

PSYC 60 – Statistics
Spring 2012
Notes #8 - Part II (Originally labeled #9)

Exercise: Dependent versus Independent t-test

Detecting differences between WATER and GATORADE for marathon times.

Main question: Which test, dependent or independent, has a better chance of detecting an effect?

First: Independent 2-sample t-test

Water Group		Gatorade Group		
	Observed time	Baseline time *	Gatorade effect *	Observed time
A:	5.25 hrs	D: (5.25 hrs	-1.25 hrs) =	4.0 hrs
B:	4.5 hrs	E: (4.5 hrs	-0.75 hrs) =	3.75 hrs
C:	3.75 hrs	F: (3.75 hrs	-1.0 hrs) =	2.75 hrs

(* = unknown to experimenter)

What are the typical marathon times for individuals drinking water?

What are the typical means times for groups of 3 runners drinking water?

What are the typical differences in sample mean for a water versus gatorade group if there was no effect?

If the gatorade group recruited a runner with an unusually slow baseline time (8 hours), how does that affect the difference in water and gatorade sample means?

If the water group happened to recruit people with unusually slow times, is the same automatically true for the gatorade group?

For the independent t-test, what are three sources of variability that prevent the difference in group times from always being 1 hour?

1. Variability in ...
2. Variability in ...
3. Variability in ...

Perform t-test

t*

calculated t

Significant?

Second: Dependent 2-sample t-test

Water condition	Gatorade condition			Difference
Observed time	Baseline time *	Gatorade effect *	Observed time	
A: 5.25 hrs	A: (5.25 hrs	-1.25 hrs) =	4.0 hrs	-1.25 hrs
B: 4.5 hrs	B: (4.5 hrs	-0.75 hrs) =	3.75 hrs	-0.75 hrs
C: 3.75 hrs	C: (3.75 hrs	-1.0 hrs) =	2.75 hrs	-1.0 hrs

What are the typical differences between water & gatorade for individual runners?

What are the typical mean differences for a water versus gatorade group?

If the experiment recruited a runner with an unusually slow baseline time (8 hours), how does that affect the mean difference?

If the water condition happened to show unusually slow times, would the same be expected in the gatorade condition?

For the dependent t-test, how many sources of variability prevent the difference in condition times from always being 1 hour?

1. Variability in...
2. Variability in...
3. Variability in...

Perform t-test

t*

calculated t

Significant?

Summary

Which test, dependent or independent, has a better chance of detecting an effect?

Why?