

# Normality Tests in SPSS

# What do these tests do?

- They compare the shape of your sample distribution to the shape of a normal curve
- Assumes, if your sample is normal shaped, the population from which it came is normally distributed
  - Then you can assume normality
- A significant test means the sample distribution is not shaped like a normal curve
- Shapiro Wilks W test is the one we will use most

# Shapiro Wilks W Test

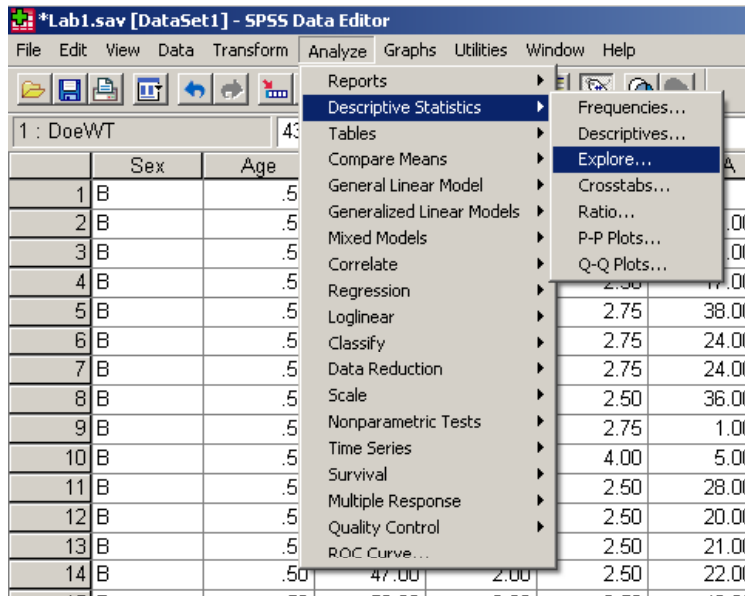
- W is the test statistic 
$$W = \frac{\left(\sum_{i=1}^n a_i x_{(i)}\right)^2}{\sum_{i=1}^n (x_i - \bar{x})^2}$$
- W is insignificant if the variable's distribution is not different from normal
- $W \approx$  the correlation between given data and ideal normal scores
- $W = 1$  when your sample-variable data are perfectly normal (perfect  $H_0$ )
- When W is significantly smaller than 1 = non-normal ( $H_a$  is accepted)
- Shapiro-Wilk's W is recommended for small and medium samples up to  $n = 2000$

# What is a significant test result?

- When  $W$  is small enough given sample size that  $p$  is low, the results are significant
- What is  $p$ ?  $p$  is the probability of Type I error, rejecting the  $H_0$  when it is true
- So, if  $p$  is high, we do not want to reject  $H_0$
- If  $p$  is low, there is a low probability of Type I error

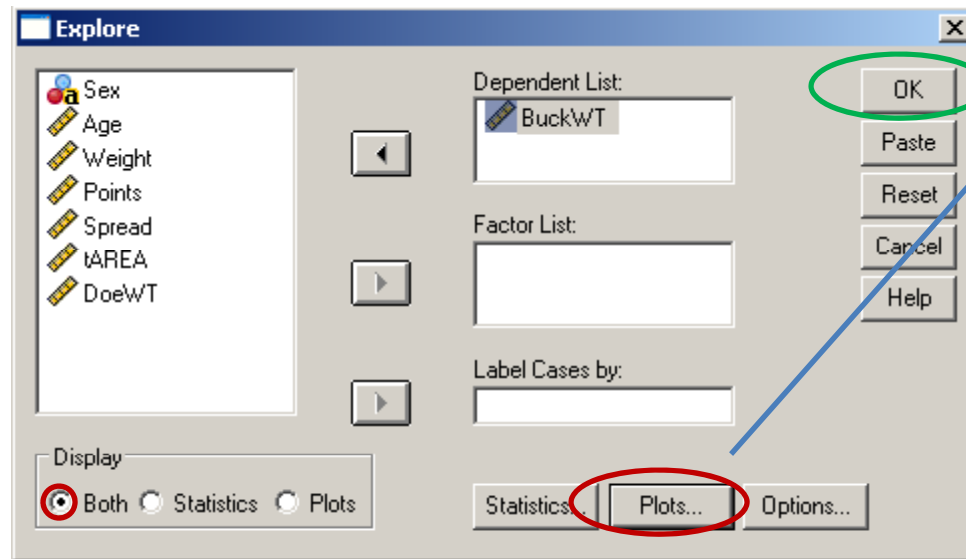
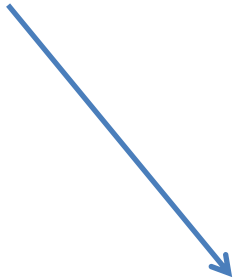
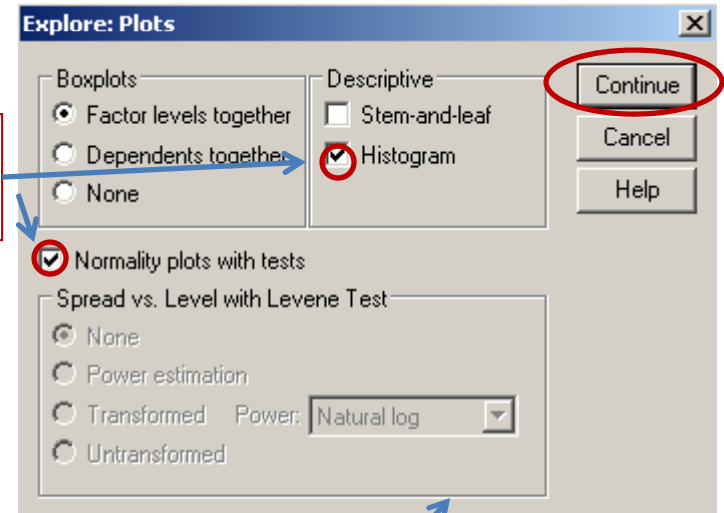
# Normality test Hypotheses

- $H_0$  the observed distribution fits the normal distribution
- $H_a$  the observed distribution does not fit the normal distribution
- If we accept the  $H_0$ , we accept/assume normality



# Accessing the tests

You must choose these or you will not get test results



After Explore Plots: push "OK"

# Interpreting results

**Tests of Normality**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BuckWT	.053	1382	.000	.986	1382	.000

a. Lilliefors Significance Correction

For tests on samples of  $n = 3$  to 2000 use Shapiro Wilks; for those of  $n > 2000$  use Kolmogorov-Smirnov

$H_0$  = normality

If you accept, then assume normality

If you reject, then do not assume normality

“Statistic” is the test statistic W for S-W, D for K-S

“Sig” is the significance for the test (aka the *p-value*)

If  $p < 0.05$ , reject the  $H_0$  because the test is significant

# Significance, etc.

- Let's not worry about how we determine significance of a test at this point
- Simply learn the criteria and “trust it...”
- We will get back to significant results later in the class

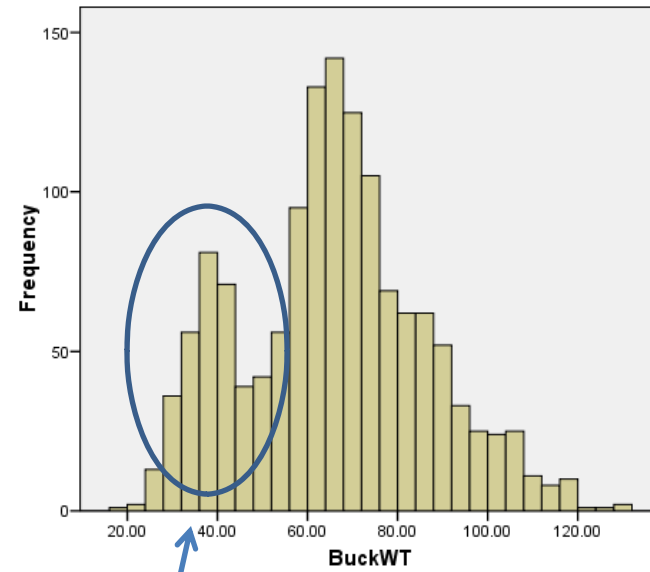
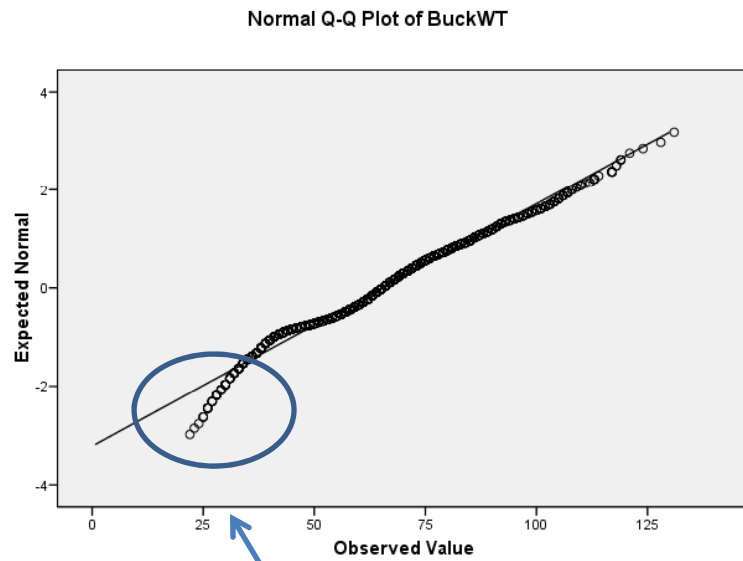


Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BuckWT	.053	1382	.000	.986	1382	.000

a. Lilliefors Significance Correction

Reject  $H_0$



Both charts show you departure from normality at 35 to 40 pounds