

Psychology 5741 (Neuroscience) Sample Write Up for *t* Tests

Data Set: CREB Inhibitor

Background:

Protein synthesis in certain areas of the brain (notably the hippocampus) appears necessary for memory retention. A research examined the effect of CREB, an RNA transcription factor, on memory by administering a CREB inhibitor to a group of rats and saline to a control group. The dependent variable in this case was the amount of freezing after establishing a conditioned fear response. Higher freezing is associated with higher memory retention.

Your Task:

Present these data in either figure or table form and write a short (i.e., one paragraph) synopsis of the analysis.

Here are the data:

	Group	Freezing
Type:	Category	Real
Source:	User Entered	User Entered
Class:	Nominal	Continuous
Format:	•	Free Format Fi...
Dec. Places:	•	1
		3
1	Control	54.4
2	Control	46.5
3	Control	48.1
4	Control	48.0
5	Control	43.0
6	Control	55.3
7	Control	55.8
8	Control	35.8
9	Control	51.5
10	CREB Inhibitor	41.1
11	CREB Inhibitor	44.0
12	CREB Inhibitor	36.3
13	CREB Inhibitor	35.6
14	CREB Inhibitor	36.7
15	CREB Inhibitor	41.2
16	CREB Inhibitor	32.8
17	CREB Inhibitor	30.1
18	CREB Inhibitor	34.1
19	CREB Inhibitor	46.1

Here is the output:

Unpaired Means Comparison for Freezing

Grouping Variable: Group

Hypothesized Difference = 0

	Mean Diff.	DF	t-Value	P-Value	95% Lower	95% Upper
Control, CREB Inhibitor	10.917	17	4.087	.0008	5.281	16.553

Variance Comparison for Freezing

Grouping Variable: Group

Hypothesized Ratio = 1

	Var. Ratio	Num. DF	Den. DF	F-Value	P-Value	95% Lower	95% Upper
Control, CREB Inhibitor	1.626	8	9	1.626	.4944	.396	7.084

Group Info for Freezing

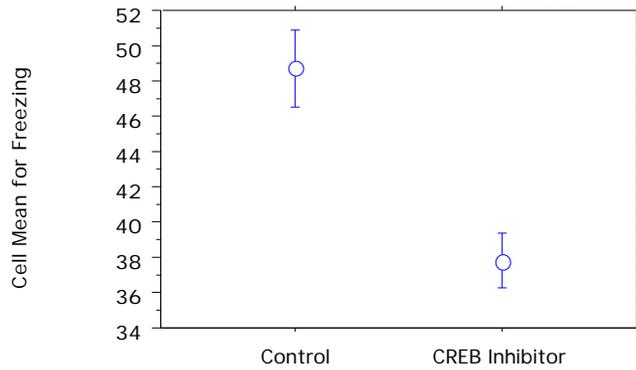
Grouping Variable: Group

	Count	Mean	Variance	Std. Dev.	Std. Err
Control	9	48.721	42.449	6.515	2.172
CREB Inhibitor	10	37.804	26.111	5.110	1.616

Cell Point Chart

Grouping Variable(s): Group

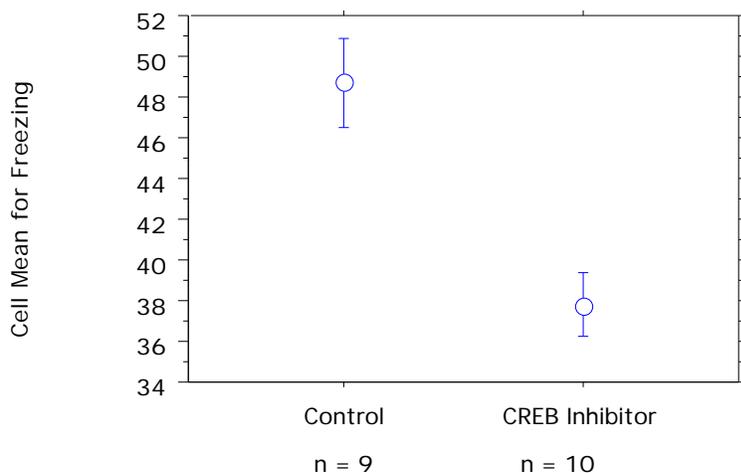
Error Bars: ± 1 Standard Error(s)



Sample write up:

Figure 1 depicts the means (plus or minus one standard error) for the control group and the group given the CREB inhibitor. The difference in means was 10.9 units and was highly significant by a t test for two independent groups ($t = 4.09$, $df = 17$, $p < .001$). The pooled within group standard deviation was 5.8, giving an effect size of 1.88. Hence, the CREB inhibitor had a strong effect in inhibiting the conditioned freezing response.

Figure 1. Means (plus and minus one standard error) for freezing response in controls and in subjects administered a CREB inhibitor.



NOTES:

(1) The formula for pooling the variance for two groups is

$$s_{pooled}^2 = s_p^2 = \frac{(N_1 - 1)s_1^2 + (N_2 - 1)s_2^2}{N_1 + N_2 - 2}$$

where N_i is the number of observations in the i th group and s_i^2 is the variance of the i th group. The pooled within group standard deviation is simply the square root of this quantity.

(2) An effect size is a quantitative index of the magnitude of an effect. For this example, effect size equals the difference in means divided by the pooled within group standard deviation or $10.8 / 5.8$. The result (1.88) denotes that the two groups differ by 1.88 standard deviation units.