Matched Pairs Data

Math 121 - Workshop

Sometimes you have quantitative data that comes in pairs: each individual in the data table has two numbers. Here is an example. The following data comes from 24 marriage records from Cumberland County, Pennsylvania. The individuals are the couples and each individual has an age for the husband and an age for the wife.

Husband's Age	Wife's Age	Difference		Husband's Age	Wife's Age	Difference
25	22	3		25	24	1
25	32	-7		23	22	1
51	50	1		19	16	3
25	25	0		71	73	-2
38	33	5		26	27	-1
30	27	3		31	36	-5
60	45	15		26	24	2
54	47	7		62	60	2
31	30	1		29	26	3
54	44	10		31	23	8
23	23	0		29	28	1
34	39	-5		35	36	-1

We want to know if husbands are older than their wives on average (in the population). So we set up the following hypotheses where μ_H is the population mean age of the husbands and μ_W is the population mean age for the wives when they get married.

- $H_0 : \mu_H = \mu_W$
- $H_A : \mu_H > \mu_W$

Given the two means (μ_M and μ_F), it looks like we should do a two-sample t-test, but because the individuals in this data frame are actually the married couples, we actually only have one-sample and so we should do a one sample t-test focusing on the age difference between the men and the women. This is called a **matched pairs t-test**. This is a one-sample t-test to see if the average difference is significantly different from zero.

1. Do a matched pairs t-test to see if husbands really are significantly older than their wives. That is, do a one sample t-test on the age differences above to see if there is significant evidence that the average age difference would be positive in the whole population. Use the data summary in the table below:

	$\bar{x}$	s	n
Husbands	35.7	14.6	24
Wives	33.8	13.6	24
Difference	1.88	4.81	24

2. Now make a 90% confidence interval for the average age difference between husbands and their wives.