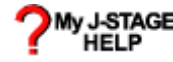


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## JOURNAL OF THE JAPAN STATISTICAL SOCIETY

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[\[PDF \(187K\)\]](#) [\[References\]](#)**Conjugate Location-Dispersion Families**Toshio Ohnishi<sup>1)</sup> and Takemi Yanagimoto<sup>1)</sup>*1) Institute of Statistical Mathematics*

**Abstract:** We make a conjugate analysis for the five location-dispersion families including the normal, the transformed gamma and the von Mises distributions. The five families are introduced through the requirement for the existence of conjugate prior densities. We show in a unified way that a Pythagorean relationship holds with respect to posterior risks, which clarifies the optimality of the posterior mode under a Kullback-Leibler loss. An explicit form of the posterior mode is given, and a type of linearity is observed. We construct an empirical Bayes estimator of a location vector explicitly.

**Key words:** addition identity, conjugate prior, empirical Bayes estimator, Kullback-Leibler separator, location-dispersion family, posterior mode, Pythagorean relationship

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