

Planning sample size with reference to EPG experiments

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Electropenetrography is a tool for acquiring quantitative data for understanding host-arthropod interactions. The method requires using specialized equipment and it is labor intensive. Minimizing sample sizes may be economically beneficial but sample sizes that are too small degrade the quality of the data. Published research in EPG shows statistical tests using sample sizes from 1 through 34 per treatment. The planned sample size has modes at 10, 15, and 20 insects per treatment. The difference arises when not all insects perform the behavior of interest. Planning sample sizes is a common task, and there are many programs that help do this. At least initially we know almost nothing about the experimental system because nobody has recorded feeding from that arthropod. Sample size calculators want good estimates of the variability in the data and an expected effect size. Such estimates are not available. An analysis like the t-test assumes that the means are normally distributed. People have suggested that a collection of 30 or more is sufficient for assuming Normality under the Central Limit Theorem (CLT). Using simulation, we show the effect of sample size on the estimates and the quality of the statistical analyses with a focus on the range from 2 to 50.