Chapter 9: Introduction to the t statistic

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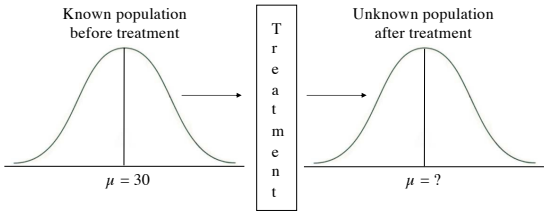

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$$z = \frac{\overline{X} - \mu}{\sigma_{\overline{X}}}$$

$$t = \frac{\overline{X} - \mu}{S_{\overline{X}}}$$

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1. State the hypotheses:
   - e.g. $H_o: \mu = 25$
     $H_1: \mu \neq 25$
     $\alpha = .01$
2. Set the criteria for decision
3. Collect sample data and compute sample statistic
4. Decision (retain / reject H_o)
5. Conclusion

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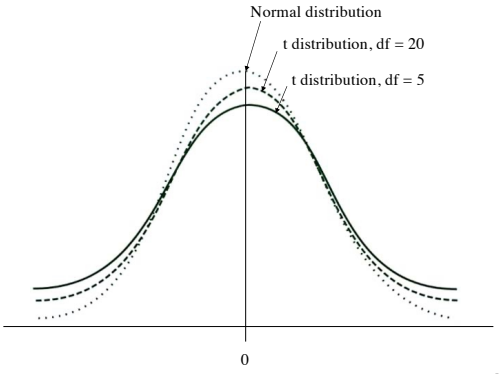

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	Proportion in One Tail					
	0.25	0.10	0.05	0.025	0.01	0.005
	Proportion in Two Tails					
df	0.50	0.20	0.10	0.05	0.02	0.01
1	1.000	3.078	6.314	12.706	31.821	63.657
2	0.816	1.886	2.920	4.303	6.965	9.925
3	0.765	1.638	2.353	3.182	4.541	5.841
4	0.741	1.533	2.132	2.776	3.747	4.604
5	0.727	1.476	2.015	2.571	3.365	4.032
6	0.718	1.440	1.943	2.447	3.143	3.707

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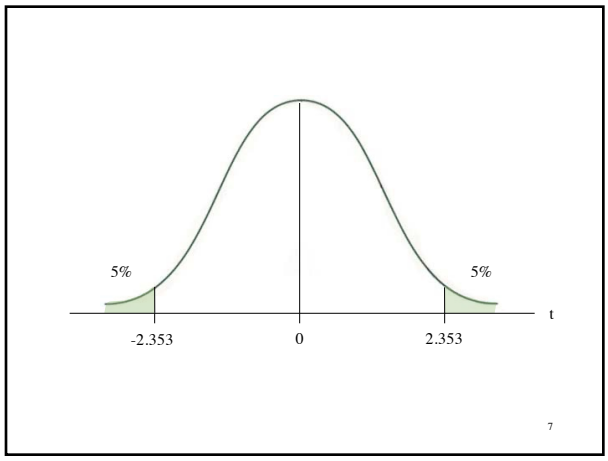

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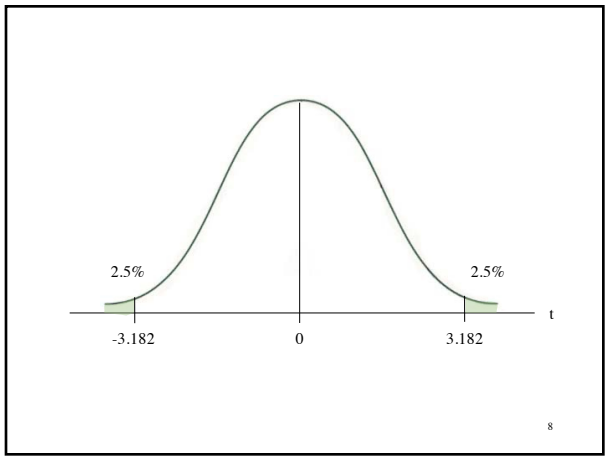

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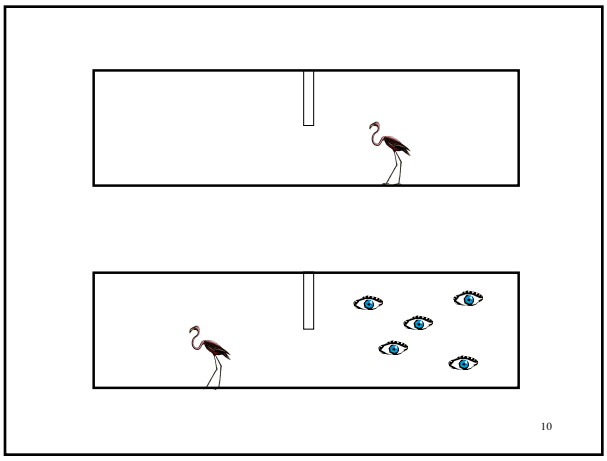
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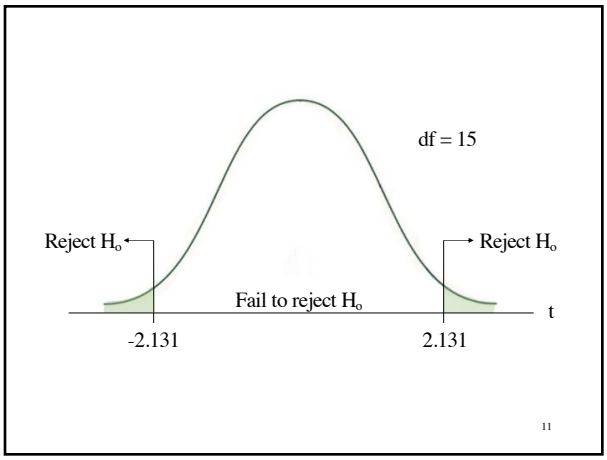
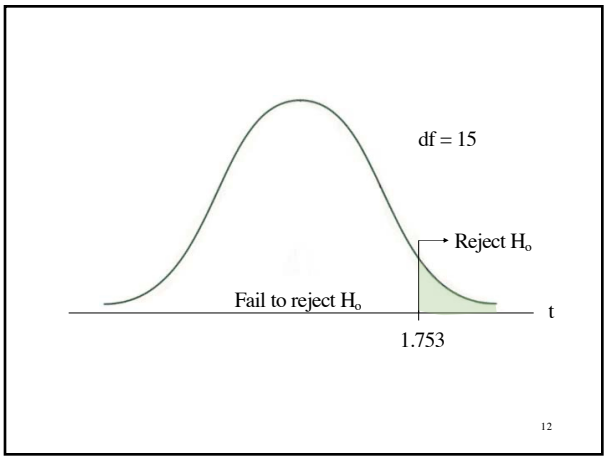

df = 15
Reject H_o
Reject H_o
Fail to reject H_o
t
-2.131
2.131
11

11


df = 15
Reject H_o
Fail to reject H_o
t
1.753
12

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Assumptions of t test

1. Values in sample must consist of independent observations
2. Population sampled must be normal

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Advantages of t statistic

1. You do not need to know the σ (standard deviation) of the population
2. Use in situations where we do not have a "known" population to serve as a before treatment standard
3. H_o can come from theory, prediction, or whatever

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What is the effect of RH Cerebral Brain Damage?

On a standardized spatial skills test, normative data reveal that people typically get $\mu = 15$ correct solutions. A psychologist selected a sample of $n = 7$ individuals with right cerebral hemisphere damage to test whether their performance on the spatial skills test is significantly impaired.

Unfortunately he has no information about the standard deviation for the spatial skills test.

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Calculating the Sum of the Squared Deviations (SS)

	x	mean	x - mean	x-mean	(x-mean) Squared	x	x squared
	12	11.71428571	12 - 11.714	0.285714286	0.081632653	12	144
	16	11.71428571	16 - 11.714	4.285714286	18.36734694	16	256
	9	11.71428571	9 - 11.714	-2.714285714	7.367346939	9	81
	8	11.71428571	8 - 11.714	-3.714285714	13.79591837	8	64
	10	11.71428571	10 - 11.714	-1.714285714	2.93877551	10	100
	17	11.71428571	17 - 11.714	5.285714286	27.93877551	17	289
	10	11.71428571	10 - 11.714	-1.714285714	2.93877551	10	100
∑x	82			0.00000000000001	73.42857143	82	1034
n	7						
mean	11.7142857					∑x	∑x squared
							SS

This is sum of the deviations of the scores from the mean of x.

This is sum of the squared deviations of the scores from the mean of x.

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