$$A = \sum_{i=1}^{N_i} \int_{\theta} p(\theta, \eta | \text{old everything and data}) \mathrm{d}\theta \quad (1)$$

$$B = \sum_{i=1}^{N_i} \int_{\theta} [(y_i - L(\theta) c_{\text{old}})]^T [(y_i - L(\theta) c_{\text{old}})] p(\theta, \eta | \text{old everything and data}) \mathrm{d}\theta \quad (2)$$

$$Q_{\text{new}} = B/(AN_a^2) \quad (3)$$