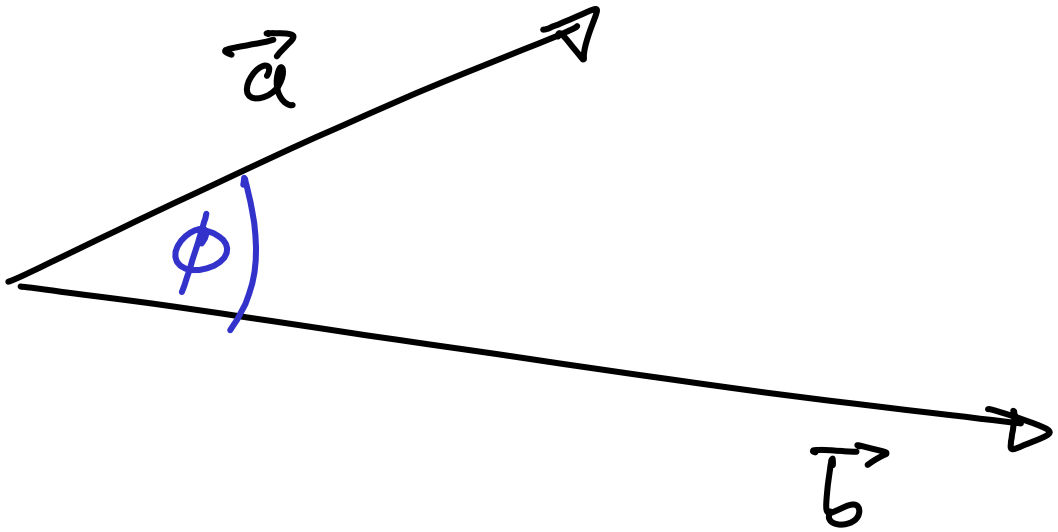
Korrelation nach Pearson

$$r_{xy} = \frac{s_{xy}}{s_x s_y}$$

$$s_{xy} = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})$$

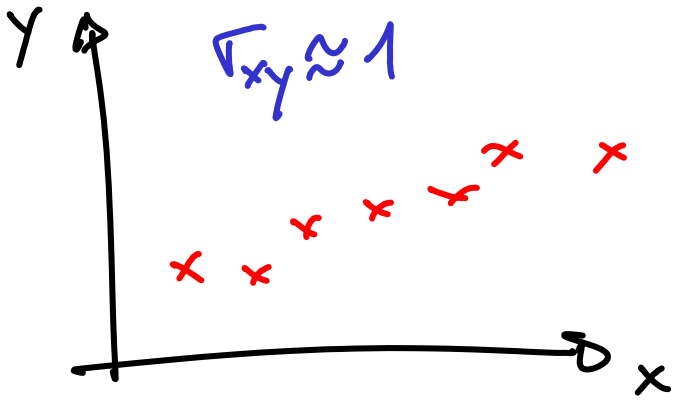
$$s_x = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2}, \quad s_y \text{ analog}$$

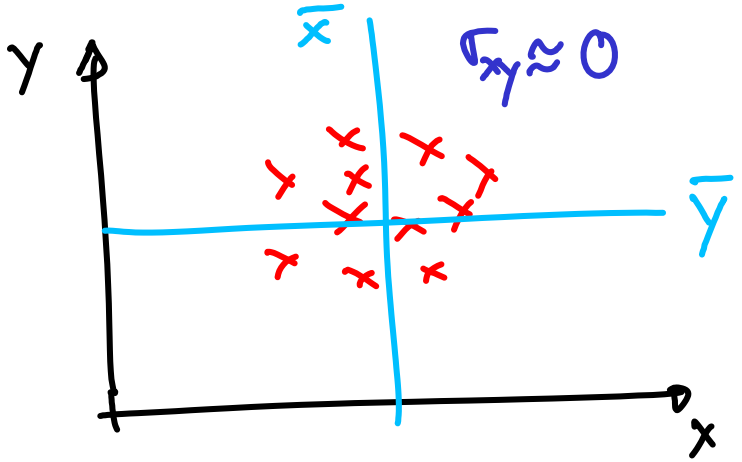
$$r_{xy} = \frac{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2 \cdot \frac{1}{n-1} \sum_{i=1}^{n} (y_i - \bar{y})^2}}$$

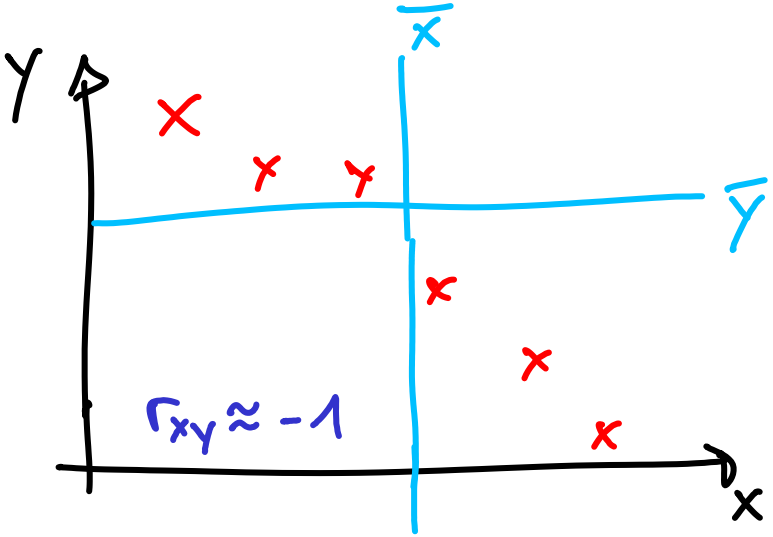


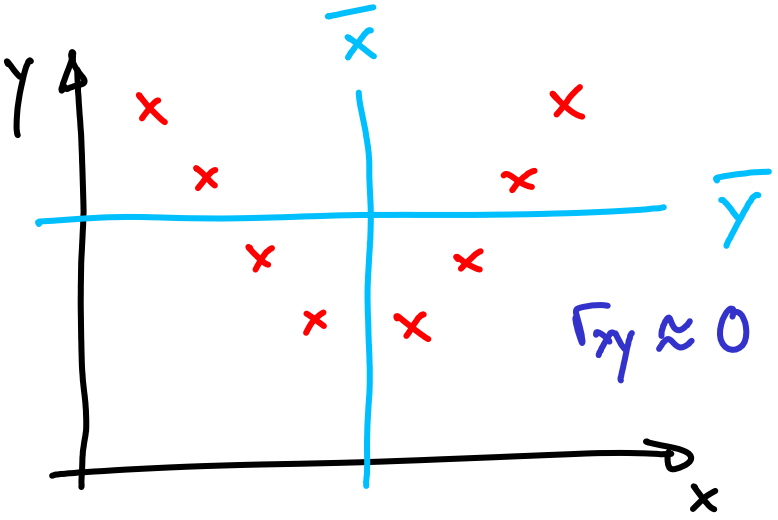
$$\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| \cos\phi$$

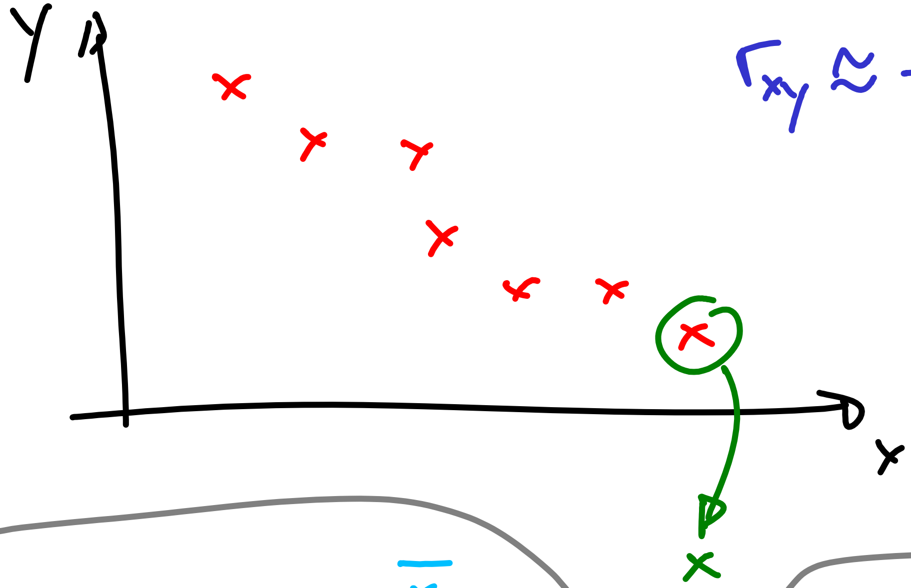
$$\vec{a} = (x_1 - \bar{x},\ x_2 - \bar{x},\ \dots,\ x_n - \bar{x})$$


y
$r_{xy} \approx 1$
x


y
$\bar{x}$
$r_{xy} \approx 0$
$\bar{y}$
x


y
$\bar{x}$
$\bar{y}$
$r_{xy} \approx -1$
x

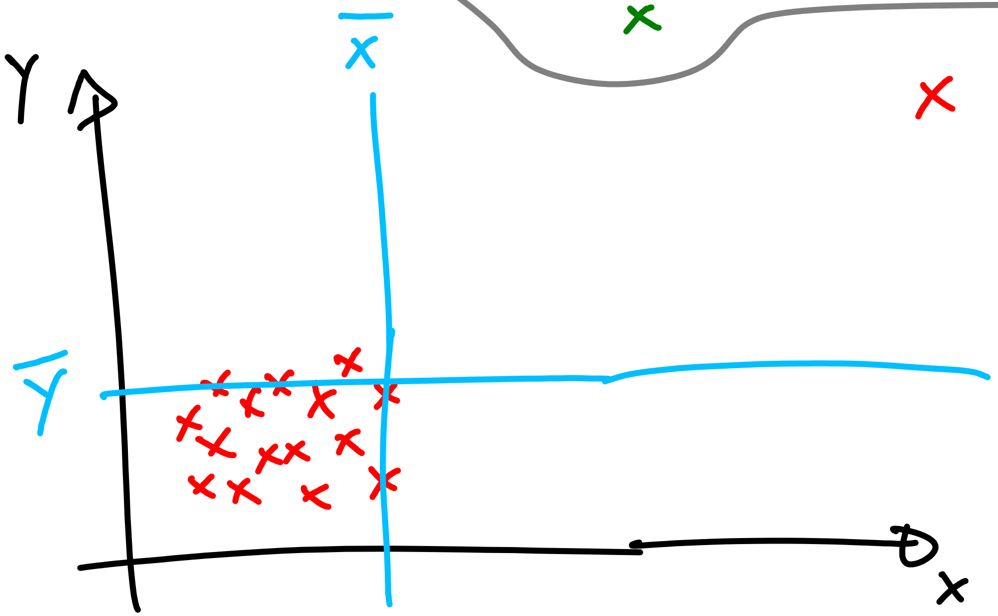

y
$\bar{x}$
$\bar{y}$
$r_{xy} \approx 0$
x



$r_{xy} \approx -1$ $\xrightarrow[\text{Abschreibefehler}]{\text{Messfehler}}$ r_{xy} steigt

(d.h. $|r_{xy}|$ fällt)

r_{xy}^{SP} ändert sich nicht

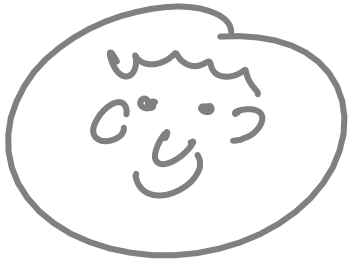


$r_{xy} > 0$ deutlich

aber <u>keine</u> Korrelation

Etwas ganz anderes ...

Münzwurf



Kopf

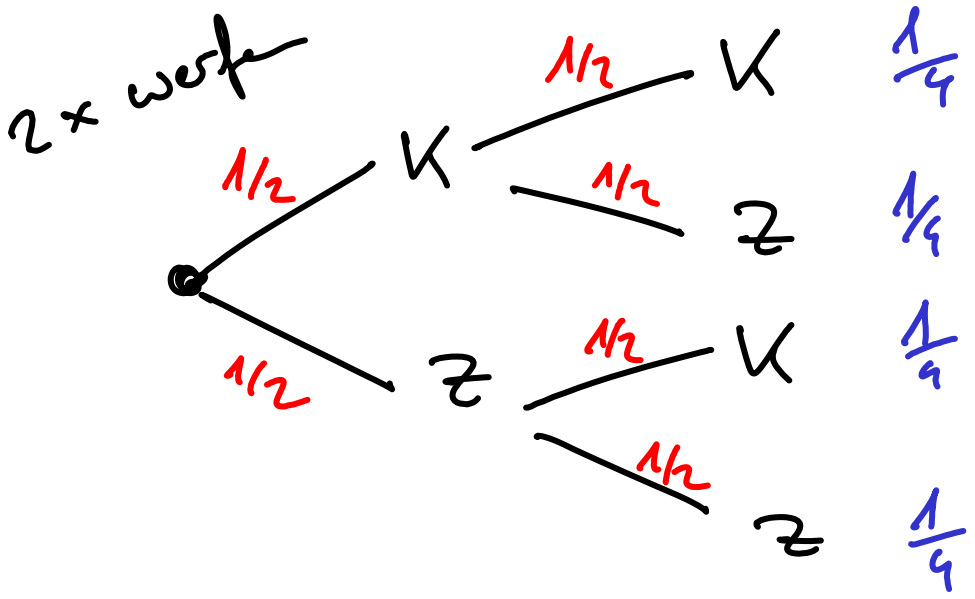
Zahl

faire Münze: Wahrscheinlichkeit für K/Z gleich groß

Behauptung: Münze fair

→ werfe 3 mal, Erg.: 3x Zahl

→ werfe 10 mal, Erg: 9x Zahl



ohne Beachtung der Reihenfolge:

2x K: $\frac{1}{4} = 25\%$

1x K, 1x Z: $\frac{1}{2} = 50\%$

2x Z: $\frac{1}{4} = 25\%$

3x werfen: 3x Z: $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \left(\frac{1}{2}\right)^3 = \frac{1}{8} = 12{,}5\%$

10x werfen: 9x Z, 1x K

$\left(\frac{1}{2}\right)^9 \cdot \frac{1}{2} \cdot 10 = \frac{10}{1024} \approx 0{,}01 = 1\%$