

# Semiparametric robust mean estimations based on the orderliness of quantile averages

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

## Inequalities related to weighted averages

So far, it is quite natural to hypothesize that the value of a  $\epsilon, \gamma$ -trimmed mean should be monotonically related to its breakdown point in a semiparametric distribution, since it is a linear combination of quantile averages as shown in Section ???. Analogous to the  $\gamma$ -orderliness, the  $\gamma$ -trimming inequality for a right-skewed distribution is defined as  $\forall 0 \leq \epsilon_1 \leq \epsilon_2 \leq \frac{1}{1+\gamma}, \text{TM}_{\epsilon_1, \gamma} \geq \text{TM}_{\epsilon_2, \gamma}$ .

**Data Availability.** Data for Figure ?? are given in SI Dataset S1. All codes have been deposited in [GitHub](#).

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