

**Definition 7.18** An  $(n, M)$  code with complete feedback for a discrete memoryless channel with input alphabet  $\mathcal{X}$  and output alphabet  $\mathcal{Y}$  is defined by encoding functions

$$f_i : \{1, 2, \dots, M\} \times \mathcal{Y}^{i-1} \rightarrow \mathcal{X}$$

for  $1 \leq i \leq n$  and a decoding function

$$g : \mathcal{Y}^n \rightarrow \{1, 2, \dots, M\}.$$

**Notations:**  $\mathbf{Y}^i = (Y_1, Y_2, \dots, Y_i)$ ,  $X_i = f_i(W, \mathbf{Y}^{i-1})$