

7C The Paired t-Test

Paired data:

What you assume about the differences:

Test statistic for a paired t-test:

1. In an experiment to test the effects of alcohol on the reaction times of people, a group of 10 students took part in the experiment. The students were asked to react to a light going on by pushing a switch that would switch it off again. Their reaction times were automatically recorded. After the students had each drunk one pint of beer the experiment was repeated. The results are shown below.

Student	A	B	C	D	E	F	G	H	I	J
Before (s)	0.8	0.2	0.4	0.6	0.4	0.6	0.4	0.8	1.0	0.9
After (s)	0.7	0.5	0.6	0.8	0.8	0.6	0.7	0.9	1.0	0.7
Difference										

Test, at the 5% significance level, whether or not the consumption of a pint of beer increased the students' reaction times.

2. In order to compare two methods of measuring the hardness of metals, readings of Brinell hardness were taken using each method for 8 different metal specimens. The resulting Brinell hardness readings are given in the table below:

Material	Method A	Method B	d
Aluminium	29	31	
Magnesium alloy	64	63	
Wrought iron	104	105	
Duralumin	116	119	
Mild steel	138	140	
70/30 brass	156	156	
Cast iron	199	200	
Nickel chrome steel	385	386	

Use a paired t-test, at the 5% level of significance, to test whether or not there is a difference in the readings given by the two methods.