The convolution operation...

$$f_c(w_0) = \int_{x_0 = -\infty}^{\infty} f_a(x_0) * f_b(w_0 - x_0) dx_0$$

$$p_c(w_0) = \sum_{x_0 = -\infty}^{\infty} p_a(x_0) * p_b(w_0 - x_0)$$

...for $c = a + b$ and a, b independent