Semiparametric robust mean estimations based on the orderliness of quantile averages

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As one of the most fundamental problems in statistics, robust location estimation has many prominent solutions, such as the symmetric trimmed mean, symmetric Winsorized mean, Hodges–Lehmann estimator, Huber M-estimator, and median of means. Recent studies suggest that their biases concerning the mean can be quite different in asymmetric distributions, but the underlying mechanisms remain largely unclear. This study establishes two forms of orderliness within a wide range of semiparametric distributions. From this, two sequences of semiparametric robust mean estimators emerge,

semiparametric | mean-median-mode inequality | asymptotic | unimodal | Hodges–Lehmann estimator