The General's Dilemma

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Data Collection

- Use a StatCrunch survey or SurveyMonkey

General's Dilemma

Used to collect data from the General's Dilemma Activity in Sullivan Statistics.

* Required

1. Edit - Delete
   Read the third sentence of the General's Dilemma, which begins "If he takes the first route..." Does your version state "200 soldiers will be saved" or "400 soldiers will die"?
   - 200 soldiers will be saved
   - 400 soldiers will die

2. Edit - Delete
   Which route did you choose? *
   - Route I
   - Route II

Submit survey

Version I

- Threatened by a superior enemy force, the general faces a dilemma. His intelligence officers say his soldiers will be caught in an ambush in which 600 of them will die unless he leads them to safety by one of two available routes. If he takes the first route, 200 soldiers will be saved. If he takes the second, there is a one-third chance that 600 soldiers will be saved, and a two-thirds chance that none will be saved. Which route should he take?

Version II

- Threatened by a superior enemy force, the general faces a dilemma. His intelligence officers say his soldiers will be caught in an ambush in which 600 of them will die unless he leads them to safety by one of two available routes. If he takes the first route, 400 soldiers will die. If he takes the second, there is a one-third chance that no soldiers will die, and a two-thirds chance that 600 soldiers will die. Which route should he take?

Analysis

- The raw data.
- Organize the data in a two-way contingency table. Let the row variable represent the version and let the column variable represent the route.
- Determine the conditional distribution of route selected by version.
- The research objective is to determine if there is a difference in route selected depending upon the version read. Based on this, determine the null and alternative hypotheses.
- Using the randomization test for two proportions applet in StatCrunch to approximate a P-value for this hypothesis test. Based on the result, what do you conclude?

Data in StatCrunch

Generals_Dilemma

StatCrunch 2 | Applets | Edit | Data | Stat | Graph | Help

Row	Version	Route	var3	var4	var5	var6	var7
14	Risk Averse	1					
15	Risk Averse	1					
16	Risk Averse	1					
17	Risk Averse	1					
18	Risk Averse	1					
19	Risk Averse	2					
20	Risk Averse	2					
21	Risk Averse	2					
22	Risk Averse	2					
23	Risk Averse	2					
24	Risk Seeking	1					
25	Risk Seeking	1					
26	Risk Seeking	1					
27	Risk Seeking	1					
28	Risk Seeking	1					
29	Risk Seeking	1					
30	Risk Seeking	1					
31	Risk Seeking	1					
32	Risk Seeking	1					
33	Risk Seeking	2					
34	Risk Seeking	2					
35	Risk Seeking	2					

Contingency Tables in StatCrunch

Contingency table (with data)

Row variable:
Version

Column variable:
Route

Where:
--optional-- Build

Group by:
--optional--

Display:
- Row percent
- Column percent
- Percent of total
- Expected count
- Contributions to Chi-Square

Hypothesis tests:
- Chi-Square test for independence
- Fisher's exact test for independence (2x2 only)
- McNemar's test for marginal homogeniety (2x2 only)
- Cramer's V test for association
- Mantel-Haenszel (group by with 2x2 only)

Confidence intervals:
- Lambda
- Uncertainty coefficient
- Kappa

? Cancel Compute!

Options

Contingency table results:
Rows: Version
Columns: Route

Cell format
Count (Row percent)

	1	2	Total
Risk Averse	18 (78.26%)	5 (21.74%)	23 (100%)
Risk Seeking	9 (37.5%)	15 (62.5%)	24 (100%)
Total	27 (57.45%)	20 (42.55%)	47 (100%)

Chi-Square test:

Statistic	DF	Value	P-value
Chi-square	1	7.982337	0.0047

Randomization Tests in StatCrunch

Test For Two Proportions

From data table:

Sample 1 in:

Route

Where:

Version = "Risk Seeking" **Build**

Label:

Risk Seeking

Sample 2 in:

Route

Where:

Version = "Risk Averse" **Build**

Label:

Risk Averse

Success: 1

From summary:

Sample 1:

# of successes:

# of observations:

Label: --optional-

? **Cancel** **Compute!**

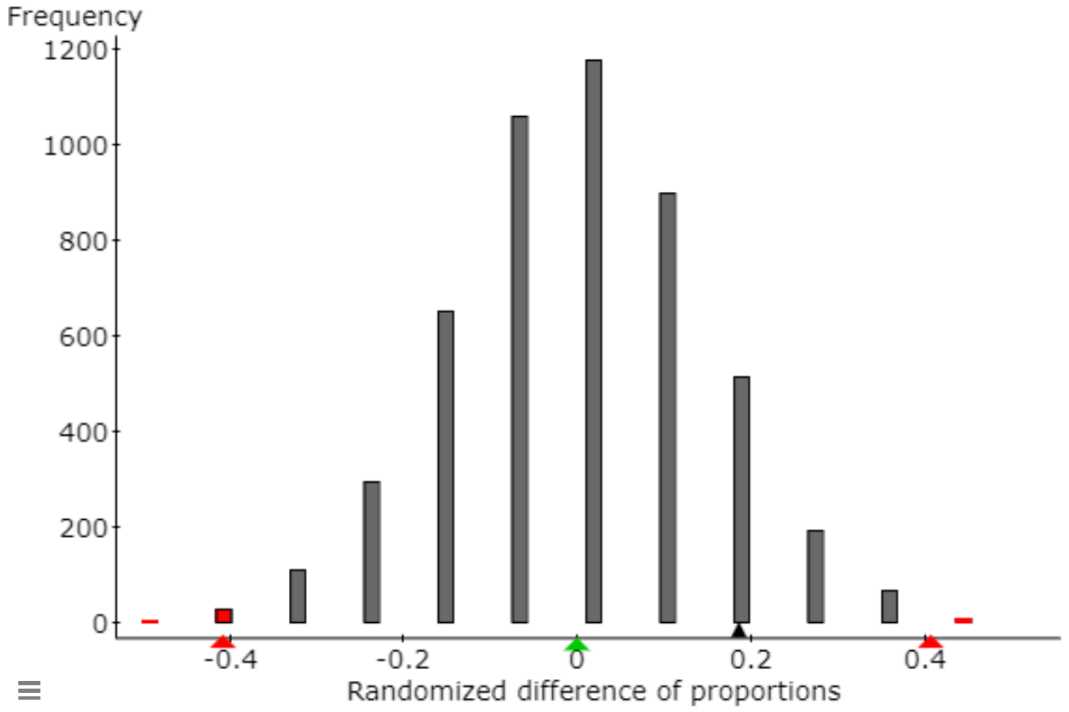
Options

Randomized differences: Prop. of Route = 1 (Risk Seeking - Risk

1 time **5 times** **1000 times** **Analyze** **Reset** **Info**

Runs
4978
4979
4980
4981
4982
4983
4984
4985
4986
4987
4988
4989
4990
4991
4992
4993
4994
4995
4996
4997
4998
4999
5000

Event	Count	Proportion of 5000 runs
-0.407608 or below	29	0.0058
0.407608 or above	8	0.0016
Total	37	0.0074



Comparing Two Proportions

Two Sample Proportions

Sample 1:
Values in:
Route
Success:
1
Where:
Version = "Risk Averse" **Build**

Sample 2:
Values in:
Route
Success:
1
Where:
Version = "Risk Seeking"

Perform:
Hypothesis test for p_1 - p_2
H_0: $p_1 - p_2 = 0$
H_A: $p_1 - p_2 \neq 0$

Options

Two sample proportion hypothesis test:
p_1 : Proportion of successes (Success = 1) for Route where Version = "Risk Averse"
p_2 : Proportion of successes (Success = 1) for Route where Version = "Risk Seeking"
$p_1 - p_2$: Difference in proportions
H_0 : $p_1 - p_2 = 0$
H_A : $p_1 - p_2 \neq 0$

Hypothesis test results:

Difference	Count1	Total1	Count2	Total2	Sample Diff.	Std. Err.	Z-Stat	P-value
$p_1 - p_2$	18	23	9	24	0.4076087	0.14427079	2.825303	0.0047

A Follow-Up Study

Decision Making Survey

Answer the following questions. There is no right or wrong response, we simply wish to determine which option you would select.

1. Edit - Delete
   Choose one of the following.
   - A sure gain of $3000
   - An 80% chance of $4000 and a 20% chance of winning nothing

2. Edit - Delete
   Choose between:
   - A sure loss of $3000
   - An 80% chance of losing $4000 and a 20% chance of losing $0

The Data

Responses to Decision Making Survey

StatCrunch | Applets | Edit | Data | Stat | Graph | Help

Row	Response_id	RiskAverse	RiskSeek	var4	var5	var6	var7
1	799893	A sure gain of $3	An 80% chance of losing $				
2	799895	A sure gain of $3	An 80% chance of losing $				
3	799900	A sure gain of $3	An 80% chance of losing $				
4	799913	An 80% chance	A sure loss of $3000				
5	799915	A sure gain of $3	An 80% chance of losing $				
6	799921	A sure gain of $3	An 80% chance of losing $				
7	799933	A sure gain of $3	An 80% chance of losing $				
8	799943	A sure gain of $3	A sure loss of $3000				
9	799950	A sure gain of $3	A sure loss of $3000				
10	799952	A sure gain of $3	A sure loss of $3000				
11	799964	A sure gain of $3	A sure loss of $3000				
12	800005	A sure gain of $3	An 80% chance of losing $				
13	800078	A sure gain of $3	An 80% chance of losing $				
14	800092	A sure gain of $3	An 80% chance of losing $				

Analysis – McNemar's Test

Options

Contingency table results:
Rows: RiskAverse
Columns: RiskSeek

Cell format
Count (Row percent) (Column percent)

	A sure loss of $3000	An 80% chance of losing $4000 and a 20% chance of losing $0	Total
A sure gain of $3000	25 (24.04%) (67.57%)	79 (75.96%) (84.95%)	104 (100%) (80%)
An 80% chance of $4000 and a 20% chance of winning nothing	12 (46.15%) (32.43%)	14 (53.85%) (15.05%)	26 (100%) (20%)
Total	37 (28.46%) (100%)	93 (71.54%) (100%)	130 (100%) (100%)

McNemar's test for marginal homogeneity

Measure	DF	Value	P-value
Chi-Square	1	49.32967	<0.0001