# Effects of Sampling Ecology on Correlational Judgment

**Richard B. Anderson (randers@bgsu.edu)**
Department of Psychology, Bowling Green State University
206 Psychology Building, Bowling Green, OH 43403 USA

**Michael E. Doherty (mdoher2@bgsu.edu)**
Department of Psychology, Bowling Green State University
206 Psychology Building, Bowling Green, OH 43403 USA

**Justin M. Gilkey (jgilkey@bgsu.edu)**
Department of Psychology, Bowling Green State University
206 Psychology Building, Bowling Green, OH 43403 USA

**Keywords:** correlation; covariation; estimation; judgment

## Introduction

Given the importance of correlation perception for adaptive behavior, it is no surprise that people's estimates of correlation are sensitive to the objective correlations (e.g., Jennings, Amabile, & Ross, 1980). However, theoretical work suggests if people treat sample correlations ($r$) as the best estimates of population correlations ($\rho$) they should tend to produce inflated estimates of $\rho$, especially with small samples (e.g., Anderson, Doherty, Berg, & Friedrich, 2005).

In contrast to Kareev, Lieberman, and Lev (1997), the present studies manipulated $n$ in a procedure wherein participants estimated correlations by estimating population frequencies from randomly drawn samples (the estimates would be converted to subjective correlations for analysis). In addition, Experiment 2 included a confidence rating task, as in Clement, Mercier, and Pasto (2002). It was predicted (see Anderson et al., 2005) that estimates of $\rho$, derived from the frequency estimates, would be inflated for smaller relative to larger samples, and that this effect would be greater for higher than for lower levels of objective $\rho$.

## Method

On each trial participants saw a sequence of 3, 7, or 15 drawings (one drawing per two seconds). Each drawing was a facial caricature that had narrow or wide shape and a happy or sad expression. Each sequence was selected randomly from a population in which the correlation between facial width and facial expression was 0, .4, .8, -.4, or -.8. After viewing a sequence, participants estimated the frequency of occurrence of two particular combinations of levels of facial width and facial expression, from which the researchers later computed a subjective $\rho$. For example, participants estimated the number of 1000 narrow faces that were happy and the number of 1000 wide faces that were happy. In addition, each trial of Experiment 2 ended with the participant rating his/her confidence in the estimates. Each experiment was a within-participant factorial, with 12 or 6 trials per condition per participant (in Experiments 1 and 2, respectively).

## Results and Discussion

Because the positive and negative conditions of $\rho$ were mathematically equivalent, the conditions were combined for purposes of analysis (thus, an estimate was scored as negative only when it was directionally opposite from objective $\rho$). For Experiment 1, the mean subjective $\rho$ increased with objective $\rho$, $F(2, 38) = 43.91$, $p < .001$, and contrary to predictions, increased with $n$, $F(2, 38) = 4.16$, $p = .023$. Also, the effect of $n$ was greater for higher levels of objective $\rho$, $F(4, 76) = 3.63$, $p < .009$. Experiment 2 yielded qualitatively similar results, and also showed that confidence increased with objective $\rho$. The particular relationship between estimation, confidence, and $n$, found by Clement et al. (2002), was not fully replicated. The findings suggest that decision-makers' information processing may substantially alter and reverse some of the informational biases intrinsic to the information ecology.

## Acknowledgments

## References

Anderson, R. B., Doherty, M. E., Berg, N. D., & Friedrich, J. C. (2005). Sample size and the detection of correlation—A signal detection account: Comment on Kareev (2000) and Juslin and Olsson (2005). *Psychological Review, 112,* 268-279.

Clement, M., Mercier, P., & Pasto, L. (2002). Sample size, confidence, and contingency judgment. *Canadian Journal of Experimental Psychology, 56*, 128-137.

Jennings, D. L., Amabile, T. M., & Ross, L. (1982). *Informal covariation assessment: Data-based versus theory-based judgments*. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), Judgment under uncertainty: Heuristics and biases. Cambridge: Cambridge University Press.

Kareev, Y., Lieberman, I., & Lev, M. (1997). Through a narrow window: Sample size and the perception of correlation. *Journal of Experimental Psychology: General, 126,* 278-287.