Title
Probability Intervals and Sample Constraints

Journal
Proceedings of the Annual Meeting of the Cognitive Science Society, 26(26)

ISSN
1069-7977

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Publication Date
2004

Peer reviewed

Probability Intervals and Sample Constraints

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The success of on agents realistic probability assessment for an unknown quantity are greatly enhanced if a pre-stated interval is evaluated, rather then produced by the same agent (Hansson, Winman and Juslin, 2004). In order to explain this *format dependence effect* we have developed what we call a *Naive Sampling Model* (here after NSM) (Juslin, Winman and Hansson, 2004).

The NSM assumes that a Subjective Probability Distribution for an unknown quantity is assessed by a retrieval of similar objects from memory which provide a sample distribution. This sample distribution is directly taken as an estimate of the corresponding population distribution. With interval production the sample dispersion is interpreted as an estimate of the population dispersion, with the fractiles in the distribution defining the upper and lower limit for the interval. Because of the fact that sample dispersion is a biased estimator of the population dispersion, failing to correct this bias (Kareev et al, 2002) leads to intervals that are too narrow, thereby producing overconfidence.

The current study tests the NSM with a special eye on sampling constrains. We manipulate how much knowledge (possibly sample size) that participants could use to make these inferences.

Experiment

The stimuli used in the current experiment were fictive income figures for 136 different companies. The companies were divided in to five different fictive regions (the regions were supposed to function as cues). Two conditions (13 participants in each) were used: one (4XTraining) where the participant trained on 4 x 136 trials, the other (2XTraining) where the participants trained on 2 x 136 trials. Feedback was given under the training phase. After going trough the training phase participants in both conditions completed a test phase consisting in making point estimates and producing intervals under three different confidence levels (50, 80 and 100%) regarding the income of the 136 companies.

Results and Discussion

Participants in the 4XTraining condition produced significantly more correct point estimates in the test phase than the participants in the 2XTraining condition ($t(24)=2.38$, $p=.03$). This indicated that they had received more knowledge (i. e. larger sample). Figure 1 (Left Panel): although the participants in the 2XTraining condition had learned less, they were not worse calibrated then those who participated in the 4XTraining condition. Both groups are overconfident in their interval productions. Monte Carlo simulation of the NSM on the same database used in the experiment showed that sample size (n) = 5 fitted the data best for both groups. One interpretation of these results is that the sample used to make these kinds of inferences is constrained by working memory limitations and that knowledge produced by the long-time summarizing of the complete sample of the observation experienced plays no part. One limitation with the model is that it does not predict the difference between the two conditions regarding the interval width (see Figure 1, Right Panel).

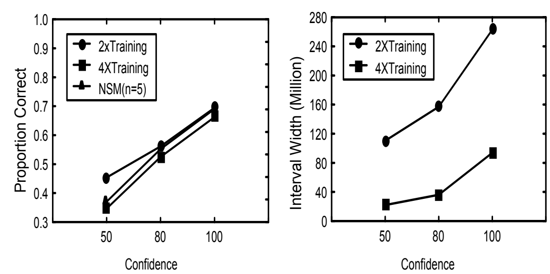

Figure 1: Left Panel: Mean proportion of correct values included in each confidence intervals in the two experimental conditions and the models performance with sample size (n) =5. Right Panel: Interval width (upper minus lower limit) for the produced interval by the participants in the two conditions

Acknowledgments

This research is supported by the Swedish Research Council.

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