Y è <u>indipendente in media</u> da X se $\mu_y(x_1) = \mu_y(x_2) = \_\,\_ = \mu_y(x_s) = \mu_y$
(non dipende dal valore della x)

Devianze
$D_y(x_1)$
=
$D_y(x_i)$
=
$D_y(x_s)$
D_y

$$\boxed{D_y = D_S + D_R} \quad , \quad D_y = \sum_j (y_j - \mu_y)^2 \cdot n_{oj} \; ;$$

$$D_S = \sum_i (\mu_y(x_i) - \mu_y)^2 \cdot n_{io} \; ; \qquad D_S \in [0, D_y]$$

$$D_R = \sum_i D_y(x_i) = \sum_i \Big[\sum_j (y_j - \mu_y(x_i))^2 \cdot n_{ij} \Big]$$

PROPOSIZIONE: $D_y = D_S + D_R$

<u>DIM</u> $\sum_j (y_j - \mu_y)^2 \cdot \underbrace{\boxed{n_{oj}}}_{\sum_j n_{ij}} = \sum_j \boxed{(y_j - \mu_y)^2} \sum_i n_{ij} = \sum_i \sum_j (y_j - \mu_y)^2 \cdot n_{ij}$

$\pm\, \mu_y(x_i)$

$= \sum_i \sum_j [\underbrace{(y_j - \mu_y(x_i))}_{a} + \underbrace{(\mu_y(x_i) - \mu_y)}_{b}]^2 \cdot n_{ij}$; $(a+b)^2 = a^2 + b^2 + 2ab$

$$= \underbrace{\sum_i \sum_j (y_j - \mu_y(x_i))^2 \cdot n_{ij}}_{D_R} + \underbrace{\sum_i \sum_j (\mu_y(x_i) - \mu_y)^2 \cdot n_{ij}}_{\underbrace{\sum_i (\mu_y(x_i) - \mu_y)^2 \cdot n_{io}}_{D_S}} + \underbrace{2 \sum_i \sum_j (y_j - \mu_y(x_i))(\mu_y(x_i) - \mu_y) \cdot n_{ij}}_{\underbrace{2 \sum_i (\mu_y(x_i) - \mu_y) \boxed{\sum_j (y_j - \mu_y(x_i)) n_{ij}}}_{0}}$$

Indice di indipendenza in media $\Rightarrow$ $\boxed{\eta^2 = \dfrac{D_S}{D_y}}$, $\eta^2 \in [0, 1]$
o RAPPORTO DI CORRELAZIONE

	y_1	y_2	y_3	
x_1	0	0	12	$\rightarrow D_y(x_1) = 0$
x_2	0	7	0	$\rightarrow D_y(x_2) = 0$
x_3	5	0	0	$\rightarrow D_y(x_3) = 0$

dipendenza perfetta

$\eta^2 = 1$ quando Y dipende perfettamente da X
η^2 causale se x è quantitativa ;
$\eta^2 x \stackrel{?}{=} \eta^2 y$ NO!

18-10-19

X \ Y	1	2	3	4	
0	0	30	30	0	60
1	20	0	0	20	40
	20	30	30	20	100

$\boxed{\eta^2 x = 1}$ $\boxed{\eta^2 y = 0}$ dipendenza in media

$$\mu(x=0) = \frac{1 \cdot 0 + 2 \cdot 30 + 3 \cdot 30 + 4 \cdot 0}{60} = 2{,}5$$

distr. simmetrica

$$\mu(x=1) = \frac{1 \cdot 20 + 2 \cdot 0 + 3 \cdot 0 + 4 \cdot 20}{60} = 2{,}5$$