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How many subjects do we need assuming each subject has 8 stages?

Power analysis by simulation

Consider following model and a hypothesis test:

$$y_{ij} = \mu + b_i + e_{ij},\ b_i \sim N(0, \sigma_1^2),\ e_{ij} \sim N(0, \sigma_2^2),$$

One of the reasons why we are not using "session + estrogen+ progesterone" is that they seem to be correlated. Even if they are not linearly correlated, their correlation may cause the variance to increase.

$H_0 : \mu = 0$, VS $H_a : \mu \neq 0$.

	sd=0.20	sd=0.25	sd=0.30
mu=0.3	0.983	0.927	0.829
mu=0.4	1	0.995	0.998
mu=0.5	1	1	0.997

Table 1: n=10, summary of power and size

	sd=0.20	sd=0.25	sd=0.30
mu=0.3	0.998	0.966	0.883
mu=0.4	1	0.999	0.990
mu=0.5	1	1	0.999

Table 2: n=12, summary of power and size

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	sd= 0.14	sd= 0.2	sd= 0.25	0.3
mu= 0.08	0.401	0.244	0.187	0.147
mu= 0.27	1	0.962	0.881	0.779
mu= 0.53	1	1	1	0.999
mu= 0.76	1	1	1	1

Table 3: n=10, response y, summary of power and size

	sd= 0.23	sd= 0.3	sd= 0.35	sd= 0.4
mu= 0.14	0.448	0.312	0.255	0.210
mu=0.45	1	0.985	0.947	0.903
mu=0.76	1	1	1	1
mu= 1.16	1	1	1	1

Table 4: n=10, response z, summary of power and size

Grand mean	-0.367
subject-1-mean	0.078
subject-2-mean	-0.532
subject-3-mean	-0.274
subject-4-mean	-0.768
between-subject-variance	0.132
Within-subject-variance	0.0197

Table 5: response y, statistic summary

Grand mean	0.351
subject-1-mean	1.160
subject-2-mean	0.757
subject-3-mean	-0.452
subject-4-mean	0.142
between-subject-variance	0.499
Within-subject-variance	0.0528

Table 6: response z, statistic summary