

The University of Georgia
 Department of Political Science
 POLS 2000 Introduction to Political Science

Statistical Significance


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Fall 2004 Georgia Poll


How important do you believe the United Nations is as an organization for maintaining world security? Would you say extremely important, important, not very important, or not at all important?

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- The Logic of Statistical Significance
 - Example
 - Topic: Importance of U.N. for Security
 - Hypothesis: Democrats Think U.N. More Important for Security Than Republicans
 - Null Hypothesis: No Difference Between the Parties in Attitude Toward U.N.

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Fall 2004 Georgia Poll

How important do you believe the United Nations is as an organization for maintaining world security? Would you say extremely important, important, not very important, or not at all important?

respondent's party affiliation	importance of un in maintaining world security				Total
	extremely important	important	not very important	not at all	
democrat	64	53	19	4	140
	45.71	37.86	13.57	2.86	100.00
republican	28	64	48	53	193
	14.51	33.16	24.87	27.46	100.00
Total	92	117	67	57	333
	27.63	35.14	20.12	17.12	100.00

Do The Results Support the Hypothesis?

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- The Logic of Statistical Significance
 - How Do We Know Sample Results Are 'Real' And Not Due to Sampling Error (Biased Sample Results Due to Sampling)?

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- "Significance" of Research Results
 - Overview
 - Statistical Significance
 - How Likely Sample Results Occur in Population?
 - Substantive Significance
 - Is Statistically-Significant Finding Substantively Meaningful?

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- Logic of Tests of Statistical Significance
 - Two Explanations for Associations Between Variables
 - Sample Results Not Representative
 - e.g. Relationship in Sample But Not Population
 - Reject the Null Hypothesis
 - Relationship in Both
 - Results 'Support' or are 'Consistent With' Hypothesis (Not 'Accept' Hypothesis)

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- Tests of Statistical Significance
 - Probability that Relationship Due to Sampling Error (Chance)
 - Expressed as Probabilities
 - e.g., $p = .05$, $p = .01$, $p = .001$

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Fall 2004 Georgia Poll

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```
. tab q6 q53 if q6<3, row all
```

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Pearson chi2(3) = 62.9555 Pr = 0.000

Accept or Reject the Null Hypothesis?

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▪ Difference of Means (t-Test)

▪ e.g., South & Religiosity (2004 NES)

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. ttest relig, by(south) unequal
```

Two-sample t test with unequal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]
otherwis	830	.5726908	.0114927	.3311013	.5501326 .595249
Old Sout	382	.6901178	.0149927	.2930304	.6606389 .7195967
combined	1212	.6097016	.0093995	.3240997	.591437 .6279662
diff		-.117427	.0188909		-.1545066 -.0803475

Satterthwaite's degrees of freedom: 828.785

Ho: mean(otherwis) - mean(Old Sout) = diff = 0

Ha: diff < 0	Ha: diff = 0	Ha: diff > 0
t = -6.2161	t = -6.2161	t = -6.2161
P < t = 0.0000	P > t = 0.0000	P > t = 1.0000

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▪ Correlation

▪ e.g., Moral Values & Religiosity in 2004

```
. pwcorr mtrad relig, sig star(.05)
```

	mtrad	relig
mtrad	1.0000	
relig	0.4231*	1.0000
		0.0000

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▪ OLS Multiple Regression

▪ e.g., Regress Bush Feeling Thermometer on Party Identification, Controlling for Ideology, Sex, Race, and Age

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \epsilon$$

$$y = .86 - 57x_1 - 14x_2 + .76x_3 - 1.20x_4 + 9.05x_5 + e$$

```
. regress bushft pid id female black age
```

Source	SS	df	MS	Number of obs =
Model	667969.467	5	133593.893	1141
Residual	624506.701	1135	550.226169	F(5, 1135) = 242.80
Total	1292476.17	1140	1133.75102	Prob > F = 0.0000
				R-squared = 0.5168
				Adj R-squared = 0.5147
				Root MSE = 23.457

bushft	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
pid	-.57.10519	2.421478	-23.58	0.000	-61.85626 -52.35411
id	-14.12498	1.722495	-8.20	0.000	-17.50461 -10.74534
female	.7654903	1.400711	0.55	0.585	-1.982783 3.513763
black	-1.199076	2.086294	-0.57	0.566	-5.292501 2.89435
age	9.051962	3.009013	3.01	0.003	3.148109 14.95582
_cons	86.36562	1.862337	46.37	0.000	82.71161 90.01963

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- Substantive Significance
 - More Subjective
 - Magnitude of Results
 - Statistical Significance Affected By Sample Size
 - In Large Samples, Even Weak Associations May be 'Significant'
 - 'Significant' Associations May be Substantively Small

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- Substantive Significance, Cont.
 - Contribution to Knowledge?
 - Results Address Theory
 - Something New About Results
 - Results Not Trivial (The 'So What?' Factor)
 - Most Journals (Implicitly) Require Both Statistical & Substantive Significance

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