MDSC 643.01, Biostatistics I
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Comparing paired binomial samples

Same fundamental experimental principles apply to paired designs with binary outcomes as with continuous outcomes

More efficient than unpaired design

Two observations per subject

Observations yield more information (more power).

Observations can be tabulated in two formats

customary format - rows = conditions (exposures), cols = outcome

usual 2 x 2 methods don't apply due to matching

discordancy table - "non-standard" 2 x 2 table

usual 2 x 2 methods apply but with new interpretation

OR , chi-square measures association within pairs

e.g.

Comparing proportions in a table of discordancies

concordant observations not "informative" about differences

discordant observations provide most information

test for differences can be reduced to test of $H_0: p = 1/2$ in discordant cells

exact binomial test can be applied, n_D = # discordant observations

e.g.

for large samples (Rosner: $n_D \geq 20$),

McNemar's test $X^2 = \frac{(|b-c|-1)^2}{b+c}$

is approximately χ^2 with 1 degree of freedom under H_0

note: subtraction of 1 is a continuity correction

e.g. (for illustration, $n_D < 20$)