

"Is 
$$p$$
 different from  $0.6$ ?"  $\rightarrow p_0 = 0.6$ 

Test-statistic, Use z-distribution:

$$z = \frac{\hat{p} - p_0}{se_0}$$
,  $se_0 = \sqrt{\frac{p_0(1 - p_0)}{n}}$ 

Comparing independent groups proportions

"Is  $p_1$  different from  $p_2$ ?"

Test-statistic, Use z-distribution:

$$z = \frac{\widehat{p_1} - \widehat{p_2} - 0}{se_0}$$
,  $se_0 = \sqrt{\frac{\widehat{p}(1 - \widehat{p})}{n_1} + \frac{\widehat{p}(1 - \widehat{p})}{n_2}}$ ,

 $\hat{p}$ =pooled estimate, see p471-472

Comparing dependent groups proportions

"Is  $p_1$  different from  $p_2$ ?"

Test-statistic, use z-distribution:
McNemar test (pp503-504):

$$z = \frac{f_{10} - f_{01}}{\sqrt{f_{10} + f_{01}}}, f_{01} = \text{frequency of pairs}$$

scoring 0,1;  $f_{10}$ =freq. of pairs that score 1,0 (see slides lecture 17)

Comparing one group to a specific mean

"Is  $\mu$  different from 8.2?"  $\rightarrow \mu_0 = 8.2$ 

Test-statistic, Use t-distribution:

$$t = \frac{\bar{x} - \mu_0}{se}$$
, se  $= \frac{s}{\sqrt{n}}$ , with df=n-1

Comparing independent groups means

"Is  $\mu_1$  different from  $\mu_2$ ?"

"Is  $\mu_1$  different

from  $\mu_2$ ?"

Test-statistic, Use t-distribution:

$$t = \frac{\overline{x_1} - \overline{x_2} - 0}{se}$$
, se  $= \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$ ,

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Test-statistic, Use t-distribution:

$$t = \frac{\overline{x_d} - 0}{s_e}$$
, se  $= \frac{s_d}{\sqrt{n}}$ , with df=n-1

 $\overline{x_d}$  is the mean of the difference scores, See p.498

These give you a test-statistic. The next step to get a p-value is to calculate a tail probability using:

Z-value, Left tail probability: =norm.dist(z-value;0;1;true) or

Z-value, Right tail probability: =1-norm.dist(z-value;0;1;true)

T-value, Left tail probability: =t.dist(t-value;df;true) or

T-value, Right tail probability: =1-t.dist(t-value;df;true)

If  $H_a$  is directed (one-sided test): Calculate left or right tail depending on direction of  $H_a$ 

If  $H_a$  is undirected (two-sided test): Calculate smaller tail (that is left tail for negative z-value or t-value, or right tail for positive z-value or t-value) and then double it!

Comparing dependent groups means