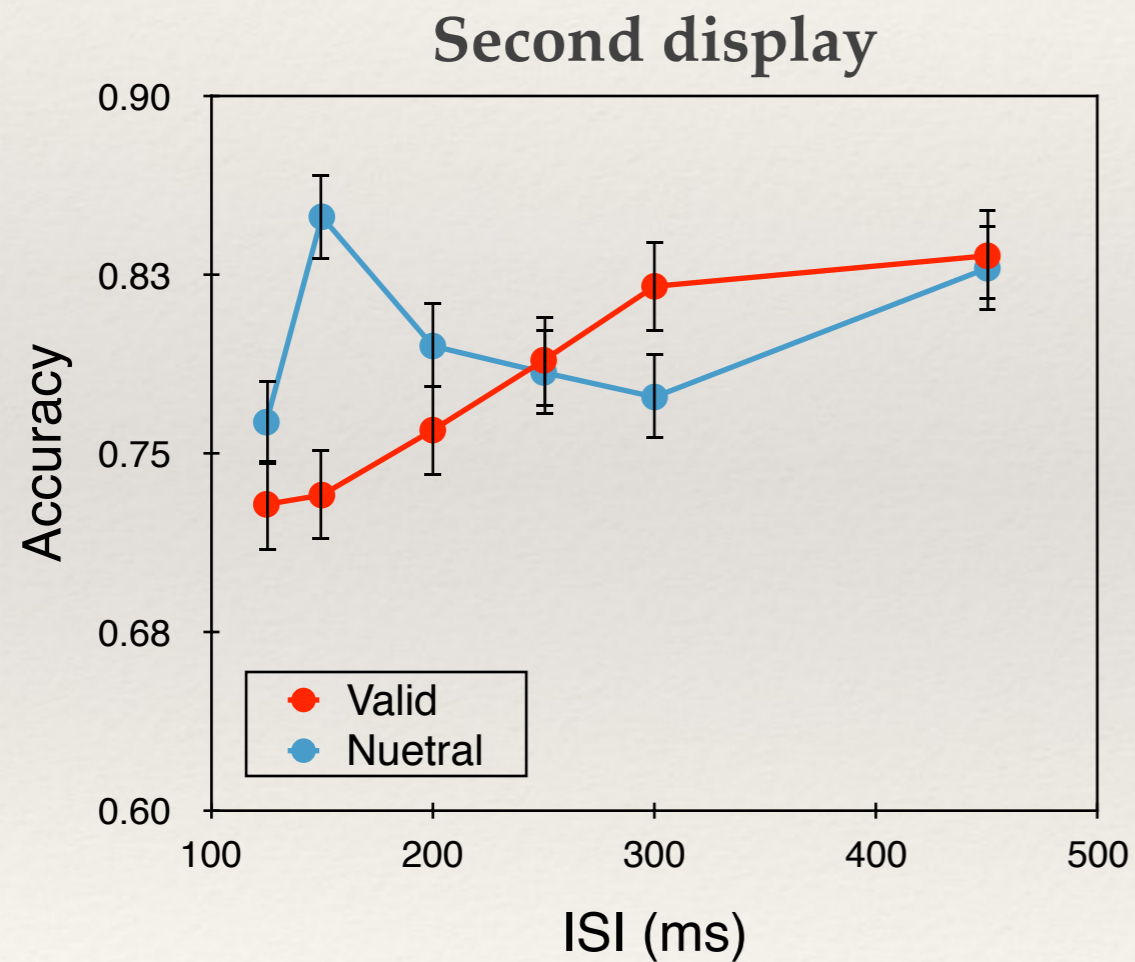
# Cueing effects

- ❖ A significant Cue type x Target temporal order interaction
- ❖ A significant Cue type x ISI x Target temporal order interaction



# Cueing effects

- ❖ A significant Cue type x Target temporal order interaction
- ❖ A significant Cue type x ISI x Target temporal order interaction





# Summary

- ❖ Spatial attention improved performance only when the target appeared in the first display.
- ❖ Directing spatial attention via a visual cue reduced temporal crowding.