

Redundant Coding Can Speed Up Segmentation in Multiclass Displays



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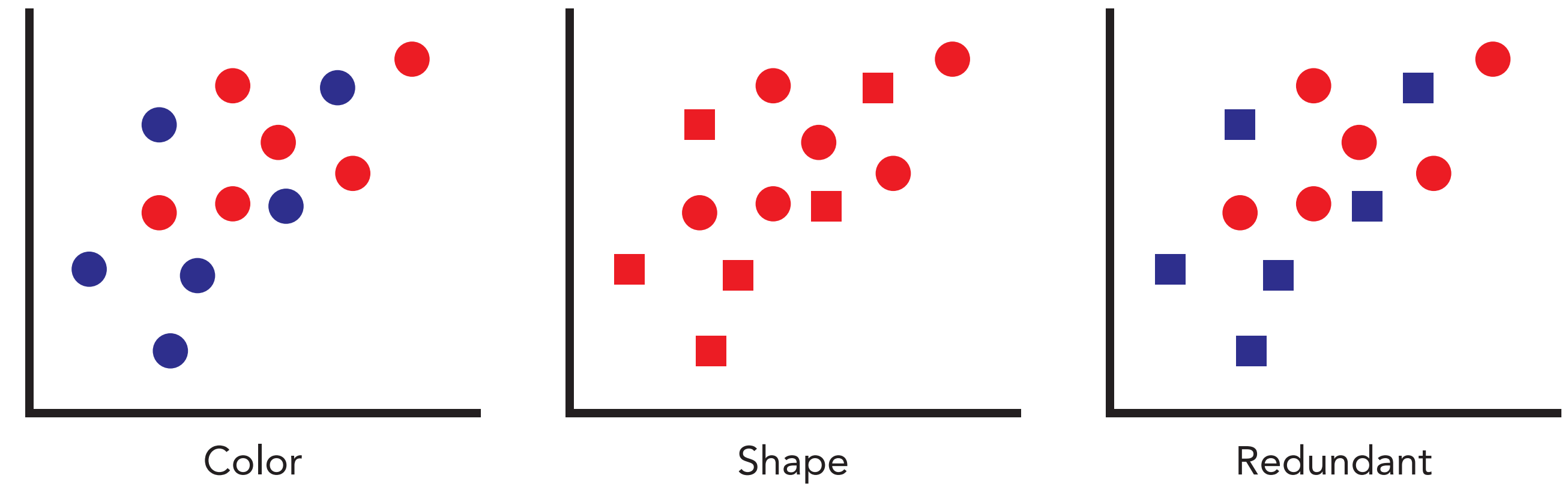
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REDUNDANT CODING

Graphs and maps often depict multiple datasets, or *classes*, that are important to distinguish quickly and efficiently.

These classes are designated by differences in easily perceived visual features, such as colors or shapes.

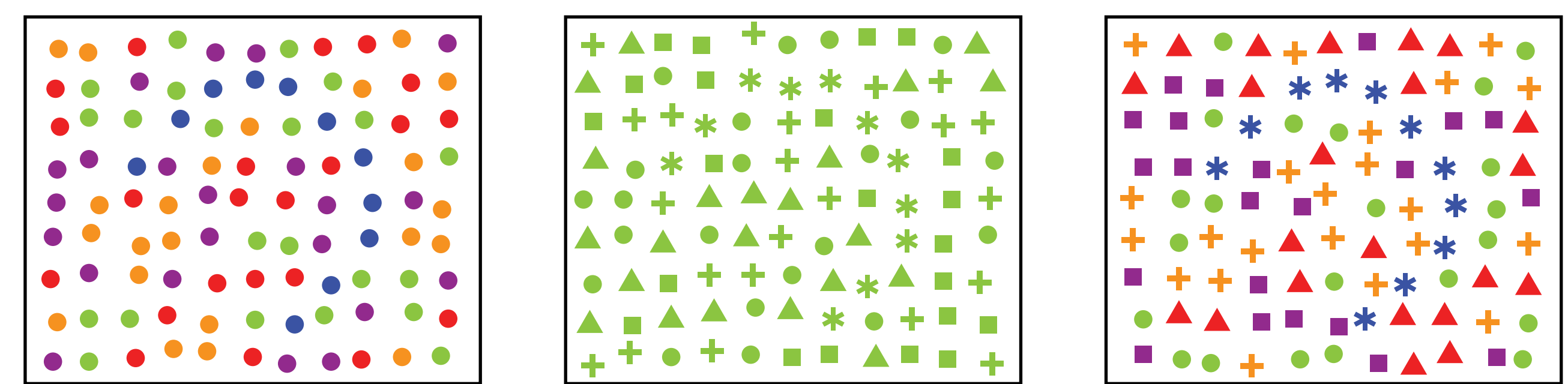
Visual features are often used in combination as a *redundant coding*¹.



Our past work shows that redundant features improved accurate visual selection of objects by 25% and led to stronger grouping.²

But those conditions may not be representative of realistic tasks:

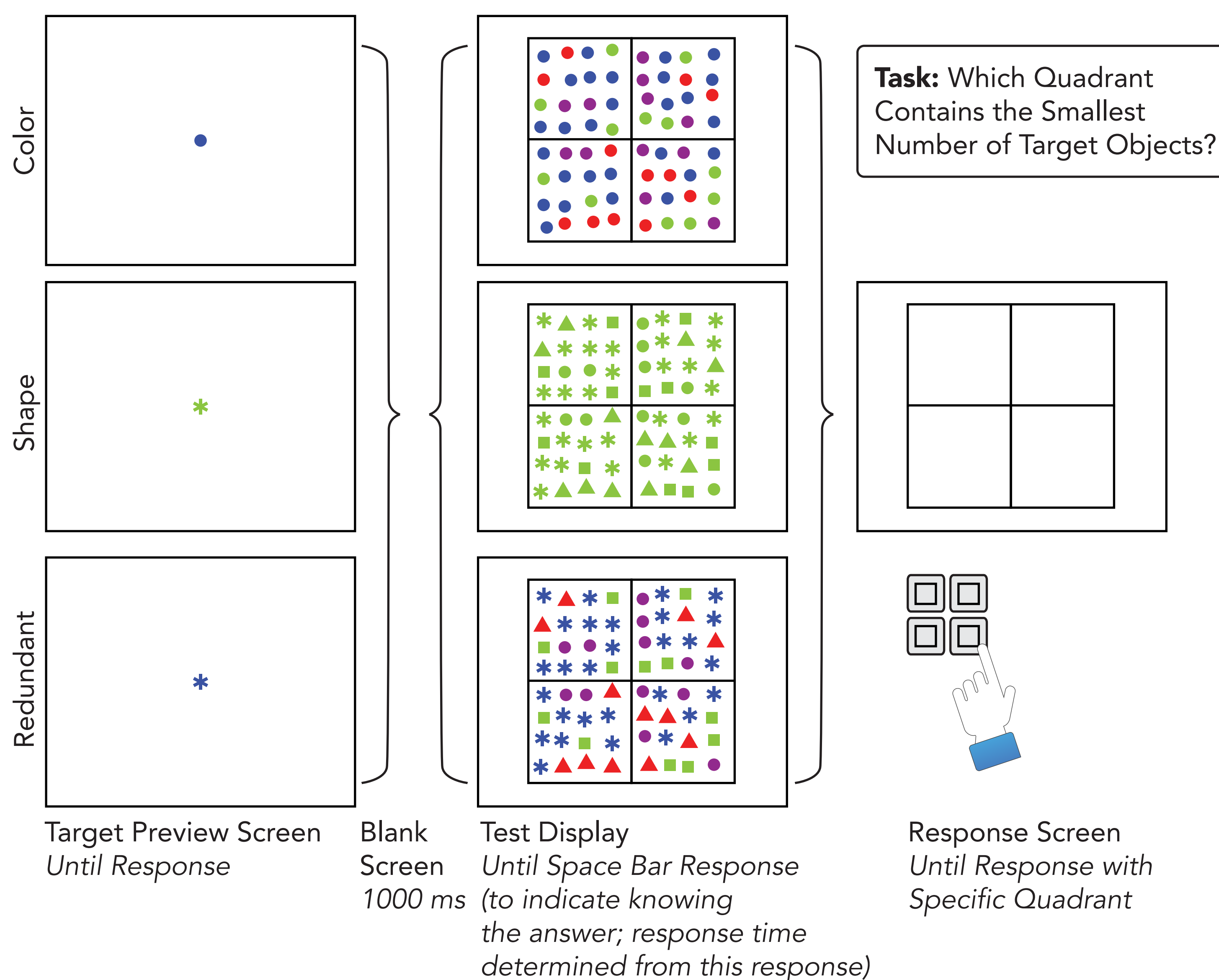
- target pattern highly regularized
- displays presented for fraction of a second



Questions:

Do the benefits from redundant coding translate to more **realistic situations**? And lead to **response time benefits**?

DESIGN



Methodology

We constructed a task designed to model situations in which observers judge the distribution of a data class.

Task

Which quadrant contains the smallest number of the target objects?

Procedure

Target Preview ► Blank Screen ► Test Display ► Response Screen

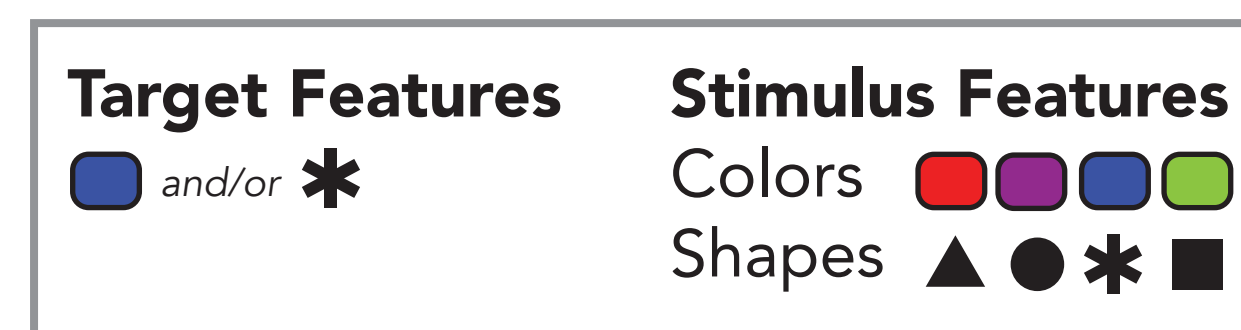
Conditions

Color (top), Shape (center), Redundant (bottom)

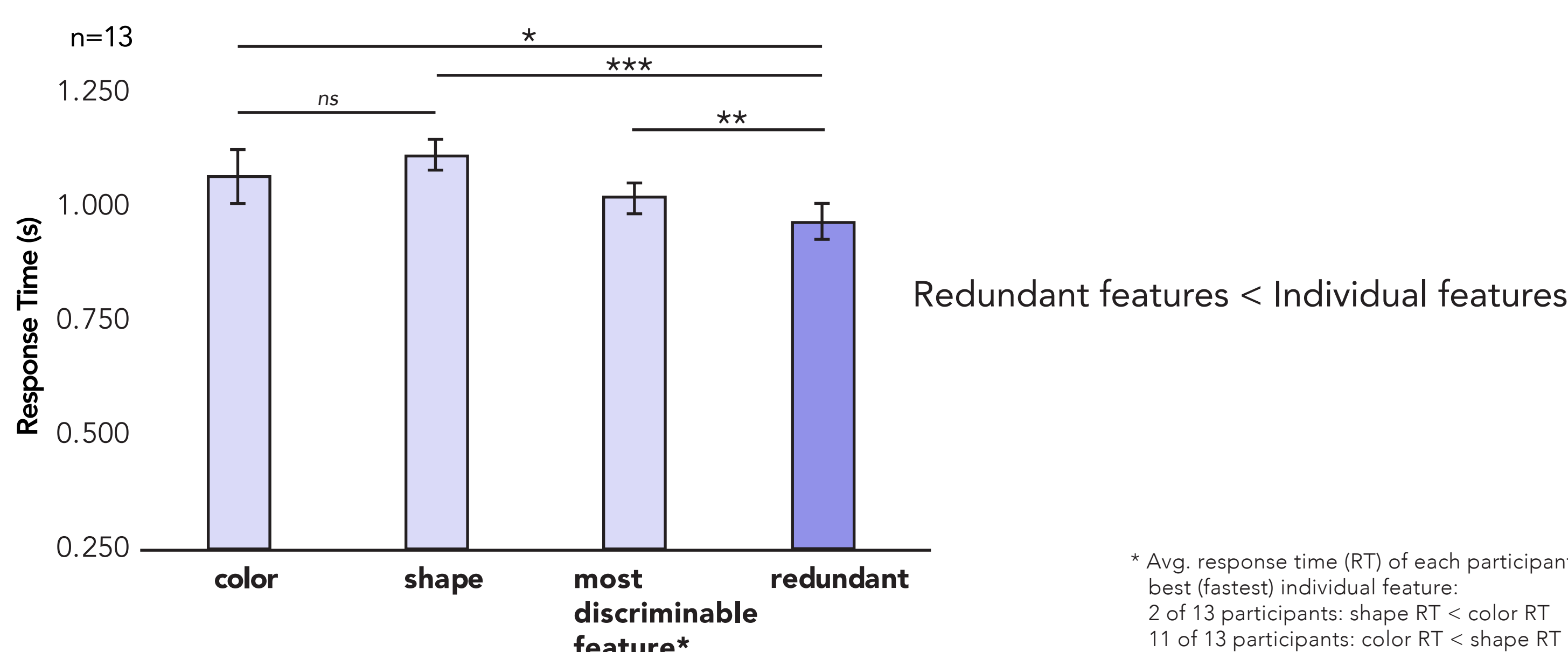
Hypothesis

If attending to redundantly coded objects yields better visual selection and subsequent distribution detection, then:

redundant features < **either feature alone**
response time < **response time**



RESULTS



CONCLUSION

Suggests ~13-18% faster processing for redundant coding compared to the more discriminable feature (color or shape).

Evidence that redundant coding is beneficial in more realistic situations.

REFERENCES

- 1 Ware, C. (2012). *Information visualization: perception for design*. Burlington, MA: Morgan Kaufmann.
- 2 Nothelfer, C., Gleicher, M., & Franconeri, S. F. (in press) Redundant encoding strengthens segmentation and grouping in visual displays of data. *Journal of Experimental Psychology: Human Perception and Performance*.

ACKNOWLEDGEMENTS

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