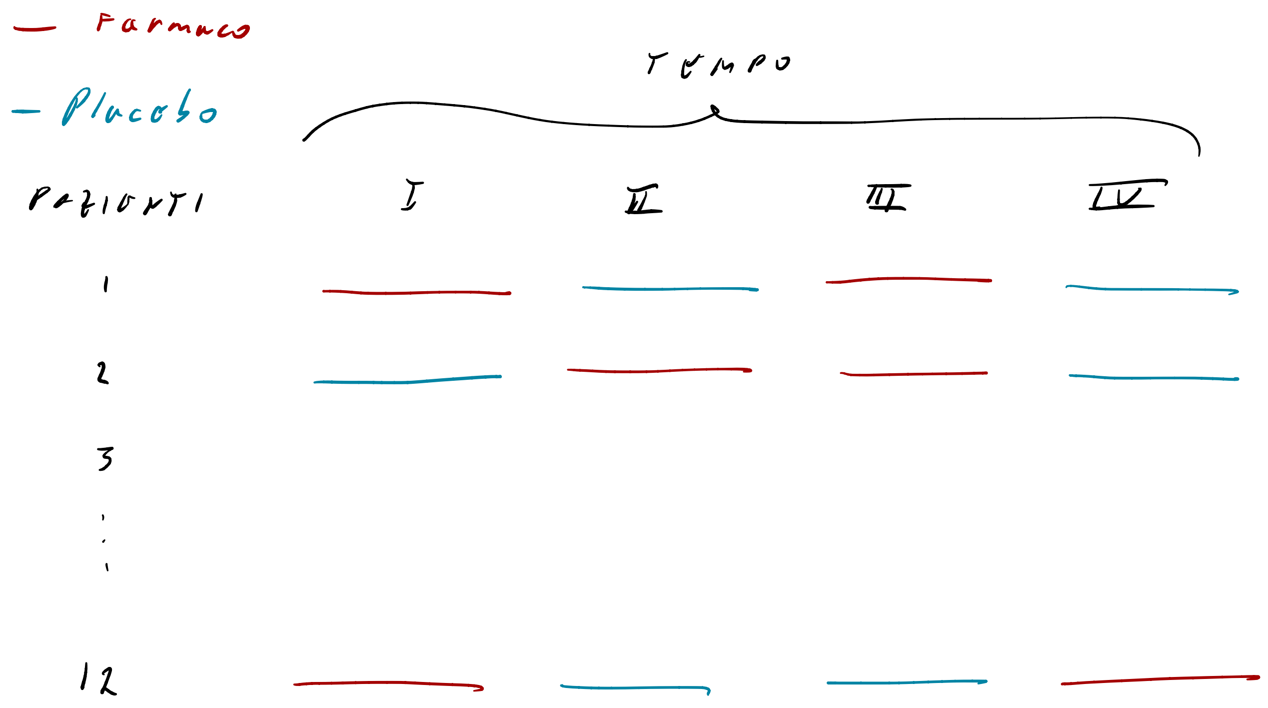


Test di ipotesi

"Ipotesi Nulla"

I.N.: I dati sono spiegati dal caso
Non c'è nessun effetto

I.A.: Un effetto esiste

"Ipotesi alternativa"

Il test rigetta l'ipotesi nulla con

"$p <$ soglia di significatività"

"Il caso produce i dati osservati, o altri più estremi con probabilità < "soglia"

Patients	No. of Attacks of Pain	
	Pronethalol	Placebo
1 +	7	14
2 +	16	23
3 +	29	71
4 +	25	34
5 +	15	17
6 +	1	8
7 +	0	2
8 +	2	7
9 +	0	3
10 −	348	323
11 +	65	79
12 +	41	55

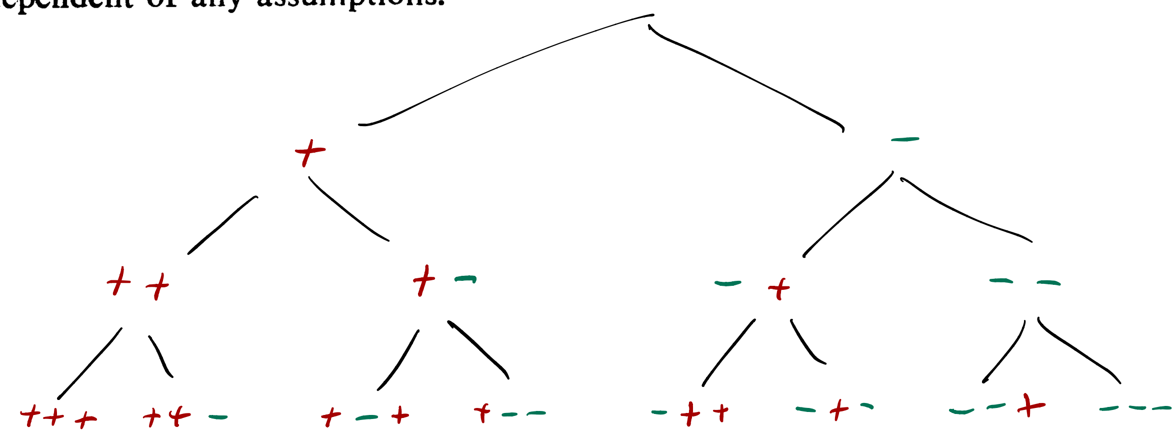
I.N.: $\pm$ sono 50/50

Of the 12 patients, 11 had fewer attacks on pronethalol than on placebo. This event in itself is statistically significant (P=0.003) and has the advantage over other analyses of being independent of any assumptions.

1 paz.

2 paz.

3 paz.



12 paz. $2^{12} = 4096$ casi

Casi con uno o meno peggioramenti: 13

$$p = \frac{13}{4096} = 0.0032$$

test a due code:

$$p = \frac{26}{4096} = 0.0063$$

Test t sulle medie

Abbiamo una v.s. X

un campione di n individui

I.N.: μ_X = un certo valore μ_0

I.A.: $\mu_X \neq \mu_0$

Calcolo l'intervallo di confidenza di $\hat{\mu} = \bar{x}$

al livello di confidenza $1-p$

se μ_0 NON appartiene a questo int. rigetto l'I.N.

μ_0 NON appartiene a $\bar{x} \pm \widehat{SEM} \cdot t_{n-1, \, p/2}$?

$$|\mu_0 - \bar{x}| > s\hat{\sigma}_M \cdot t_{n-1, \frac{p}{2}} \quad ?$$

$$\frac{|\mu_0 - \bar{x}|}{s\hat{\sigma}_M} > t_{n-1, \frac{p}{2}}$$

$$\boxed{\frac{|\mu_0 - \bar{x}|}{s/\sqrt{n}} > t_{n-1, \frac{p}{2}}}$$

Statistica di test

Test t per medie di var. appaiate

I.N.: $\mu_X = \mu_Y$

Applico il test t alla ipotesi

I.N.': $\mu_{X-Y} = 0$

Test t per il confronto delle medie di variabili NON APPAIATE

X misurata su un campione di n ind.

Y ———————— m ind.

$$t = \frac{|\bar{X} - \bar{Y}|}{\sqrt{\frac{(m-1)S_X^2 + (n-1)S_Y^2}{m+n-2}\left(\frac{1}{m} + \frac{1}{n}\right)}} > t_{\alpha/2,\, m+n-2}$$

Patients	No. of Attacks of Pain	
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Of the 12 patients, 11 had fewer attacks on pronethalol than on placebo. This event in itself is statistically significant (P=0.003) and has the advantage over other analyses of being independent of any assumptions.

The figures have also been analysed using a standard "analysis of variance" technique, after transforming the variable to log (number of attacks + 1). This transformation makes the distribution more nearly symmetrical, and the variability more nearly equal in the different groups, as required for the analysis. The difference between the placebo and pronethalol figures is found to be significant at the 1% level. There is no evidence in this small series that the drug is any better for some patients than for others.

— $p < 0.01$

$$X = \log_e(B+1) - \log_e(A+1)$$

	A	B	
	pronethalol	placebo	X
1	7	14	0.62860866
2	16	23	0.34484049
3	29	71	0.87546874
4	25	34	0.29725152
5	15	17	0.11778304
6	1	8	1.50407740
7	0	2	1.09861229
8	2	7	0.98082925
9	0	3	1.38629436
10	348	323	-0.07432841
11	65	79	0.19237189
12	41	55	0.28768207

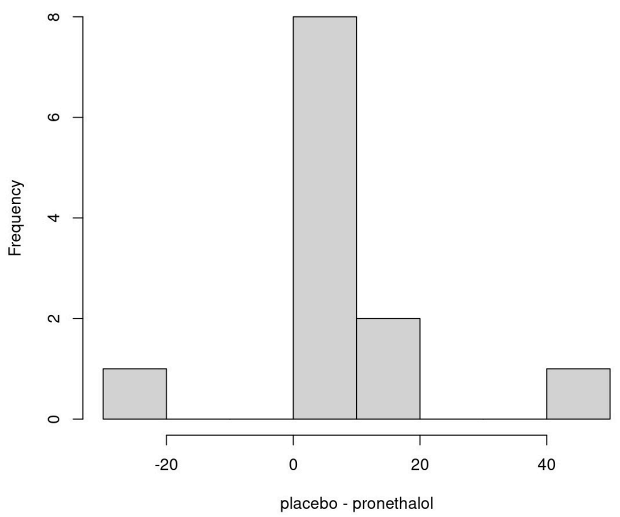
H_0: $\mu_X = 0$

$$\hat{\mu} = \frac{x_1 + x_2 + \dots + x_{12}}{12} \approx 0.6366243$$

$$s = \sqrt{\frac{(x_1 - \hat{\mu})^2 + \dots + (x_{12} - \hat{\mu})^2}{11}} \approx 0.5220226$$

$$t = \frac{|\hat{\mu}|}{s/\sqrt{12}} \approx 4.22 > t_{11,\,0.005} = 3.11$$

Histogram of placebo - pronethalol



Histogram of log(placebo + 1) - log(pronethalol + 1)