A more general case of Bayesian decision theory is applied in Minimum error rate classification. Here each action (α_i) carries a loss function:

$\lambda(\alpha_i|w_i) = \{'0'\ when\ i = j,\ \&\ '1'\ when\ i \neq j\ \}$ for i,j $\in$ $\{1..., c\}$

It's based on the cost associated with taking the action α_i when the correct classification category happens to be w_j

By accomodating this loss function, we get a new conditional risk function (expected Loss function) for the problem:

$$R(\alpha_i|x) = \sum_{j=1}^{c} \lambda(\alpha_i|w_i)P(w_j|x) = 1 - P(w_j|x)$$

According to the Bayesian decision rule ($\alpha(x) = argmin_{\alpha} R(\alpha|x)$) & above equation, The Bayesian risk for the minimum error rate classification is given by

$$R(\alpha_i|x) = \sum_{j=1}^{c} \lambda(\alpha_i|w_i)P(w_j|x) = 1 - P(w_j|x)$$