

Pieron's law, which formulates the effect of the signal intensity i on the mean or the median reaction time (MRT) as a power function: $MRT = R + i^{-\beta}C$, is of much interest in the simple reaction time literature. However, this law offers no information regarding this effect of the signal intensity on the other aspects of the reaction time distribution. In addition, the background intensity, which also has some impact on the detectability of the signal, is not considered by Pieron's law. In this paper, we generalize Pieron's law based on the above comments. In particular, we assume that both C and β are functions of the background intensity and of the percentile rank. We then investigate from a theoretical viewpoint some possible forms of the functions of the parameters in the generalized Pieron's law. It will be shown that under a homogeneity law-type assumption, if both the so-called 'Fechner-Thurstone type representation' and the generalized Pieron's law hold, new forms of the functions C and β can be determined. Empirical studies show a great deal of agreement.