

Crowds, Certainty, and Choice

The Emergence of Metawisdom in Dynamic Information Environments

Jon Atwell & Marlon Twyman

Stanford GSB & USC Annenberg

atwell@stanford.edu & marlontw@usc.edu

STUDY OVERVIEW

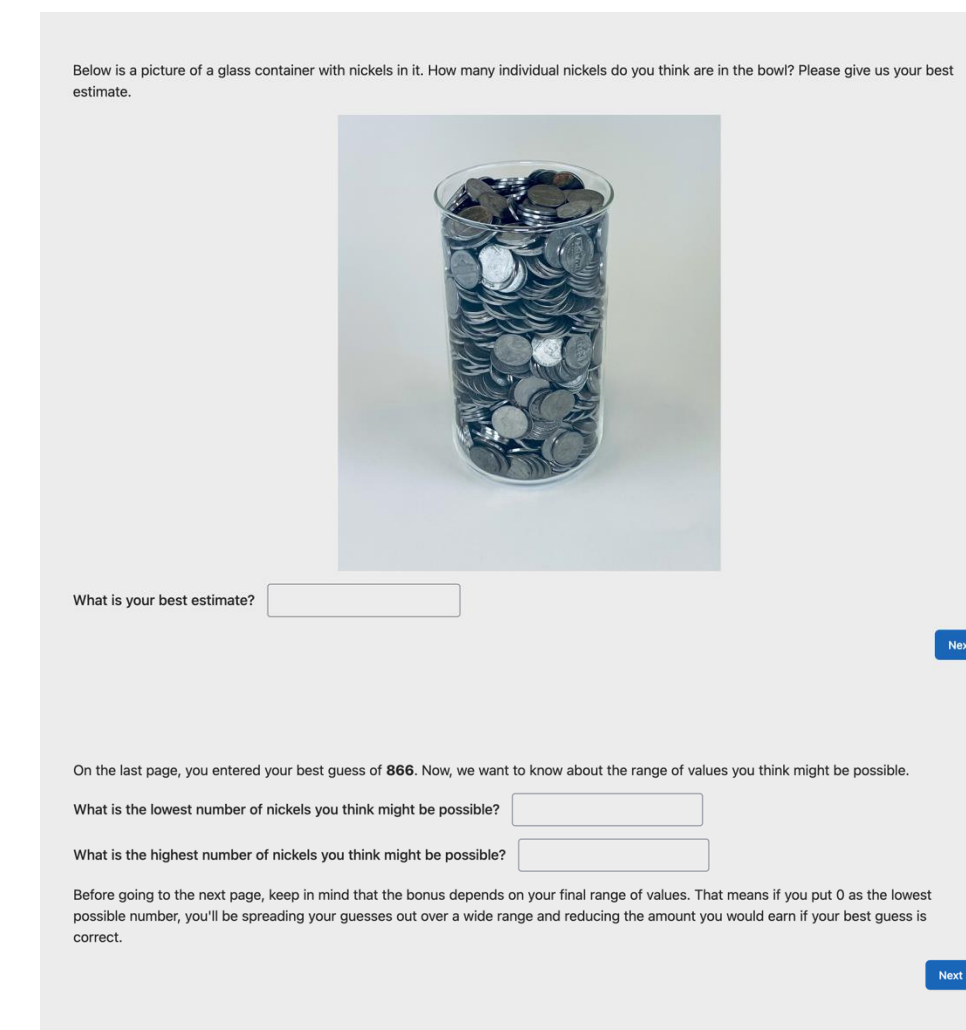
- Groups, in aggregate, can accurately assess values and situations when people make independent assessments
 - As a result, group accuracy is a function of individual estimation accuracy and predictive diversity
- How do decision aids affect predictive diversity and group accuracy?
- What distributions of decision aid choices correspond to higher levels of group accuracy?

SUMMARY

- We present a study investigating the emergence of a new concept, “**metawisdom**,” that describes the phenomenon of individuals independently choosing decision aids in a distribution that increases group accuracy
 - We explore the certainty of individual estimates through the implementation of an interactive interface where individuals adjust the range of their estimates
- Research Question:** To what extent are crowds able to choose decision aids that increase group accuracy, and how certain are individuals in their judgements?
- Experimental Setting & Description:** Study tests how individual choices of decision aids contribute to group accuracy during an estimation task
 - 728 participants recruited from a Prolific panel in an IRB-approved study based on a visual quantity estimation task; counting coins in a container using an image
 - Participants ranked their preferences for three decision aids, which were provided to participants at a given probability
 - 1st Choice: 70%, 2nd Choice: 20%, and 3rd Choice: 10%
 - “Best Guess” estimates were collected along with maximum and minimum values, and a distribution of possible values
 - Rewards were based on individual accuracy and the distribution centered around the “Best Guess”
- Results:** Decision aids improve group accuracy due to predictive diversity even when some aids are more accurate than other aids; accuracy improves even when participants do not use their preferred aid
 - There is evidence of metawisdom when choosing decision aids

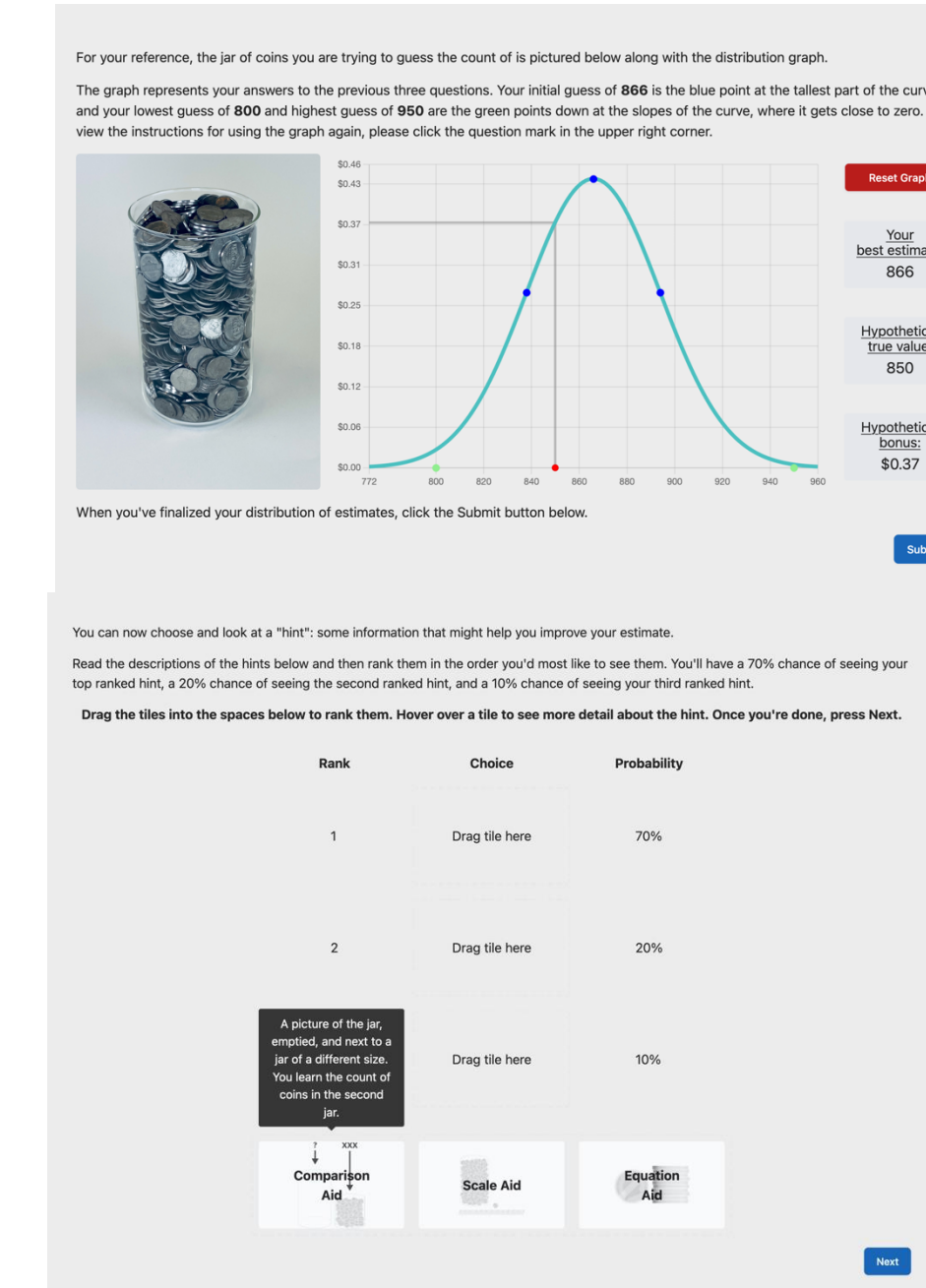
STUDY DESIGN AND TASK DESCRIPTION

1. “Best Guess” estimation

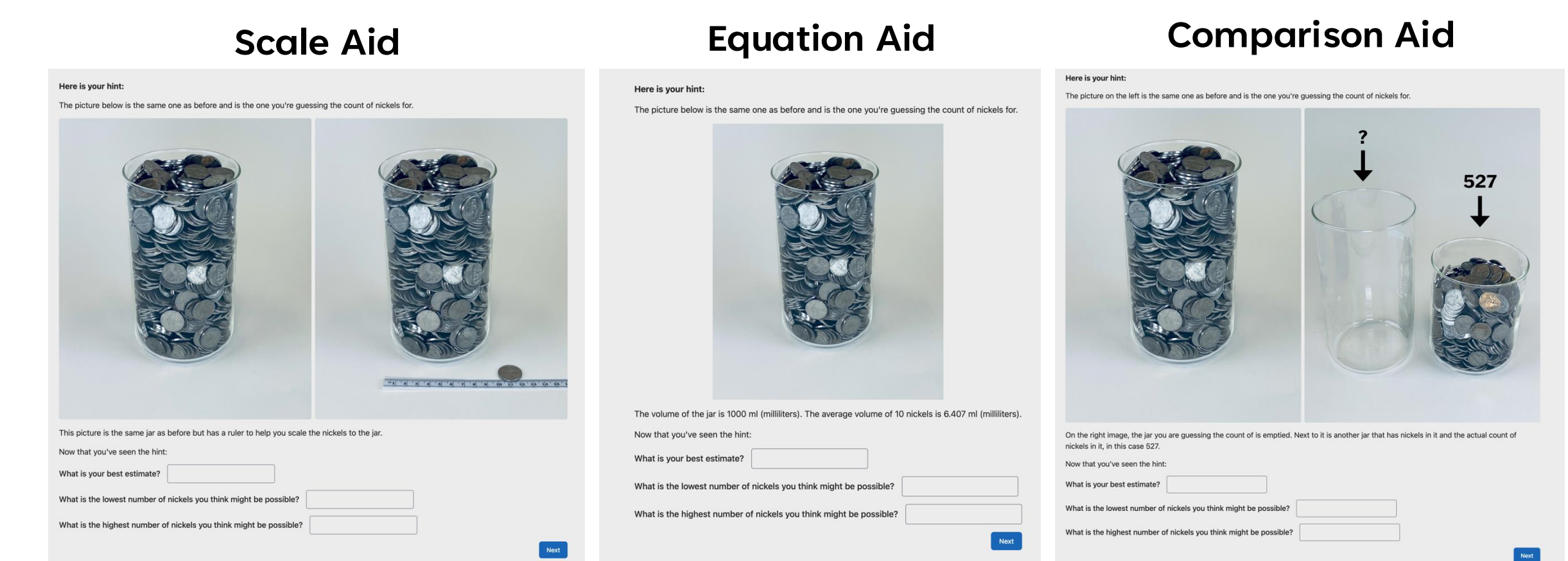


2. Maximum and minimum values

3. “Best Guess” and distribution



4. Decision Aid Choice Interface



- Step 1:** Participants were asked to view an image of a container filled with coins and provide an estimate
- Steps 2-3:** Participants provided maximum and minimum values along with a distribution tied to their accuracy bonus
- Step 4:** Participants ranked their preferred aid and repeated Steps 1-3

EXPERIMENTAL RESULTS OF DECISION AID CHOICE AND GROUP ACCURACY

Table 1: A detailed breakdown of group accuracy under various choice conditions. The mean estimate, GSE, and MSE show the aids that helped groups increase their accuracy. Both choice treatments are more accurate than the Assigned group

Choice Treatment	Decision Aid Treatment	Number of Participants (N _{Total} = 728)	Mean Estimate (True Value - 866)	Group Squared Error (GSE) (C - Y) ²	Mean Squared Error (MSE) $\frac{1}{N} \sum_i (X_i - Y)^2$
Assigned	Scale	100	606	67,636	272,921
	Equation	100	962	9,130	309,455
	Comparison	100	889	537	41,265
	All	300	818	2,220	207,881
Top Choice	Scale	41	548	101,124	211,856
	Equation	130	985	14,161	328,736
	Comparison	127	927	3,721	47,781
	All	298	900	1,156	192,919
Not Top Choice	Scale	52	698	28,082	172,981
	Equation	33	968	10,342	301,431
	Comparison	45	953	7,565	101,971
	All	130	854	121	181,007
	Initial	130	619	61,009	213,973

Table 2: OLS regression predicting the absolute estimation error of individuals with the Scale Aid as the reference aid. The Comparison Aid decreased the error while the Equation Aid increased the error relative to Scale

	Predictors of Final Accuracy
Initial Prediction Error	0.124*** (0.019)
Initial Prediction SD	-0.015 (0.017)
Exposed to Equation Aid	102.994*** (19.916)
Exposed to Comparison Aid	-249.270*** (19.627)
Chose an Aid	-20.5215 (21.474)
Exposed to Top Choice	14.428 (21.993)
Constant	371.615*** (18.514)
N	728
R ²	0.384

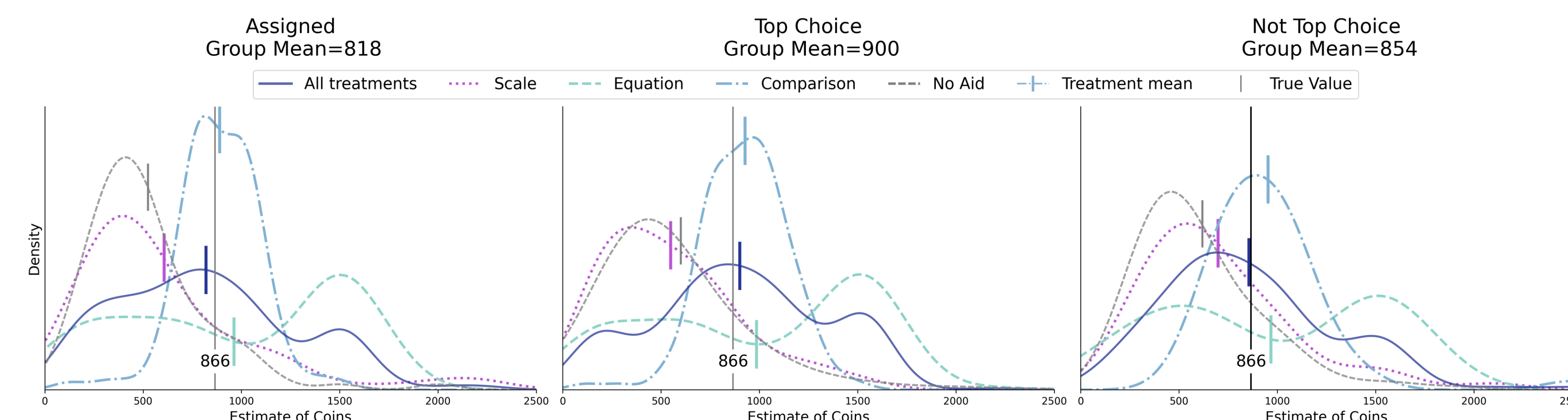


Figure 1: Kernel density estimates for the estimation distribution for each experimental treatment. Each aid results in a different estimation distribution, but predictive diversity enhances the overall group accuracy