

## **Examining the Role of a Non-informative Prior Function Through Weakly Informative Prior Densities**

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Non-informative prior functions (densities), such as Jeffreys' and the reference prior ones, have been discussed in relation only to the sampling densities. Since they are employed as substitutes of weakly informative prior densities in practical applications, we attempt to explore them in relation to weakly informative prior densities. Defining a family of proper prior densities having a parameter representing the degree of our belief of prior information, we characterize a non-informative function as the re-scaled lower limit of a sequence in the family. This approach allows us to shed new light on the role of a non-informative prior. Examining the behavior of the induced posterior density and that of the credible region, we observe that some of familiar non-informative priors in the literature are informative in some sense. Such examples cover the Haldane prior for the binomial incidence probability and Jeffreys' and the reference priors for the Poisson mean. In contrast, the role of a non-informative prior is positively evaluated as an alternative of a degenerated prior at an unknown point, which is largely different from a proper prior density.

**Key Words:** Degenerated density, Haldane prior, Poisson mean, proper prior