



## Why

We want to speak of the pairwise conditional distributions of a particular joint distribution.<sup>1</sup>

## Definition

Let  $p : \prod_{i=1}^n A_i \rightarrow \mathbf{R}$  be a distribution on  $A$ .

For  $i \neq j \in \{1, \dots, n\}$ , the *conditional distribution* of  $i$  on  $j$  is the function  $p_{i|j} : A_i \times A_j \rightarrow \mathbf{R}$  defined so that that  $p_{i|j}(\cdot, b)$  is the conditional distribution induced by conditioning on  $\{a \in \prod_{i=1}^n A_i \mid a_j = b\}$ .

For  $i, j = 1, \dots, n$  and  $i \neq j$ ,  $p_i$  and  $p_{i,j}$  satisfy

$$p_{i|j}(b, c)p_j(c) = p_{ij}(b, c)$$

for  $b \in A_i$  and  $c \in A_j$ .

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<sup>1</sup>Future editions will rework this sheet.



