Near-consistent robust estimations of moments for unimodal distributions

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A. Invariant Moments. All commonly used robust location estimators are symmetric, and therefore, asymptotically coincide with the population mean in any symmetric distribution provided that the mean is finite. A γ-weighted Hodges-Lehmann mean ($\mathrm{WHLM}_{k,\epsilon,\gamma}$) can achieve consistency for any γ-symmetric distribution with a finite mean. However, it falls considerably short of effectively handling a broad spectrum of other common distributions.