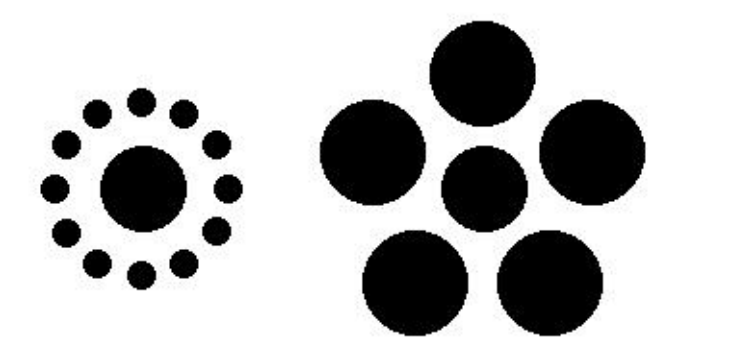




# CONFIGURAL SUPERIORITY REDUCES EFFICIENCY

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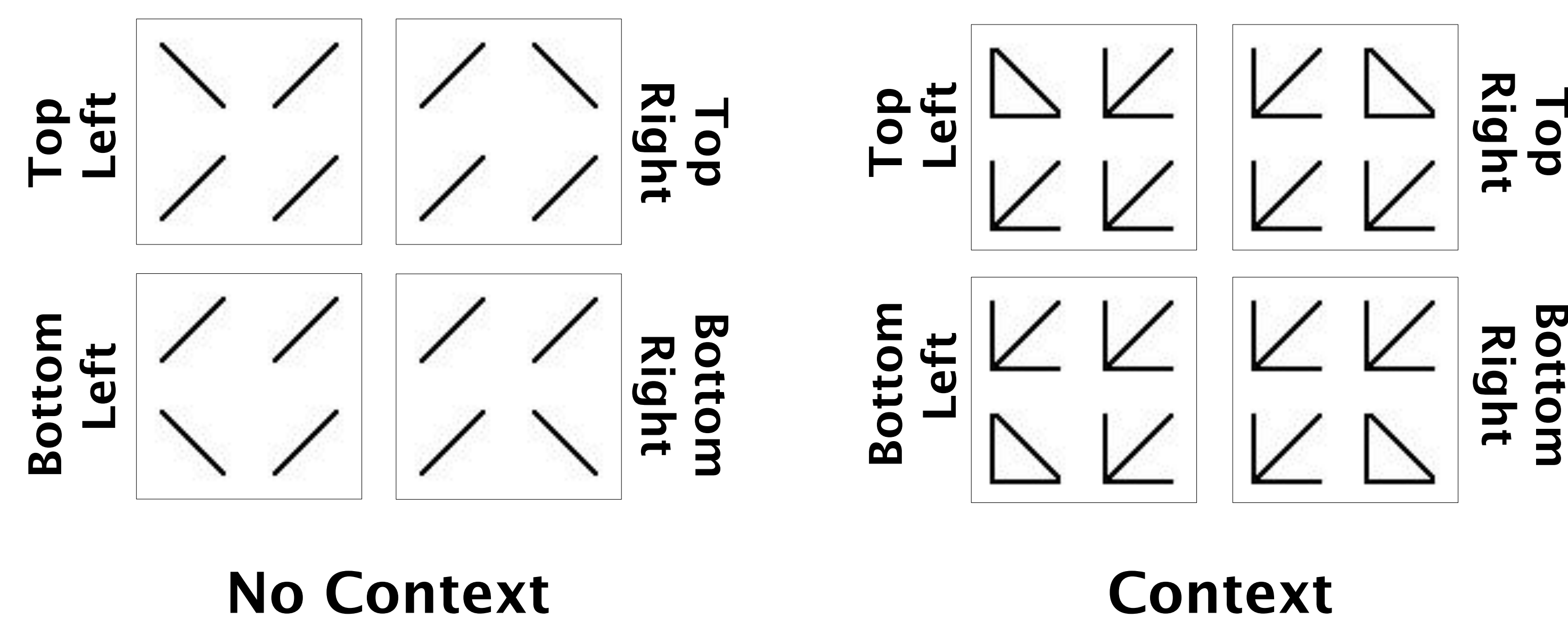
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## The Configural Superiority Effect

- The presence of redundant, uninformative context can introduce ‘emergent features’, leading to faster and more accurate performance in discrimination tasks.
- Example: Odd quadrant discrimination task (Pomerantz et al., 1977) in which observers determine which quadrant contains the odd angled line segment.



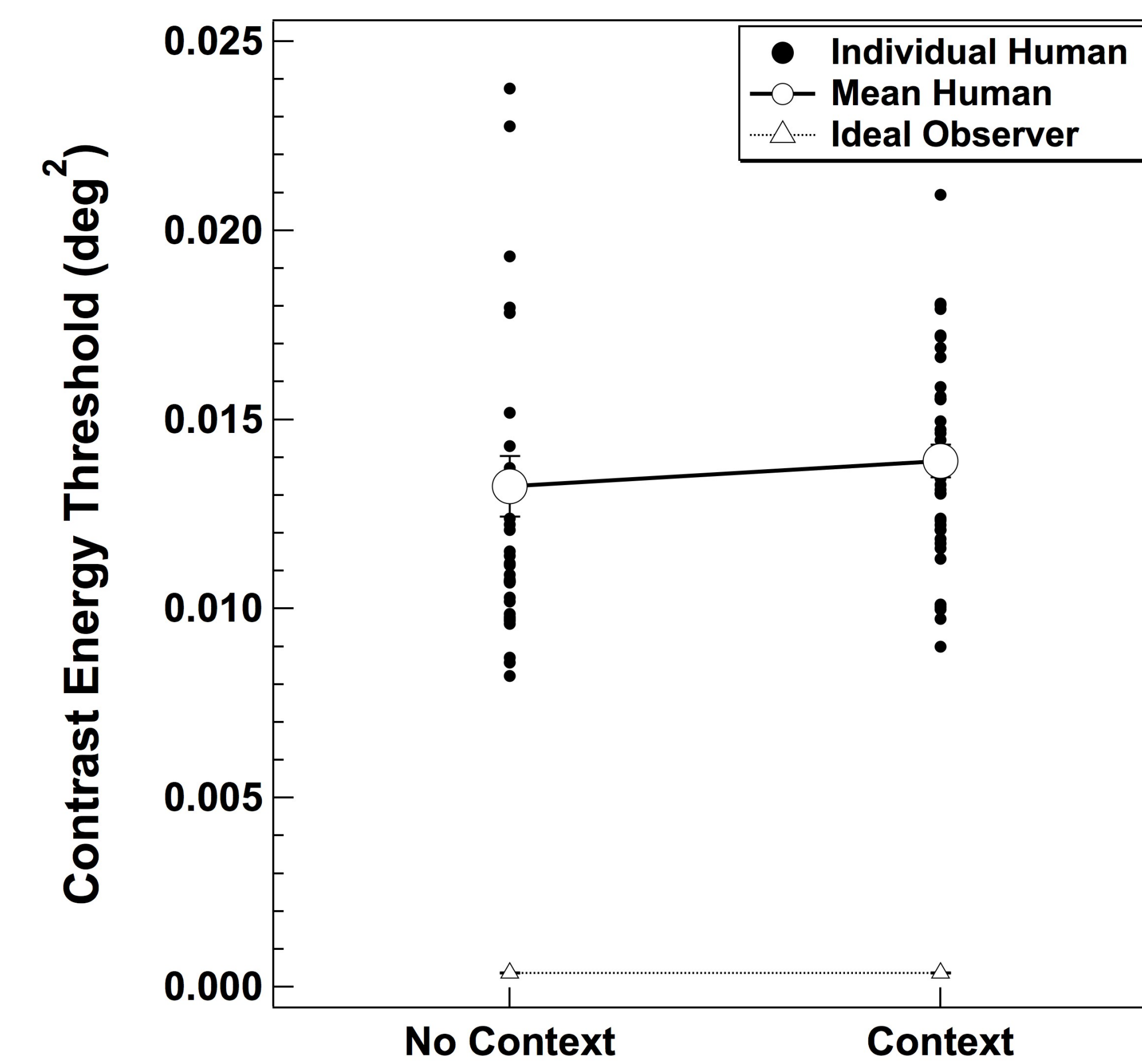
## How does the Configural Superiority Effect impact observers' use of stimulus information?

- Efficiency (ideal/human threshold):** use ideal observer to quantify overall use of information in the presence and absence of redundant context.
- Response Classification:** Measure the spatial strategy adopted by observers in the presence and absence of redundant context.

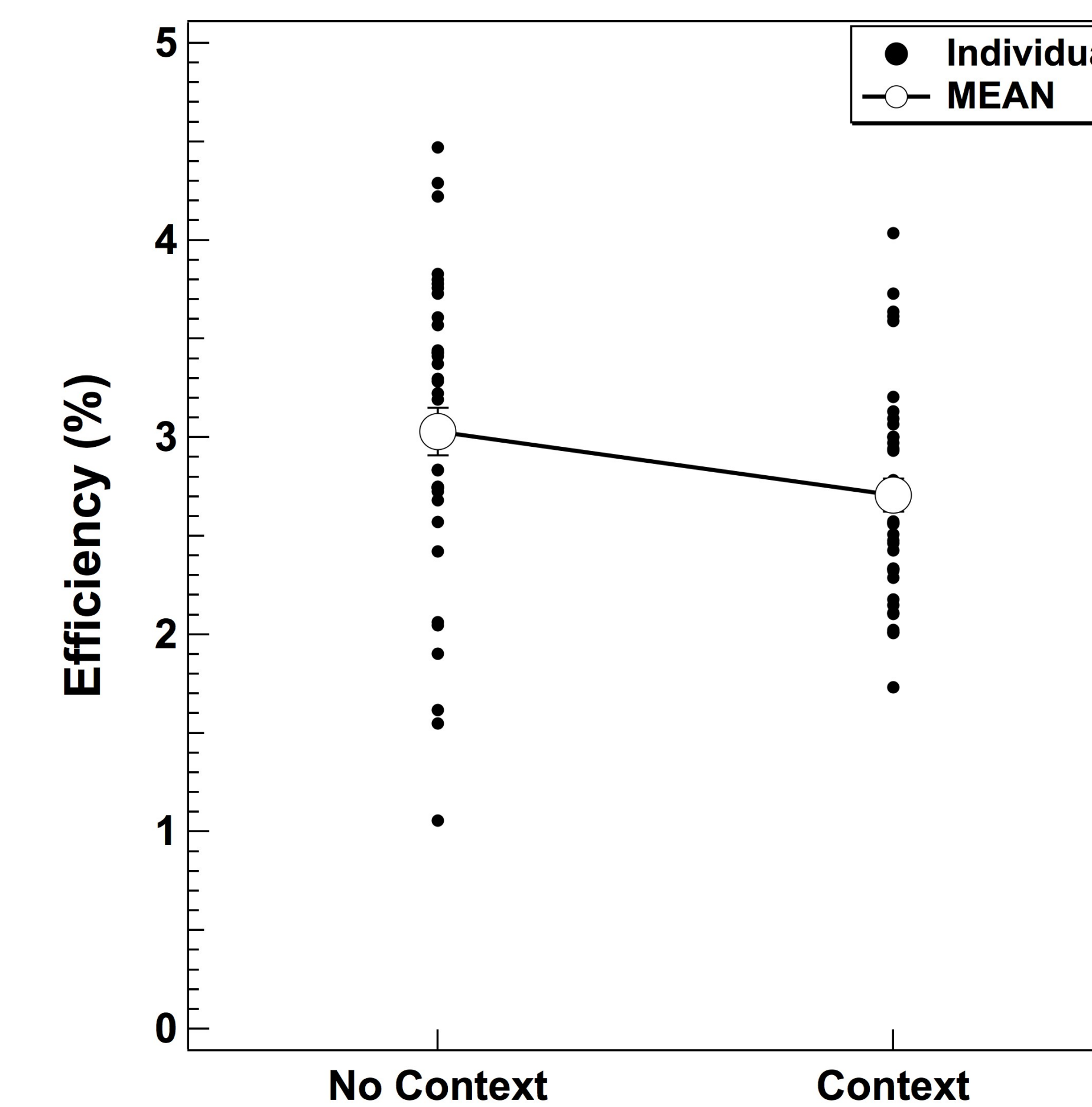
## Methods

- Odd quadrant line orientation discrimination task presented in Gaussian white contrast noise.
- Each subject ( $n=40$ ) participated in both conditions (counterbalanced) for 500 trials per condition.
- Signal contrast energy thresholds measured using a 2-down, 1-up adaptive staircase procedure.
- Ideal Observer thresholds measured in both conditions using Monte Carlo simulations.

## Thresholds

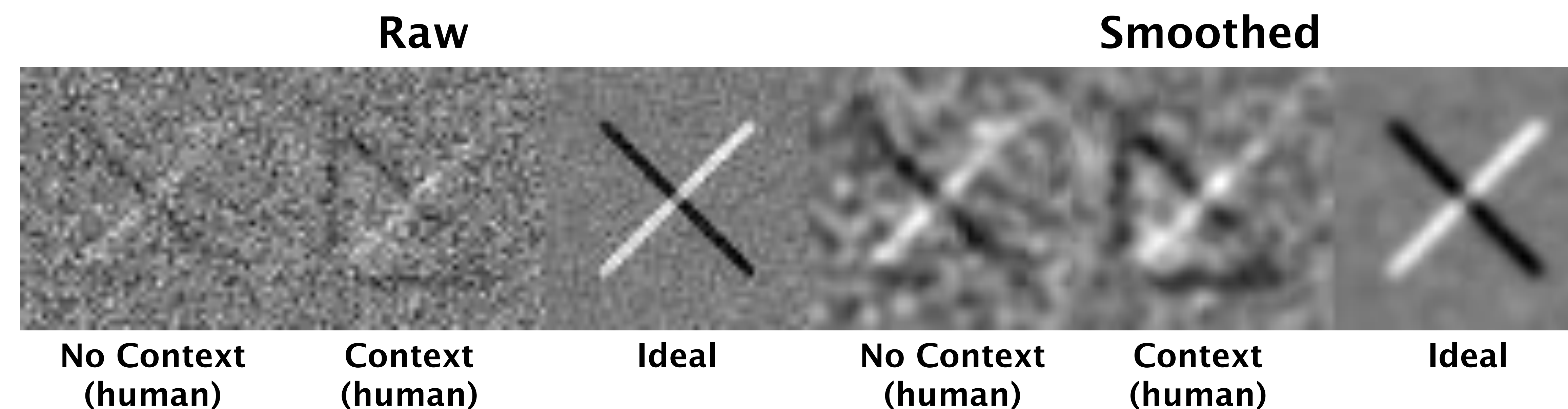


## Efficiencies



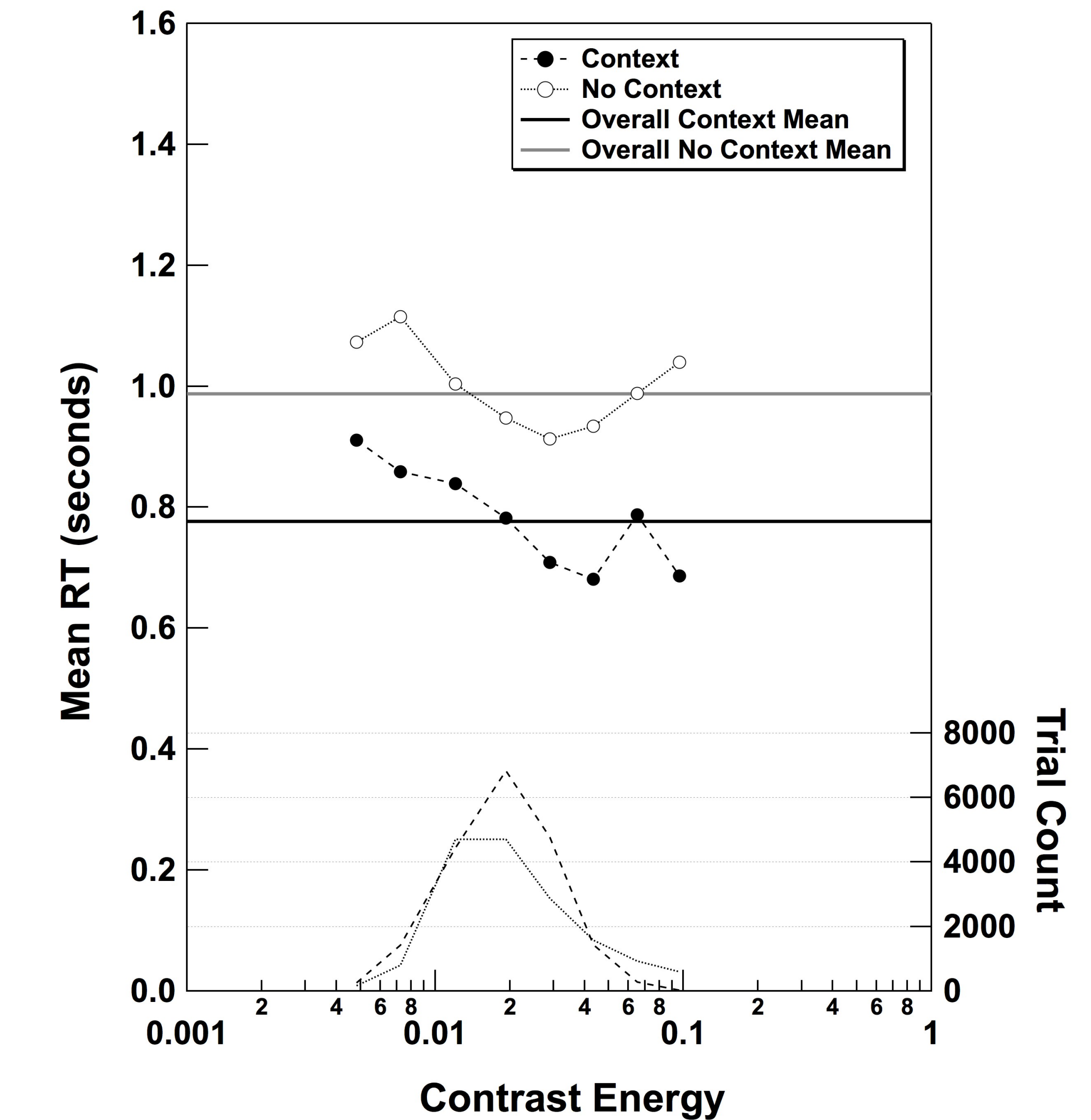
- Unlike the ideal observer, thresholds for human observers were higher on average in the presence of context.
- As a result, human efficiencies were significantly lower on average in the presence of context ( $t(39)=3.39, p=0.001612$ ).

## Classification Images



- Data were combined across observers to form a single classification image (20,000 trials per condition).
- $CI = \text{mean}(\text{Chosen Quadrant Noises}) - \text{mean}(\text{Unchosen Quadrant Noises})$ .
- A 5x5 convolution kernel was used to produce smoothed images.
- The classification images suggest that the additional use of non-informative locations led to a reduction in efficiency in the presence of redundant context.

## Reaction Times



- Subjects were faster on average in the presence of context at all contrast levels.

## Conclusion

- Although the reaction times in our experiment are consistent with the notion of Configural Superiority, the finding that context negatively impacts efficiency is inconsistent with the intuition that this effect leads to improvements in an observer's ability to make use of stimulus information.

## Reference

Pomerantz, J. R., Sager, L. C., & Stoeber, R. J. (1977). Perception of wholes and their component parts: some configural superiority effects. *JEP: HPP*, 3(3), 422-435.