N → bits → N/2 sym.

A: $x > a$; B: $y > a$

With gray

$P_{1be} = P(A) + P(B) - 2P(A \cap B)$

$P_{2be} = P(A \cap B)$

$N_{be} = \frac{N}{2} P_{1be} + \left(\frac{N}{2} P_{2be}\right) 2$

$= \frac{N}{2} P_{1be} + N P_{2be}$

$N_{be} = \frac{P(A)}{2} + \frac{P(B)}{2} = Q(1)$ (a = 1)

Without gray label

$P_{1be} = P(A)$ (assume $a = 1$)

$P_{2be} = P(B) - P(A \cap B)$

$N_{be} = \frac{N}{2} P(A) + \frac{N}{2} (P(B) - P(A \cap B)) 2$

$= \frac{P(A)}{2} + P(B) - P(A \cap B) = \frac{3}{2} Q(1) - Q(1)^2$