

**Definition 11.4 (CMC I)** A continuous memoryless channel (CMC)  $f(y|x)$  is a sequence of replicates of a generic continuous channel  $f(y|x)$ . These continuous channels are indexed by a discrete-time index  $i$ , where  $i \geq 1$ , with the  $i$ th channel being available for transmission at time  $i$ . Transmission through a channel is assumed to be instantaneous. Let  $X_i$  and  $Y_i$  be respectively the input and the output of the CMC at time  $i$ , and let  $T_{i-}$  denote all the random variables that are generated in the system before  $X_i$ . The Markov chain  $T_{i-} \rightarrow X_i \rightarrow Y_i$  holds, and

$$\Pr\{X_i \leq x, Y_i \leq y\} = \int_{-\infty}^x \int_{-\infty}^y f_{Y|X}(v|u) dv dF_{X_i}(u).$$