PEARSON'S r IN SPSS AND PSPP

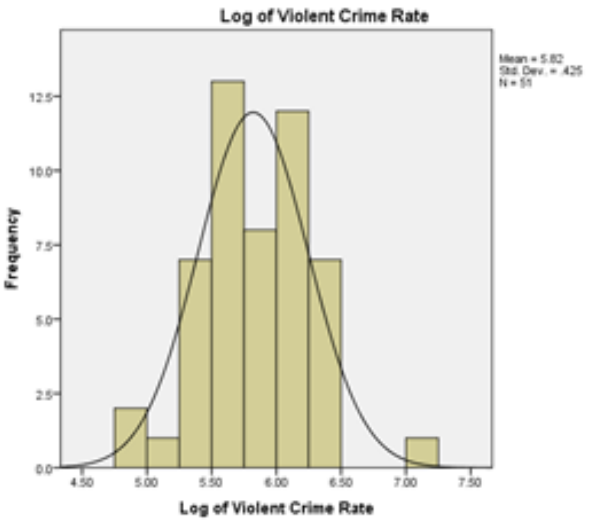
Richard Lee Rogers

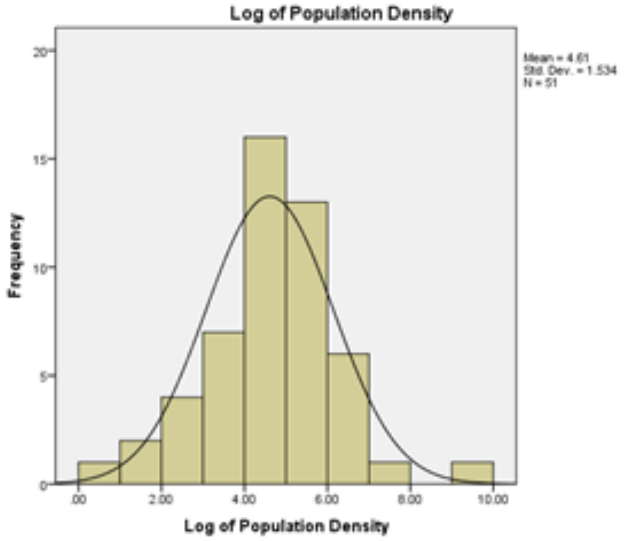
Last Update: February 6, 2016

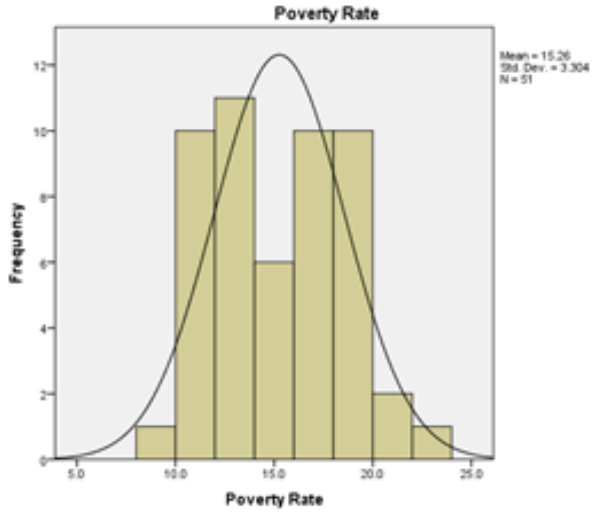
Pearson's r

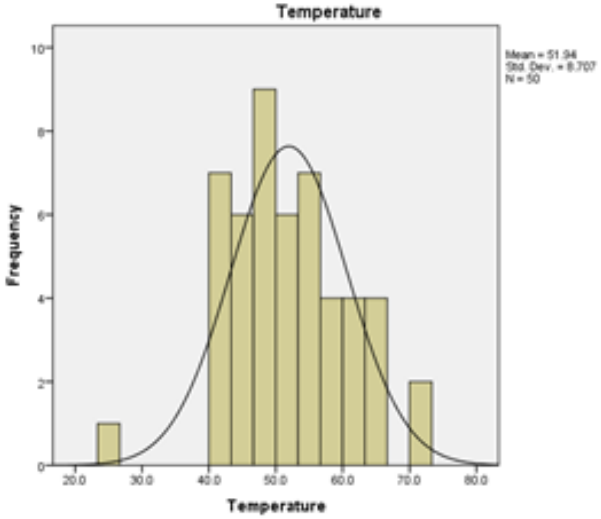
- Used if both the independent and dependent variables are numeric
- Named after Karl Pearson (1857-1936)
- Known by many other names
  - Pearson's product-moment coefficient
  - Correlation statistic
- Referred to using the symbol r. Always use "little r," not capital R, which stands for something else.
- Elements: direction, magnitude, statistical significance

Example

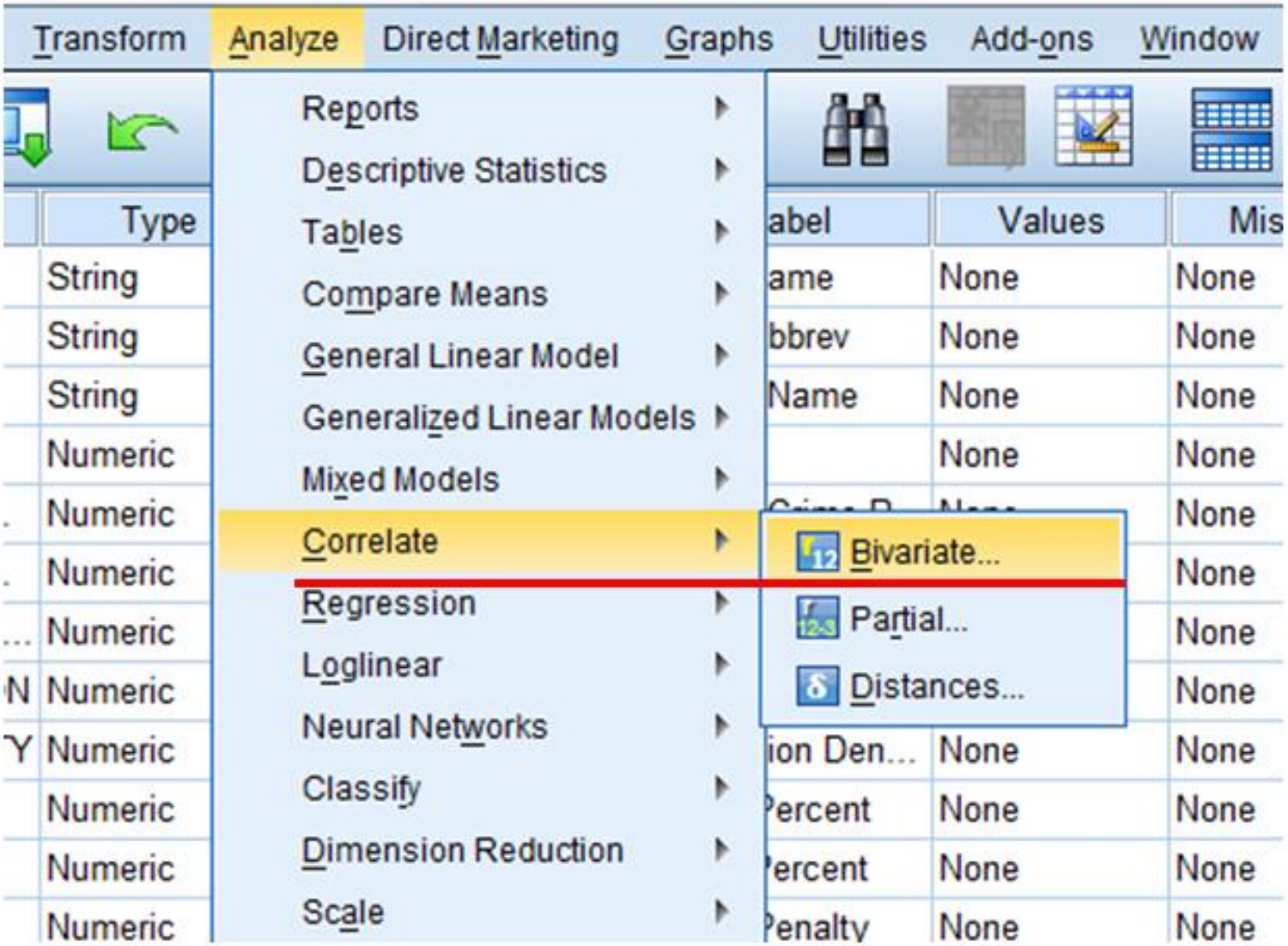

Log of Violent Crime Rate
Mean = 5.82
Std. Dev. = .425
N = 51
Frequency
Log of Violent Crime Rate


Log of Population Density
Mean = 4.61
Std. Dev. = 1.534
N = 51
Frequency
Log of Population Density

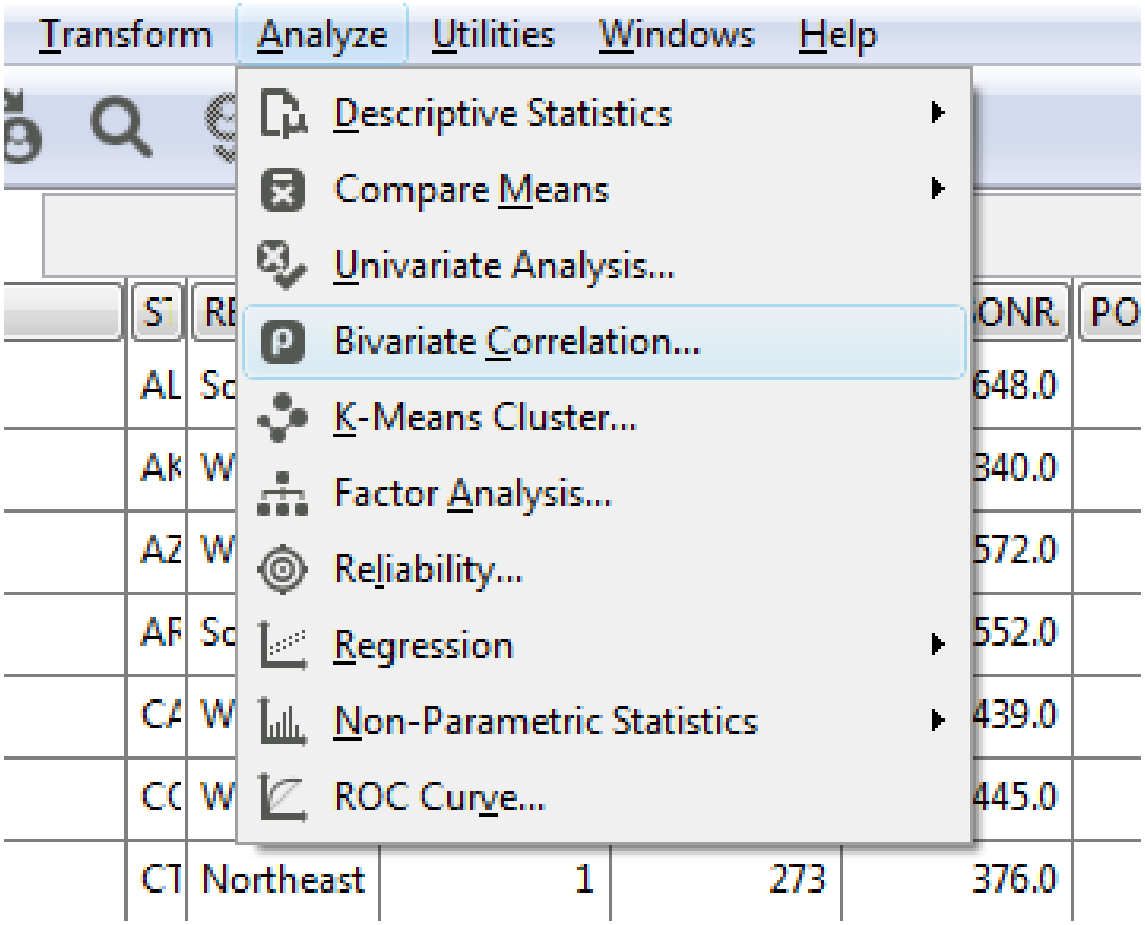

Poverty Rate
Mean = 15.26
Std. Dev. = 3.304
N = 51
Frequency
Poverty Rate


Temperature
Mean = 51.94
Std. Dev. = 8.707
N = 50
Frequency
Temperature

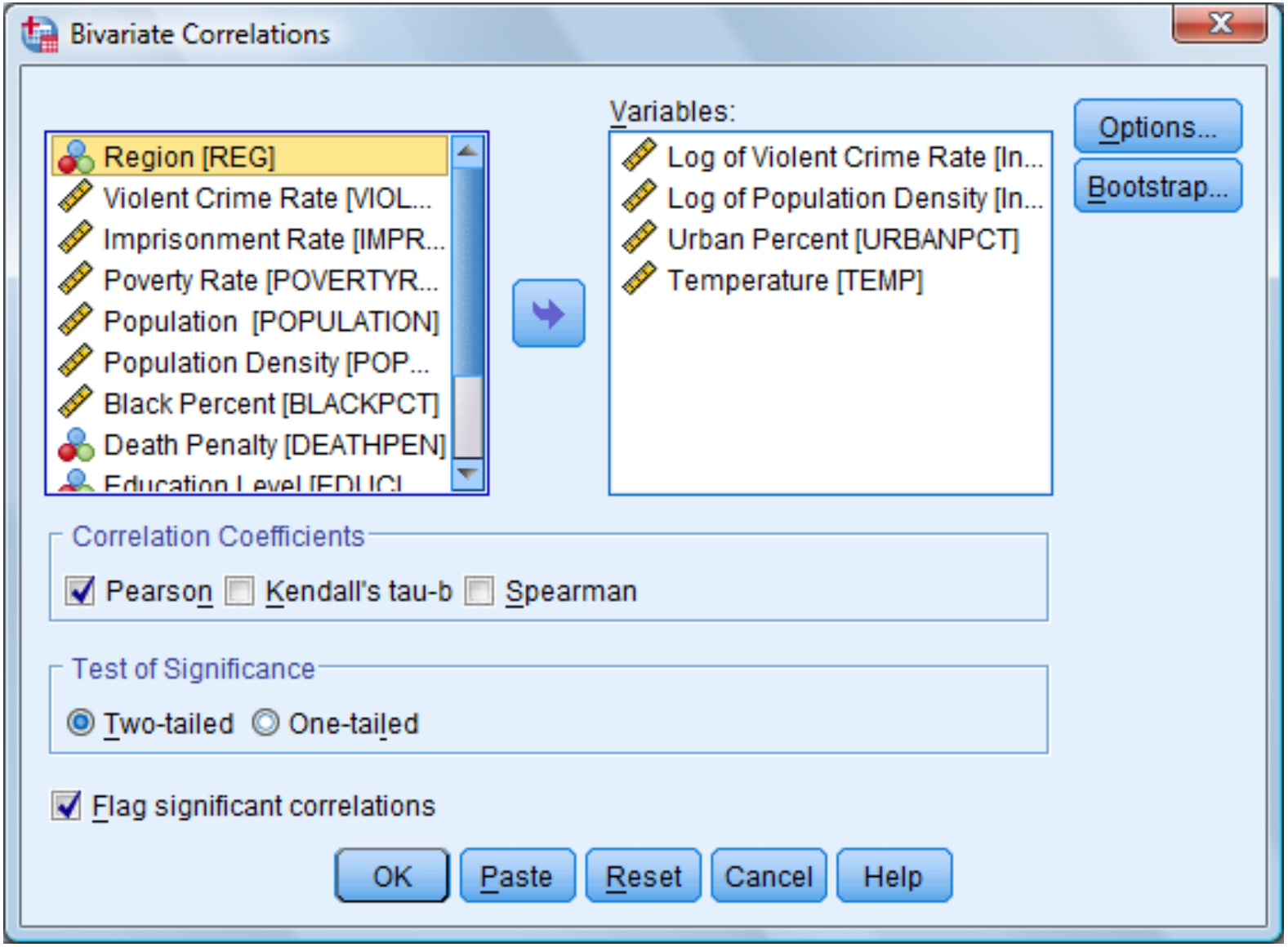
Analyze > Descriptive Statistics > Bivariate



Analyze > Bivariate Correlation



Bivariate Correlations



SPSS Output

Correlations

		Log of Violent Crime Rate	Log of Population Density	Urban Percent	Temperature
Log of Violent Crime Rate	Pearson Correlation	1	.301*	.436**	.415**
	Sig. (2-tailed)		.032	.001	.003
	N	51	51	51	50
Log of Population Density	Pearson Correlation	.301	1	.503**	.446**
	Sig. (2-tailed)	.032		.000	.001
	N	51	51	51	50
Urban Percent	Pearson Correlation	.436**	.503**	1	.216
	Sig. (2-tailed)	.001	.000		.131
	N	51	51	51	50
Temperature	Pearson Correlation	.415**	.446**	.216	1
	Sig. (2-tailed)	.003	.001	.131	
	N	50	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

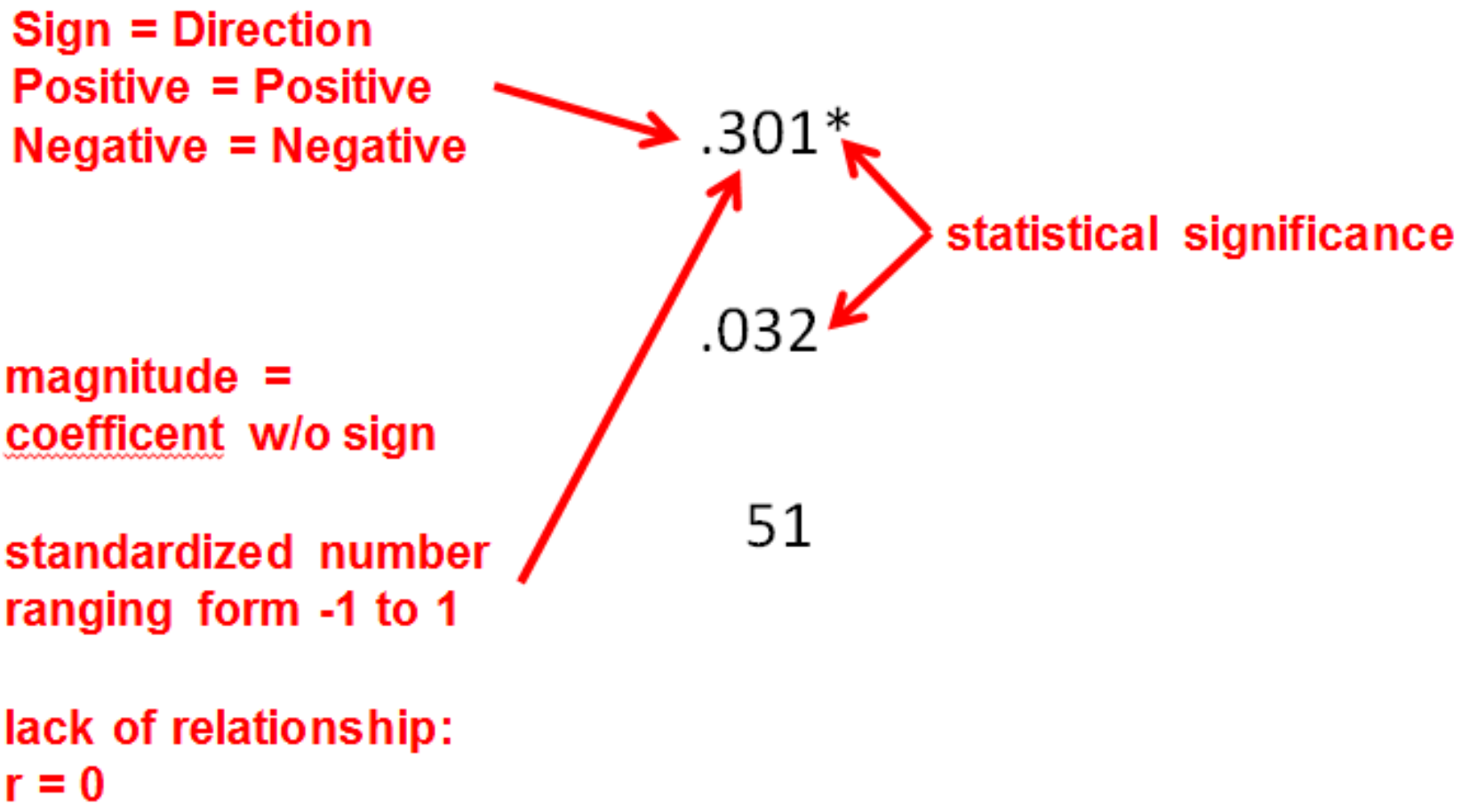
Interpreting Output

.301*

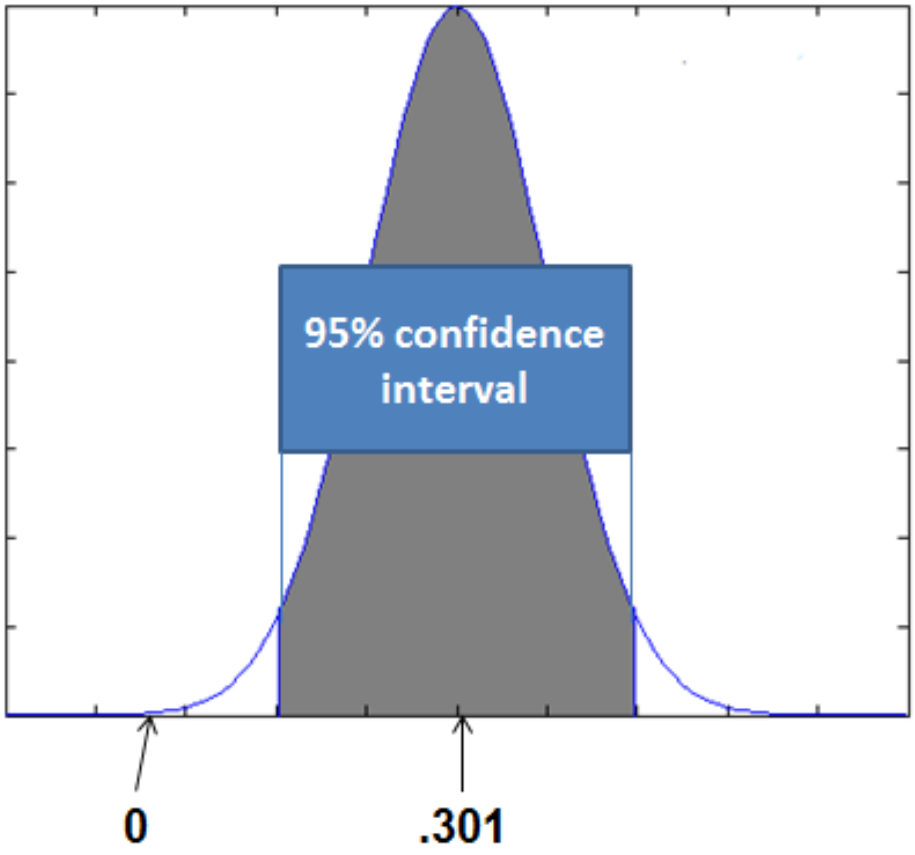
.032

51

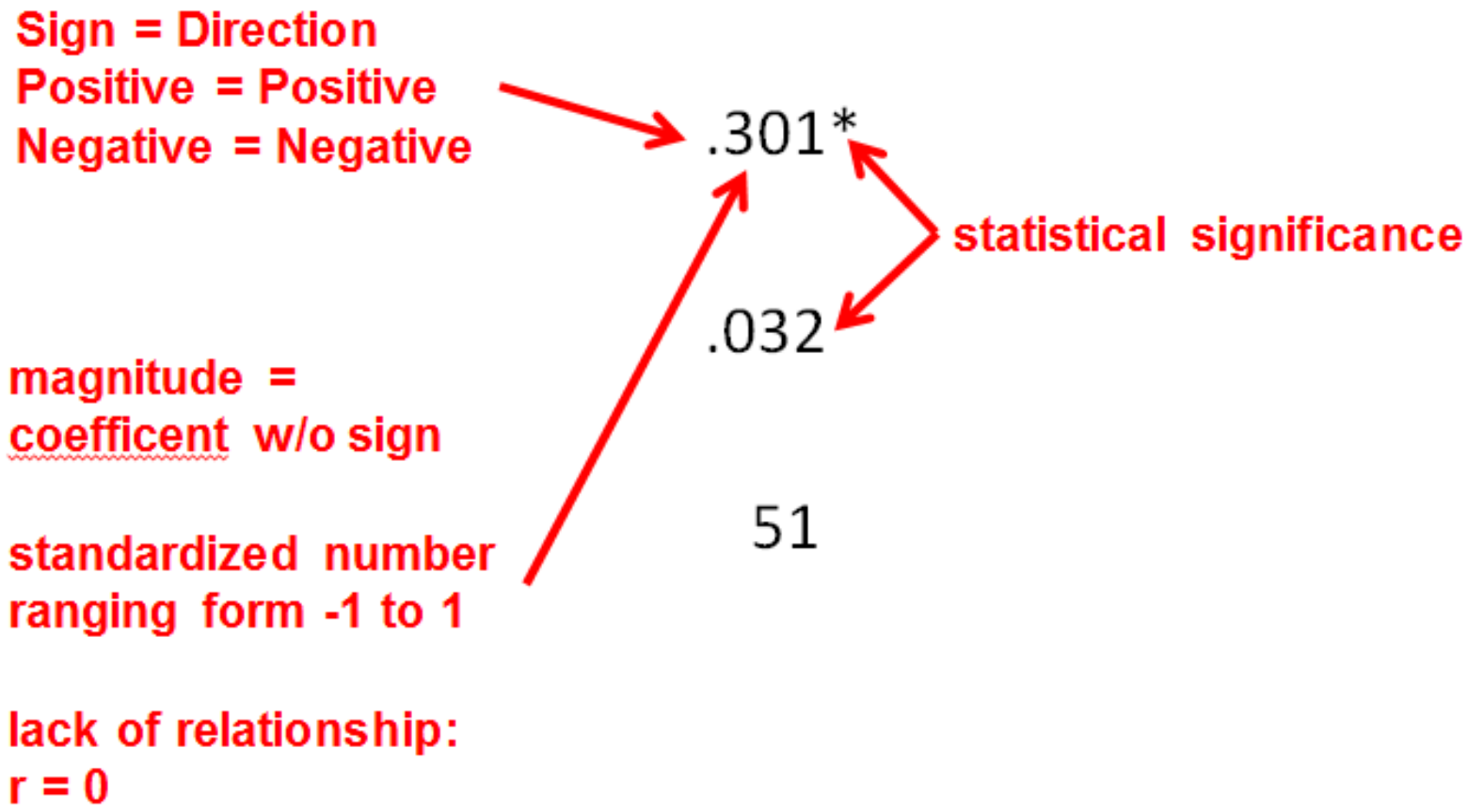
Interpreting Output



Null Hypothesis



Interpreting Output : Asterisks



SPSS Output: Footnote

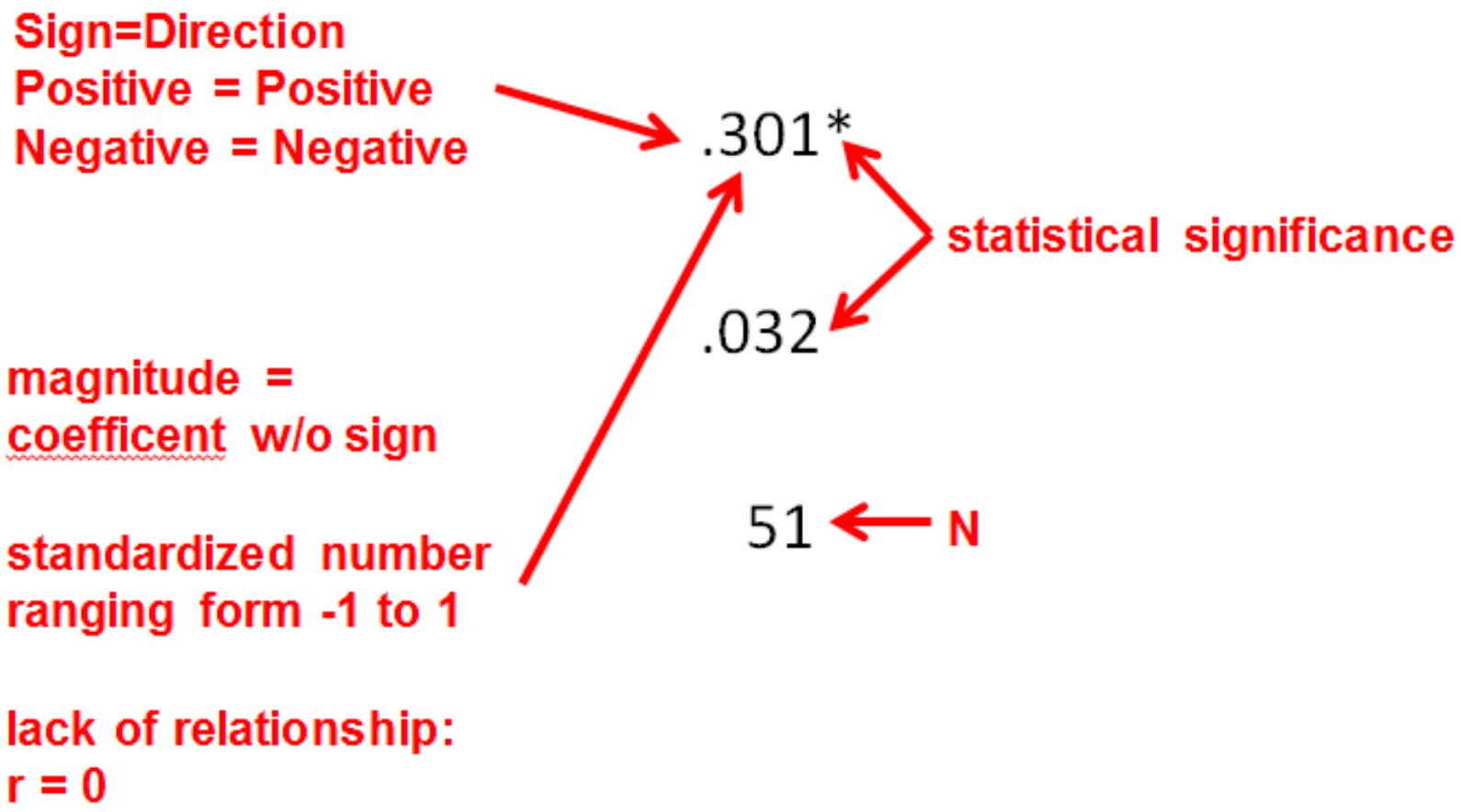
Correlations

		Log of Violent Crime Rate	Log of Population Density	Urban Percent	Temperature
Log of Violent Crime Rate	Pearson Correlation	1	.301*	.436**	.415**
	Sig. (2-tailed)		.032	.001	.003
	N	51	51	51	50
Log of Population Density	Pearson Correlation	.301*	1	.503**	.446**
	Sig. (2-tailed)	.032		.000	.001
	N	51	51	51	50
Urban Percent	Pearson Correlation	.436**	.503**	1	.216
	Sig. (2-tailed)	.001	.000		.131
	N	51	51	51	50
Temperature	Pearson Correlation	.415**	.446**	.216	1
	Sig. (2-tailed)	.003	.001	.131	
	N	50	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Interpreting Output



Formula for Pearson's r

Distance of X from its mean

Distance of Y from its mean

$$r_{x,y} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{s_x s_y}$$

Multiply the two standard deviations together

SPSS Output: Symmetry

Correlations

		Log of Violent Crime Rate	Log of Population Density	Urban Percent	Temperature
Log of Violent Crime Rate	Pearson Correlation		.301*	.436**	.415**
	Sig. (2-tailed)		.032	.001	.003
	N	5	51	51	50
Log of Population Density	Pearson Correlation	.301	1	.503**	.446**
	Sig. (2-tailed)	.032		.000	.001
	N	51	51	51	50
Urban Percent	Pearson Correlation	.436**	.503**	1	.216
	Sig. (2-tailed)	.001	.000		.131
	N	51	51	51	50
Temperature	Pearson Correlation	.415**	.446**	.216	1
	Sig. (2-tailed)	.003	.001	.131	
	N	50	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

SPSS Output: Diagonal

Correlations

		Log of Violent Crime Rate	Log of Population Density	Urban Percent	Temperature
Log of Violent Crime Rate	Pearson Correlation	1	.301*	.436**	.415**
	Sig. (2-tailed)		.032	.001	.003
	N	51	51	51	50
Log of Population Density	Pearson Correlation	.301*	1	.503**	.446**
	Sig. (2-tailed)	.032		.000	.001
	N	51	51	51	50
Urban Percent	Pearson Correlation	.436**	.503**	1	.216
	Sig. (2-tailed)	.001	.000		.131
	N	51	51	51	50
Temperature	Pearson Correlation	.415**	.446**	.216	1
	Sig. (2-tailed)	.003	.001	.131	
	N	50	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

APA Table

Table 2

Correlation Matrix

	Log of Violent Crime	Log of Pop. Density	% Urban
Temperature	.42**	.45**	.22
% urban	.44**	.50**	
Log of pop. density	.30*		

Note: * p<.05 ** p<.01

The End

- Used if both the independent and dependent variables are numeric
- Gives a standardized result between -1 and 1.
- Elements: direction, magnitude, statistical significance