**Motivation**

- Artificial intelligence struggles with a task humans excel at: reasoning
- When human intelligence remains superior, extracting it is valuable

**The Wisdom of Crowds**

- A combined collective knowledge can be more accurate than the knowledge of each
- Some aggregation methods can outperform others at greater computational cost

**Prior Research in WOC for Human Computation**

- Crowd-based approaches collect and aggregate diverse information to yield more accurate estimates
- Aggregating ranked (ordinal) lists [Steyvers et al., 2009]
- Averaging numerical (cardinal) estimations of a quantity [Surowiecki, 2004]
- Combining ordinal and cardinal estimations through specialized techniques [Kemmer et al., 2020]

**Research Questions**

- RQ1: Do the effects transfer to more challenging tasks?
- RQ2: Will collective estimates maintain accuracy when aggregated via simpler, non-optimization methods?

**The Experiment**

- Conduct a more cognitively challenging task: line segment estimation
- Elicit multiple modes of information from participants: cardinal and ordinal
- Q: What is the combined length of all lines of a particular color in the image? (as a multiple of a unit length)
- Recruit participants via crowdsourcing platform Amazon Mechanical Turk

**Data Analysis**

- Two modes of data: list of estimations (counts) and list of indices (ranking)
- Convert cardinal to ordinal by sorting
- Aggregate multiple ordinal vectors through voting rules (e.g., Borda Count)
- Does inaccuracy decrease as more individual vectors are aggregated?
- Does inaccuracy decrease more slowly, at a similar rate, or more quickly by incorporating both modes of data?

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**Investigating Data Collection and Aggregation for Improving Collective Intelligence**

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