Definition 11.16 The mutually typical set $\Psi^n_{[XY]\delta}$ with respect to $F(x, y)$ is the set of $(\mathbf{x}, \mathbf{y}) \in \mathcal{X}^n \times \mathcal{Y}^n$ such that

$$\left| \frac{1}{n} \log \frac{f(\mathbf{y}|\mathbf{x})}{f(\mathbf{y})} - I(X;Y) \right| \leq \delta,$$

where

$$f(\mathbf{y}|\mathbf{x}) = \prod_{i=1}^{n} f(y_i|x_i) \quad \text{and} \quad f(\mathbf{y}) = \prod_{i=1}^{n} f(y_i),$$

and δ is an arbitrarily small positive number. A pair of sequences $(\mathbf{x}, \mathbf{y})$ is called mutually δ-typical if it is in $\Psi^n_{[XY]\delta}$.