Obs	experiment	stimulated	notstimulated	difference
1	1	689	657	32
2	1	656	623	33
3	1	668	652	16
4	1	660	654	6
5	1	679	658	21
6	1	663	646	17
7	1	664	600	64
8	1	647	640	7
9	1	694	605	89
10	1	633	635	-2
11	1	653	642	11
12	2	707	669	38
13	2	740	650	90
14	2	745	651	94
15	2	652	627	25
16	2	649	656	-7
17	2	676	642	34
18	2	699	698	1
19	2	696	648	48
20	2	712	676	36
21	2	708	657	51
22	2	749	692	57
23	2	690	621	69
24	3	690	668	22
25	3	701	667	34
26	3	685	647	38
27	3	751	693	58
28	3	647	635	12
29	3	647	644	3
30	3	720	665	55
31	3	718	689	29
32	3	718	642	76
33	3	696	673	23
34	3	658	675	-17
35	3	680	641	39
36	4	700	662	38
37	4	718	705	13
38	4	679	656	23

This output contains analyses for all five of the rat cortex experiments.

Experiment 3 is the experiment discussed in the textbook.

Obs	experiment	stimulated	notstimulated	difference
39	4	742	652	90
40	4	728	578	150
41	4	677	678	-1
42	4	696	670	26
43	4	711	647	64
44	4	670	632	38
45	4	651	661	-10
46	4	711	670	41
47	4	710	694	16
48	5	640	641	-1
49	5	655	589	66
50	5	624	603	21
51	5	682	642	40
52	5	687	612	75
53	5	653	603	50
54	5	653	593	60
55	5	660	672	-12
56	5	668	612	56
57	5	679	678	1
58	5	638	593	45
59	5	649	602	47

rat cortex example experiment 1

The response variable is D, the difference in cortex weight (in mg)

The TTEST Procedure

Difference: stimulated - notstimulated

summary statistics

N	Mean	Std Dev	Std Err	Minimum	Maximum
11	26.7273	27.3280	8.2397	-2.0000	89.0000

T_calc = 26.7273/8.2397 = 3.24

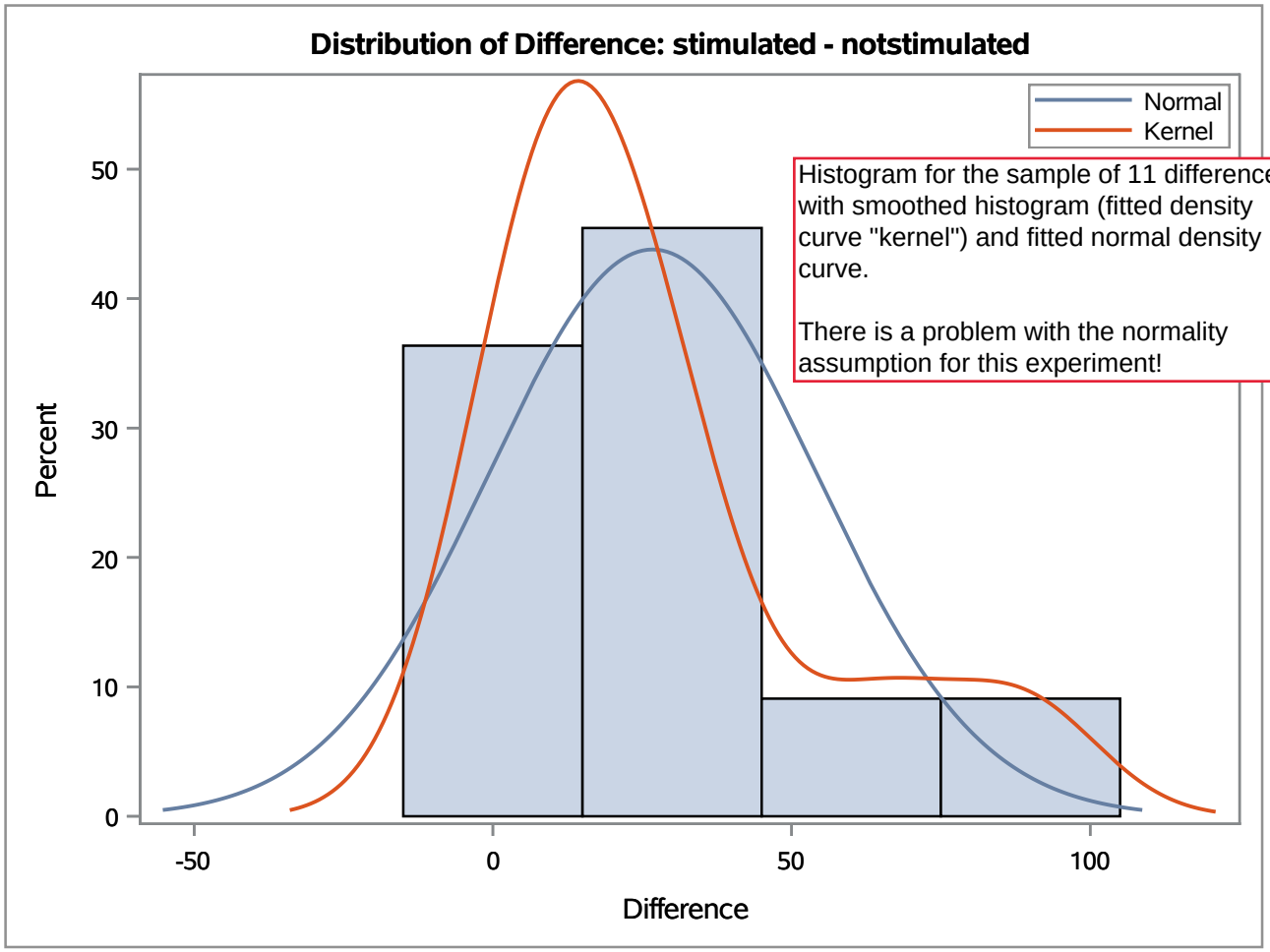
H_1: mu_D notequal to 0 (nondirectional)
P-value=.0088
VALIDITY QUESTIONABLE
H_1: mu_D > 0 (directional)
P-value=(.0088)/2=.0044)
VALIDITY QUESTIONABLE

Mean	95% CL Mean	
26.7273	8.3681	45.0865

95% confidence interval for mu_D
8.3681 <= mu_D <= 45.0865
VALIDITY QUESTIONABLE

DF	t Value	Pr > |t|
10	3.24	0.0088

WARNING
The normality assumption needed to justify these Student's t based inferences is NOT REASONABLE!

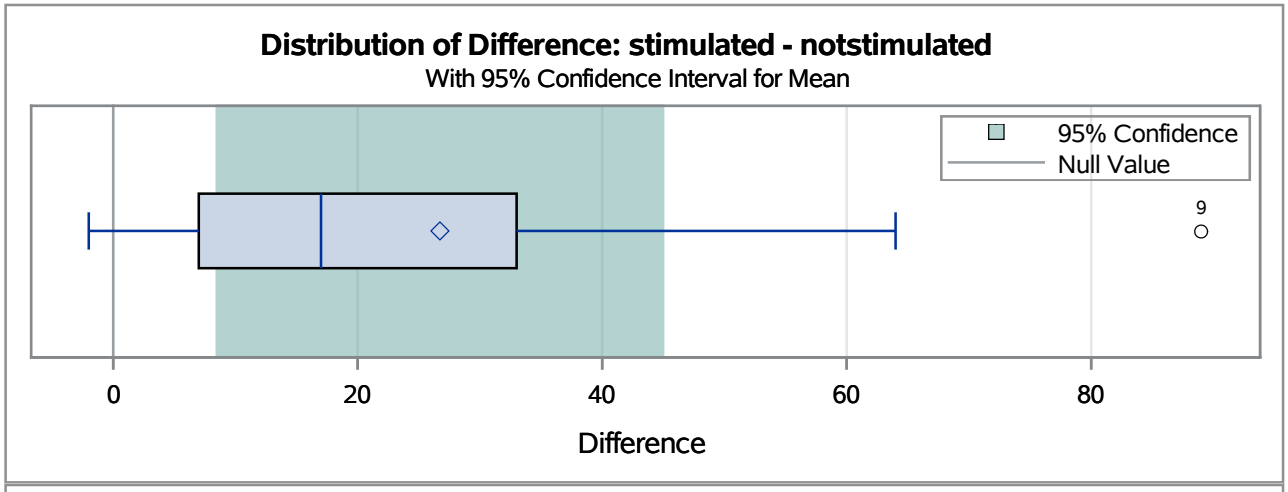


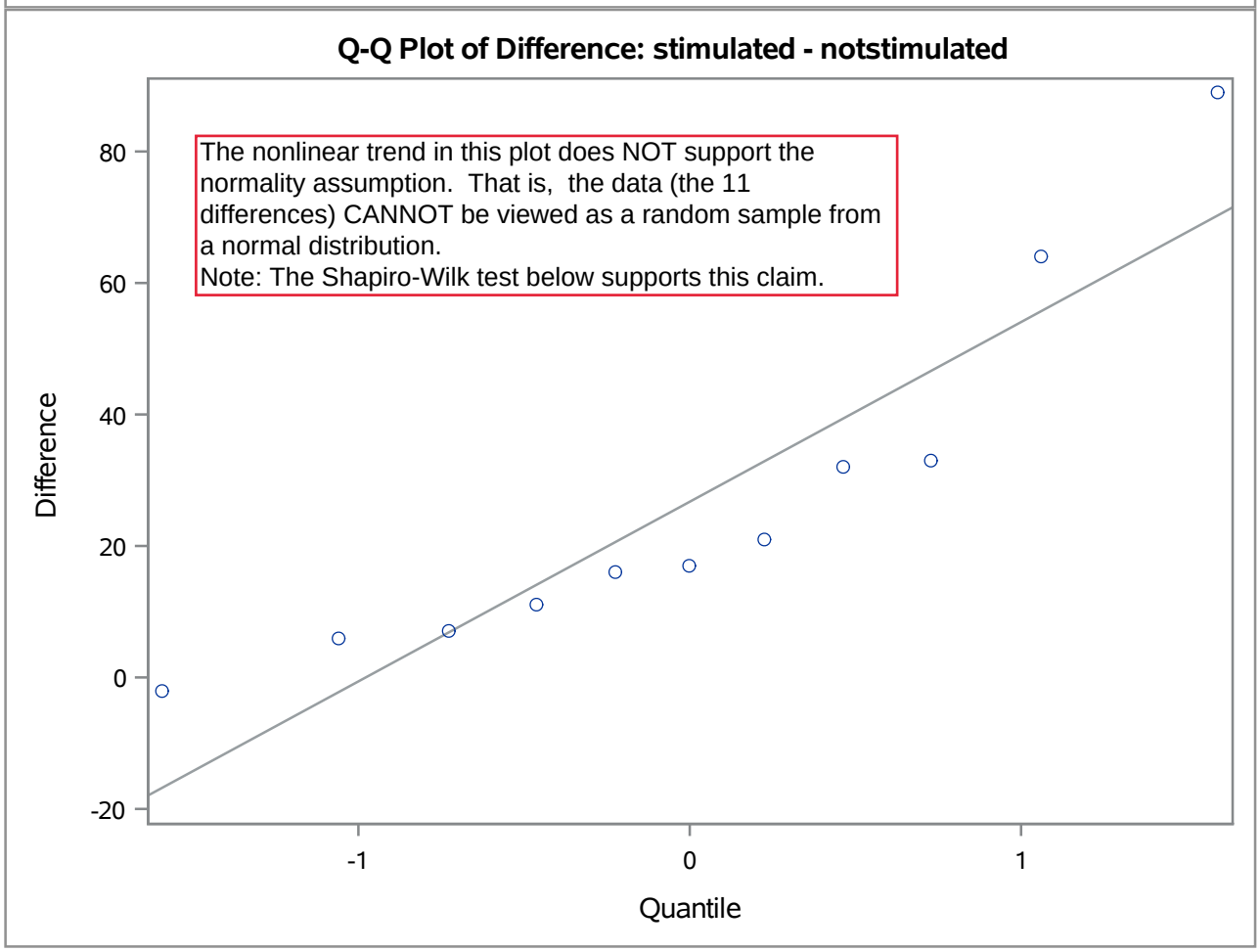
Histogram for the sample of 11 differences with smoothed histogram (fitted density curve "kernel") and fitted normal density curve.

There is a problem with the normality assumption for this experiment!

The TTEST Procedure

Difference: stimulated - notstimulated





The UNIVARIATE Procedure
Variable: difference

Basic Statistical Measures			
Location		**Variability**	
Mean	26.72727	**Std Deviation**	27.32797
Median	17.00000	**Variance**	746.81818
Mode	.	**Range**	91.00000
		Interquartile Range	26.00000

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.844661	**Pr < W**	0.0363
Kolmogorov-Smirnov	**D**	0.227408	**Pr > D**	0.1100
Cramer-von Mises	**W-Sq**	0.128102	**Pr > W-Sq**	0.0410
Anderson-Darling	**A-Sq**	0.734558	**Pr > A-Sq**	0.0404

Test for normality assumption

The null hypothesis if that the data (the 12 differences) form a random sample from a normal distribution.

The small P-value .0363 shows that the normality assumption is NOT REASONABLE!

Quantiles (Definition 5)	
Level	**Quantile**
100% Max	89
99%	89
95%	89
90%	64
75% Q3	33
50% Median	17
25% Q1	7
10%	6
5%	-2
1%	-2
0% Min	-2

Extreme Values			
Lowest		**Highest**	
Order	**Value**	**Order**	**Value**
1	-2	7	21
2	6	8	32
3	7	9	33
4	11	10	64
5	16	11	89

The response variable is D, the difference in cortex weight (in mg)

The TTEST Procedure

Difference: stimulated - notstimulated

summary statistics

N	Mean	Std Dev	Std Err	Minimum	Maximum
12	44.6667	30.8673	8.9106	-7.0000	94.0000

T_calc = 44.6667/8.9106 = 5.01

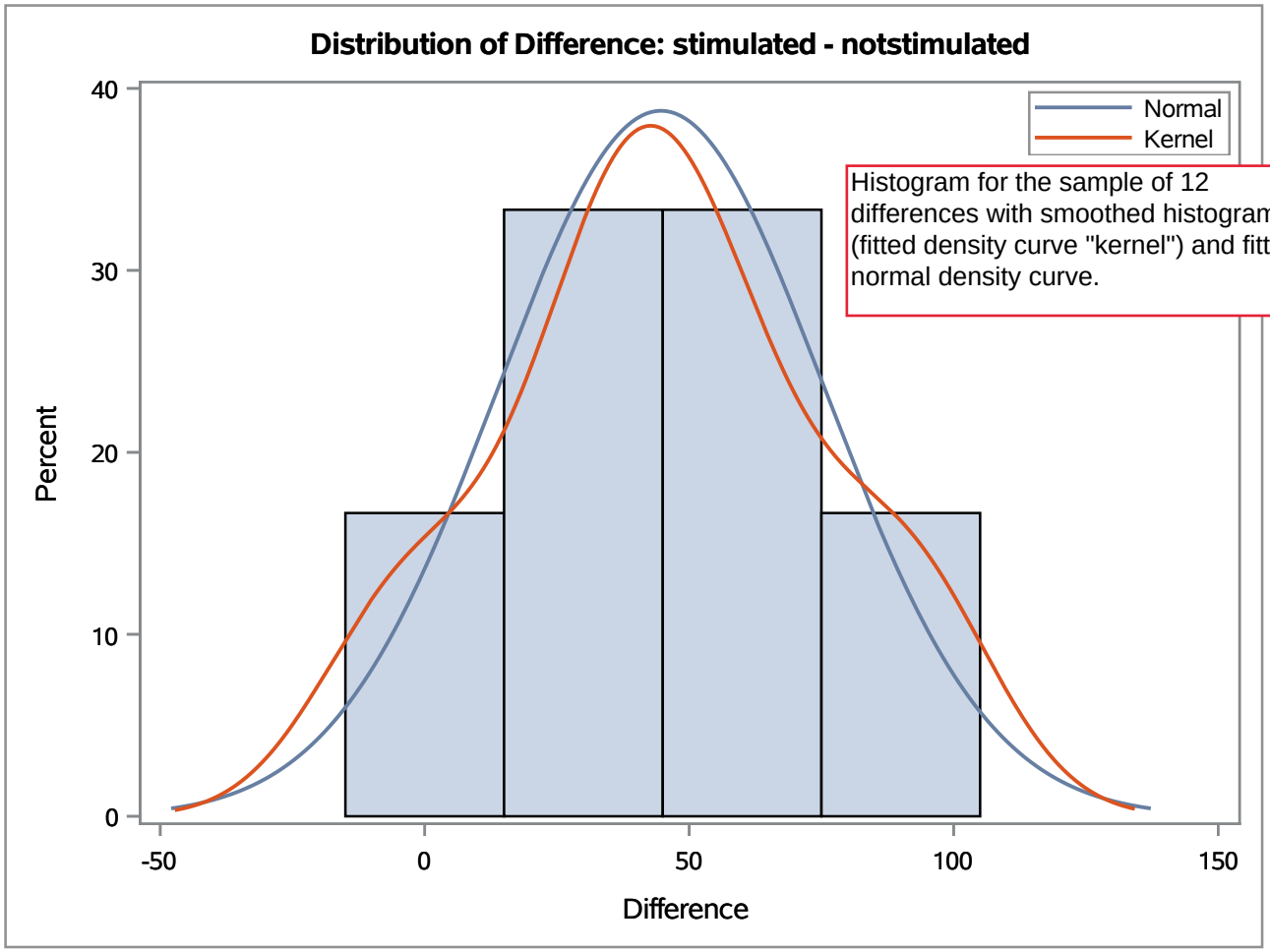
H_1: mu_D notequal to 0 (nondirectional)
P-value=.0004

H_1: mu_D > 0 (directional)
P-value=(.0004)/2=.0002)

Mean	95% CL Mean	
44.6667	25.0545	64.2788

95% confidence interval for mu_D
25.0545 <= mu_D <= 64.2788

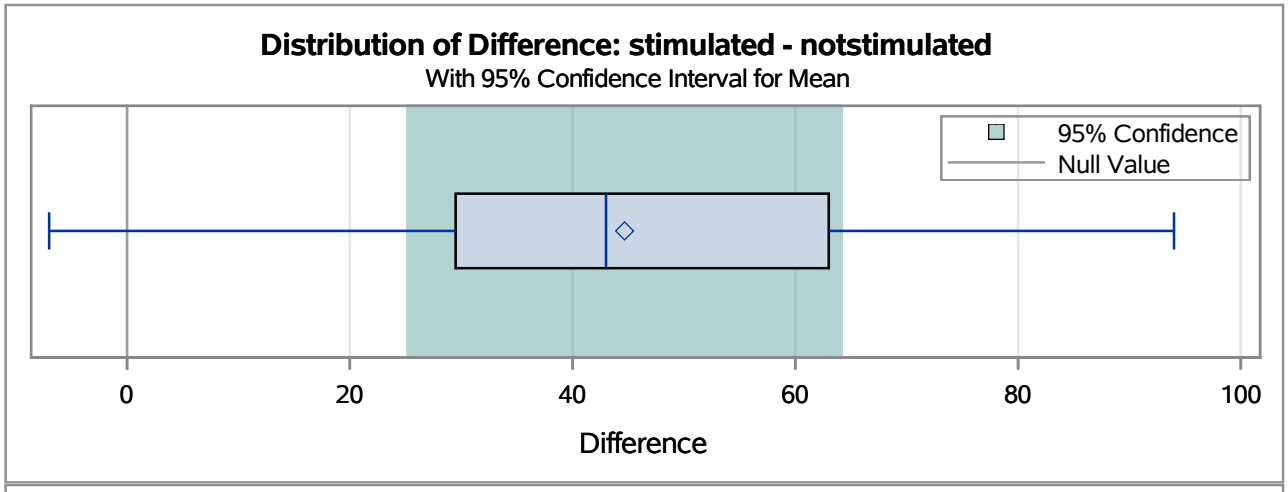
DF	t Value	Pr > |t|
11	5.01	0.0004

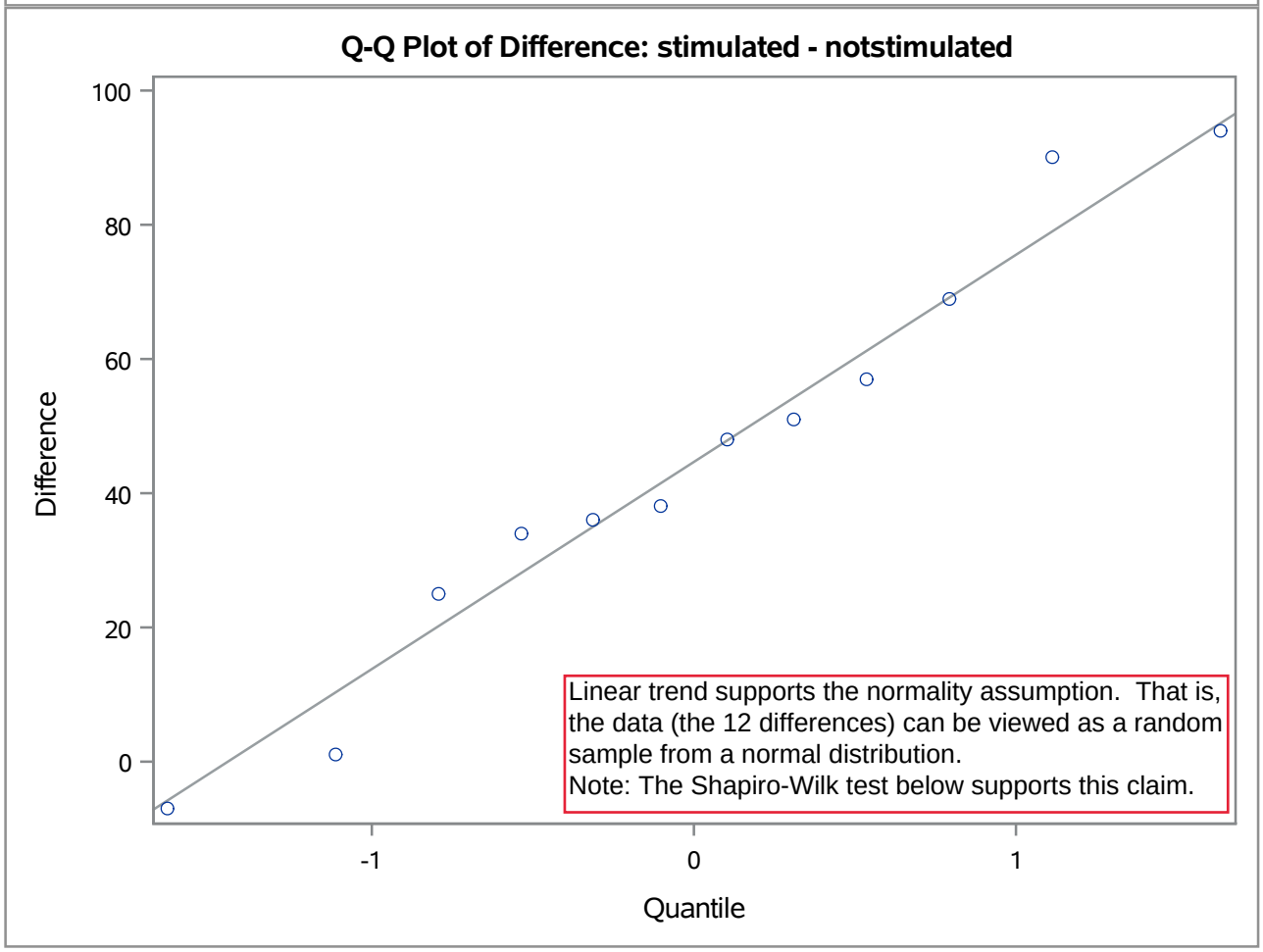


Histogram for the sample of 12 differences with smoothed histogram (fitted density curve "kernel") and fitted normal density curve.

The TTEST Procedure

Difference: stimulated - notstimulated





The UNIVARIATE Procedure
Variable: difference

Basic Statistical Measures			
Location		**Variability**	
Mean	44.66667	**Std Deviation**	30.86726
Median	43.00000	**Variance**	952.78788
Mode	.	**Range**	101.00000
		Interquartile Range	33.50000

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.964733	**Pr < W**	0.8486
Kolmogorov-Smirnov	**D**	0.114835	**Pr > D**	>0.1500
Cramer-von Mises	**W-Sq**	0.027369	**Pr > W-Sq**	>0.2500
Anderson-Darling	**A-Sq**	0.202309	**Pr > A-Sq**	>0.2500

Test for normality assumption

The null hypothesis if that the data (the 12 differences) form a random sample from a normal distribution. The large P-value .8486 shows supports for the normality assumption.

Quantiles (Definition 5)	
Level	**Quantile**
100% Max	94.0
99%	94.0
95%	94.0
90%	90.0
75% Q3	63.0
50% Median	43.0
25% Q1	29.5
10%	1.0
5%	-7.0
1%	-7.0
0% Min	-7.0

Extreme Values			
Lowest		**Highest**	
Order	**Value**	**Order**	**Value**
1	-7	8	51
2	1	9	57
3	25	10	69
4	34	11	90
5	36	12	94

The response variable is D, the difference in cortex weight (in mg)

The TTEST Procedure

Difference: stimulated - notstimulated

summary statistics

N	Mean	Std Dev	Std Err	Minimum	Maximum
12	31.0000	25.3162	7.3082	-17.0000	76.0000

T_calc = 31.0000/7.3082 = 4.24

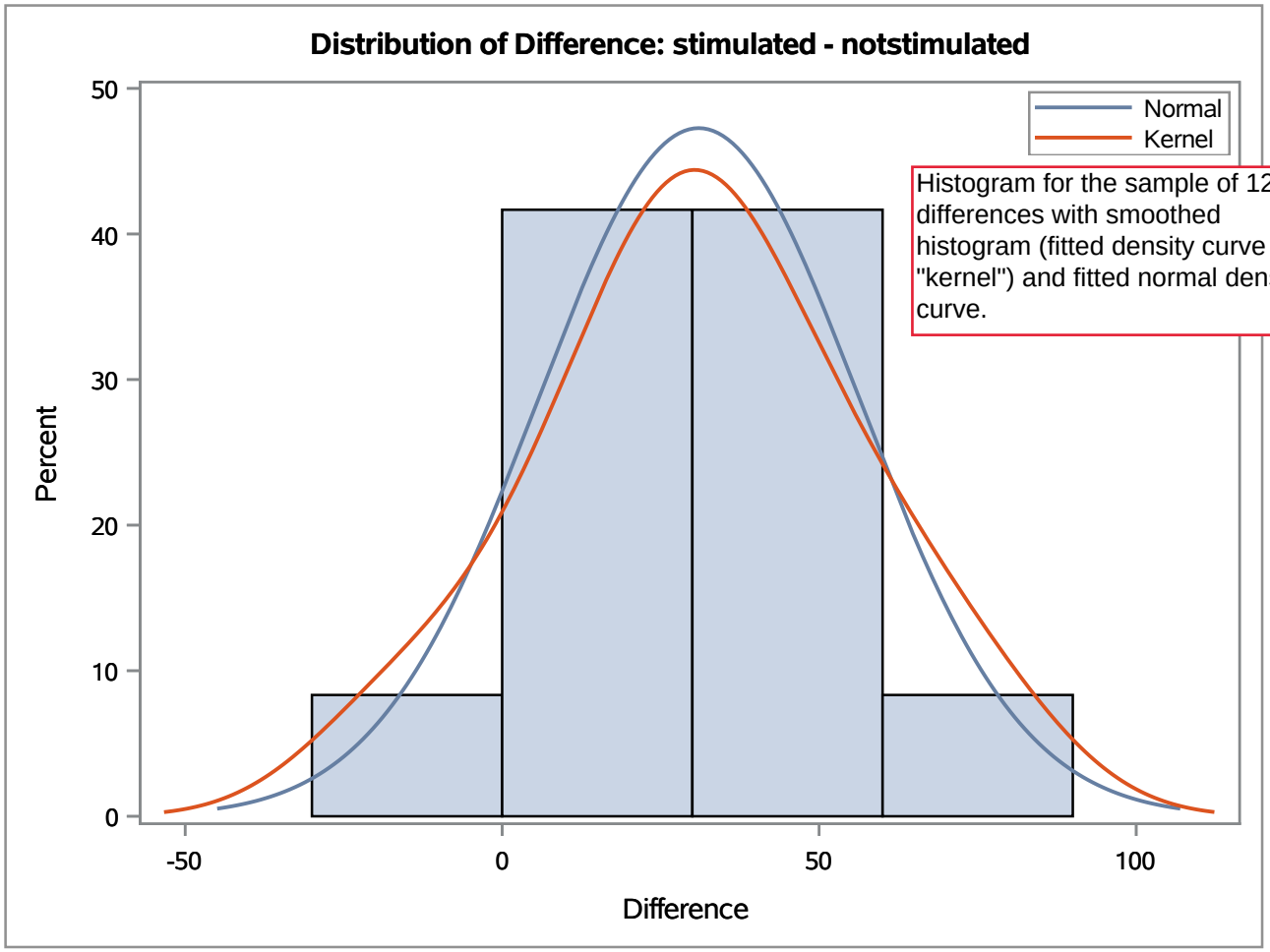
H_1: mu_D notequal to 0 (nondirectional)
P-value=.0014

H_1: mu_D > 0 (directional)
P-value=(.0014)/2=.0007)

Mean	95% CL Mean	
31.0000	14.9149	47.0851

95% confidence interval for mu_D
14.9149 <= mu_D <= 47.0851

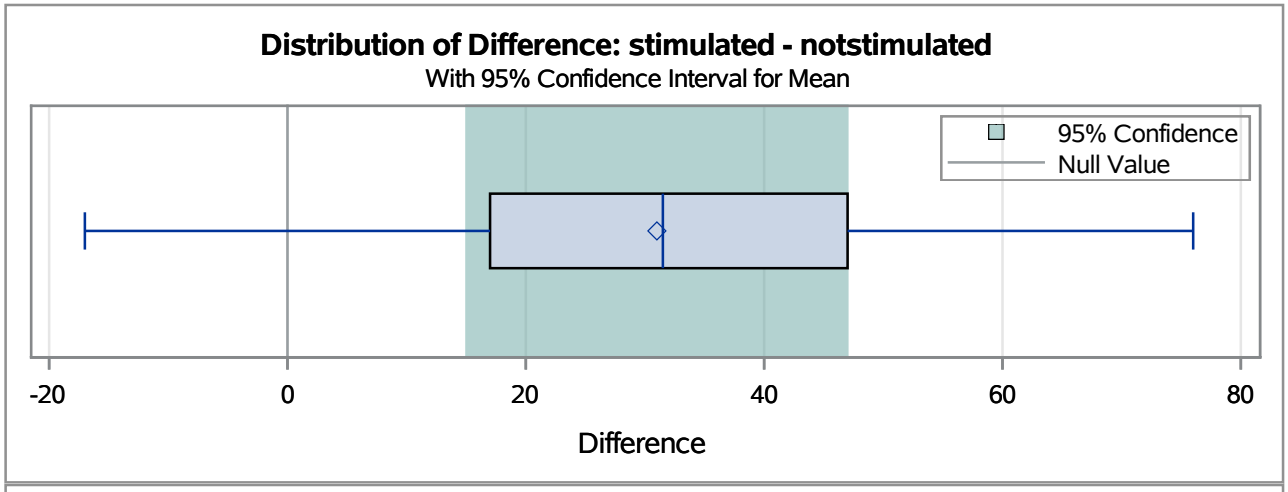
DF	t Value	Pr > |t|
11	4.24	0.0014

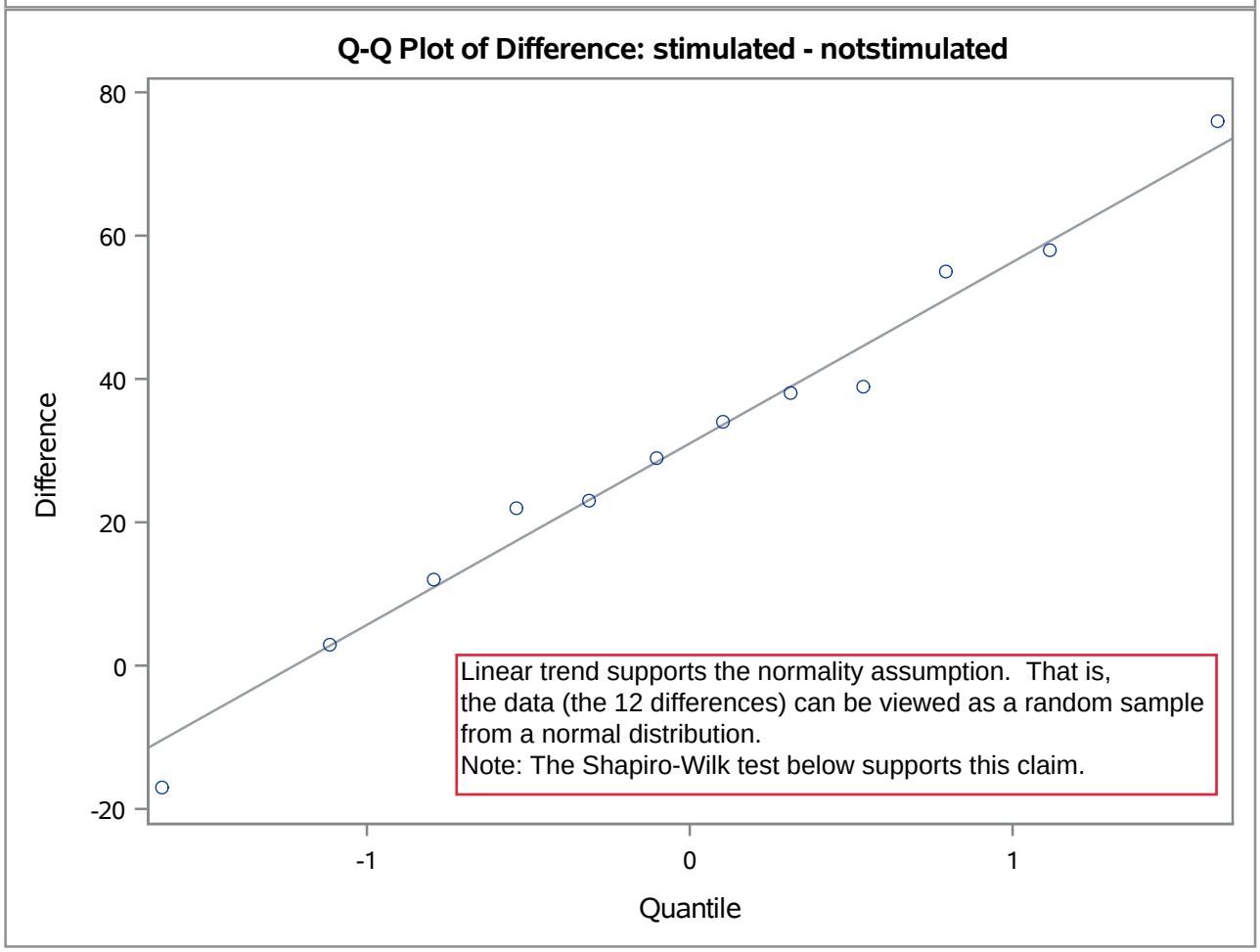


Histogram for the sample of 12 differences with smoothed histogram (fitted density curve "kernel") and fitted normal density curve.

The TTEST Procedure

Difference: stimulated - notstimulated





The UNIVARIATE Procedure
Variable: difference

Basic Statistical Measures			
Location		**Variability**	
Mean	31.00000	**Std Deviation**	25.31618
Median	31.50000	**Variance**	640.90909
Mode	.	**Range**	93.00000
		Interquartile Range	30.00000

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.989613	**Pr < W**	0.9997
Kolmogorov-Smirnov	**D**	0.126	**Pr > D**	>0.1500
Cramer-von Mises	**W-Sq**	0.021545	**Pr > W-Sq**	>0.2500
Anderson-Darling	**A-Sq**	0.140948	**Pr > A-Sq**	>0.2500

Quantiles (Definition 5)	
Level	**Quantile**
100% Max	76.0
99%	76.0
95%	76.0
90%	58.0
75% Q3	47.0
50% Median	31.5
25% Q1	17.0
10%	3.0
5%	-17.0
1%	-17.0
0% Min	-17.0

Extreme Values			
Lowest		**Highest**	
Order	**Value**	**Order**	**Value**
1	-17	8	38
2	3	9	39
3	12	10	55
4	22	11	58
5	23	12	76

Test for normality assumption

The null hypothesis if that the data (the 12 differences) form a random sample from a normal distribution. The large P-value .4787 shows supports for the normality assumption.

The response variable is D, the difference in cortex weight (in mg)

The TTEST Procedure

Difference: stimulated - notstimulated

summary statistics

N	Mean	Std Dev	Std Err	Minimum	Maximum
12	40.6667	43.8496	12.6583	-10.0000	150.0

Mean	95% CL Mean	
40.6667	12.8060	68.5274

95% confidence interval for mu_D
12.8060 <= mu_D <= 68.5274
VALIDITY QUESTIONABLE

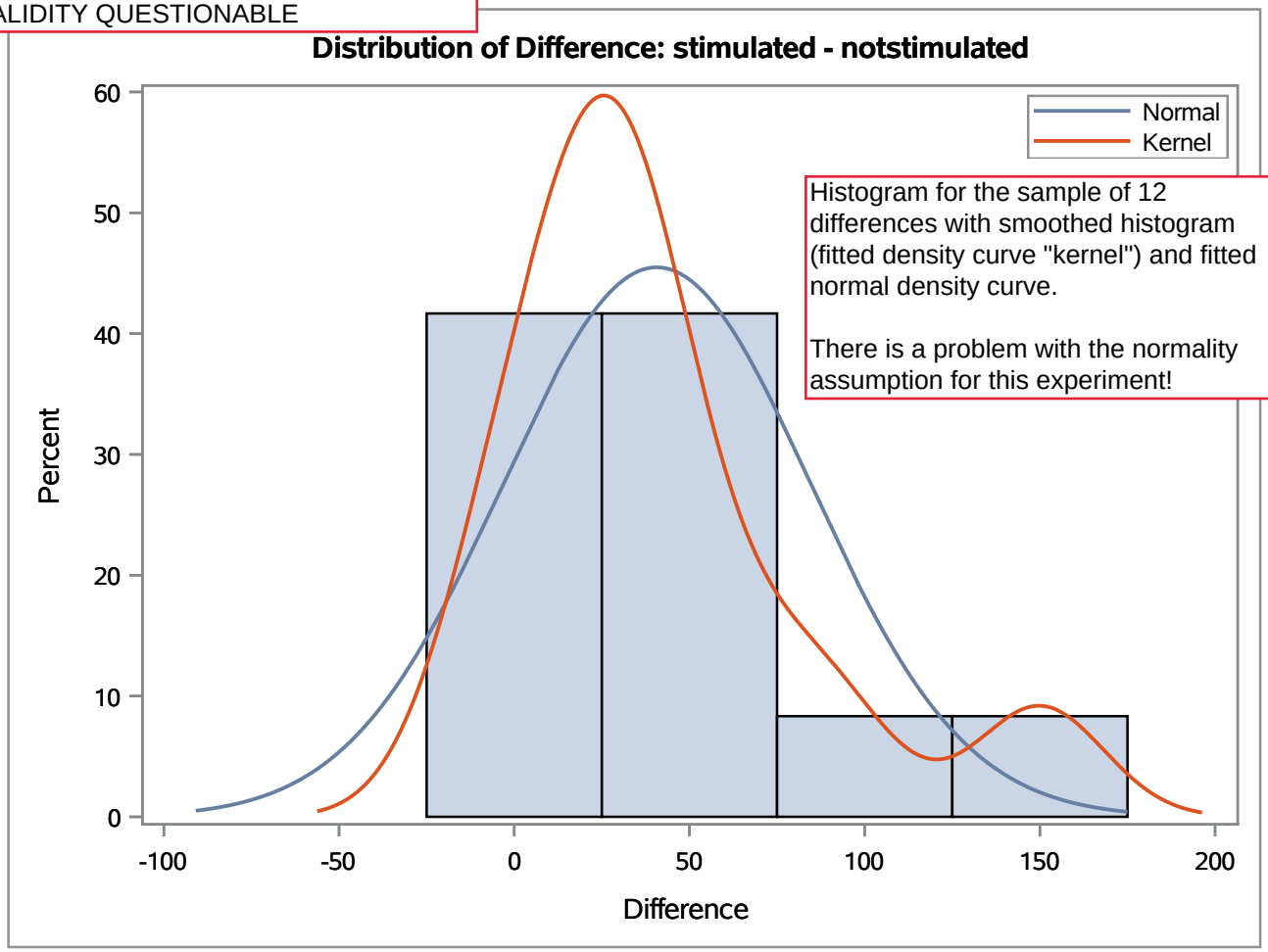
T_calc = 40.6667/12.6583 = 3.21

H_1: mu_D notequal to 0 (nondirectional)
P-value=.0083
VALIDITY QUESTIONABLE

H_1: mu_D > 0 (directional)
P-value=(.0083)/2=.00415)
VALIDITY QUESTIONABLE

DF	t Value	Pr > |t|
11	3.21	0.0083

WARNING
The normality assumption needed to justify these Student's t based inferences is NOT REASONABLE!

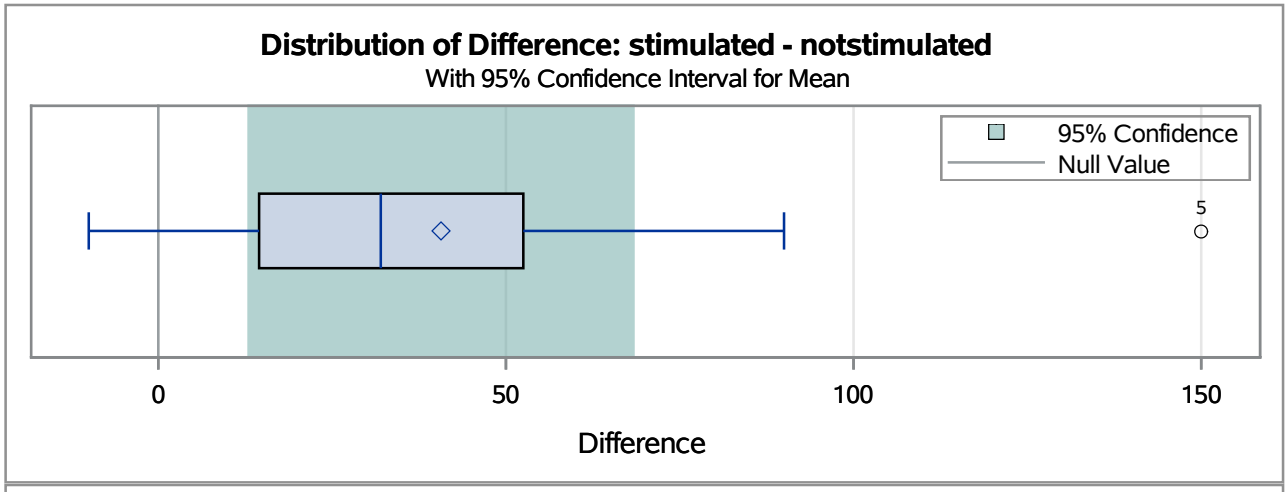


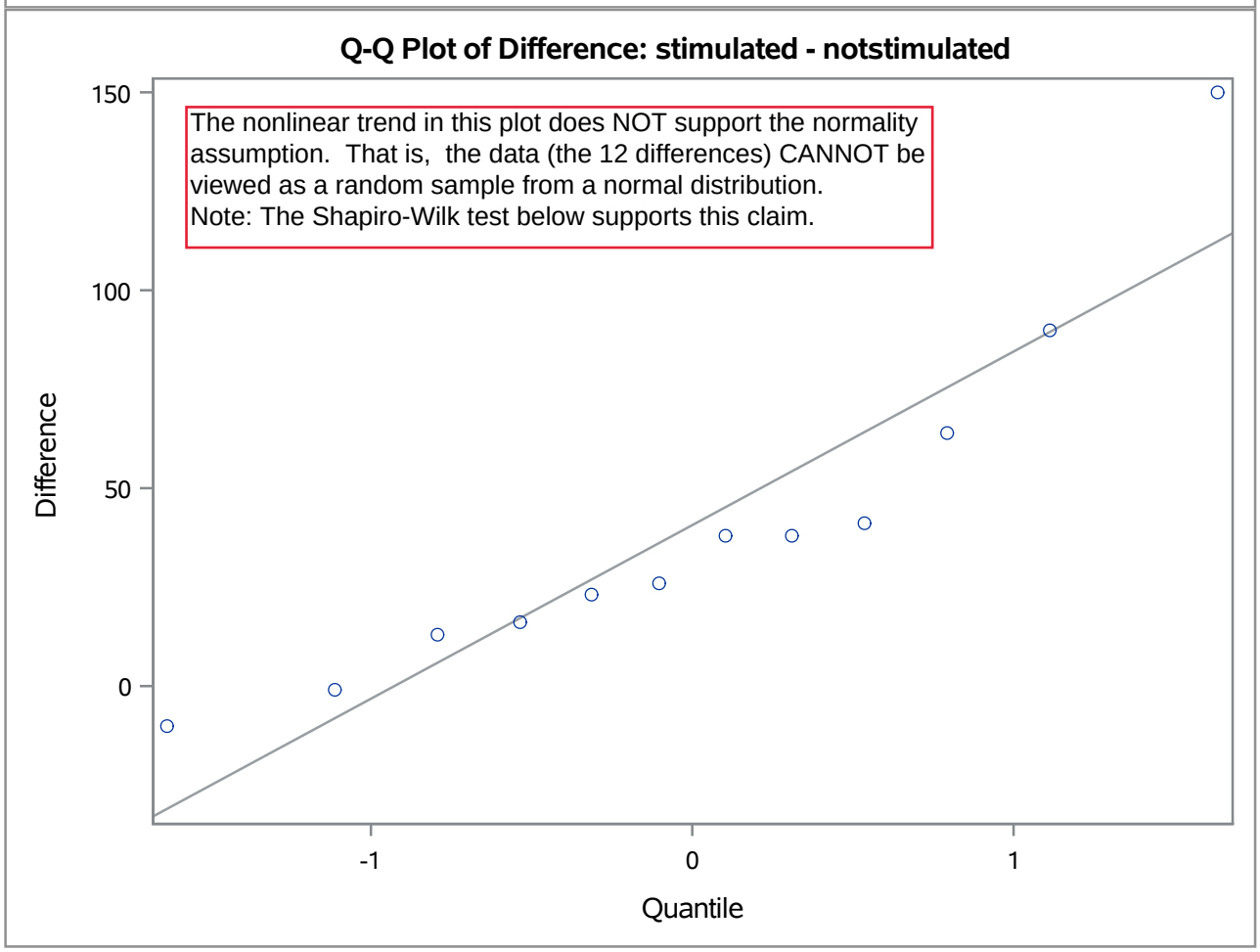
Histogram for the sample of 12 differences with smoothed histogram (fitted density curve "kernel") and fitted normal density curve.

There is a problem with the normality assumption for this experiment!

The TTEST Procedure

Difference: stimulated - notstimulated





The UNIVARIATE Procedure
Variable: difference

Basic Statistical Measures			
Location		**Variability**	
Mean	40.66667	**Std Deviation**	43.84961
Median	32.00000	**Variance**	1923
Mode	38.00000	**Range**	160.00000
		Interquartile Range	38.00000

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.868553	**Pr < W**	0.0626
Kolmogorov-Smirnov	**D**	0.246967	**Pr > D**	0.0422
Cramer-von Mises	**W-Sq**	0.10589	**Pr > W-Sq**	0.0857
Anderson-Darling	**A-Sq**	0.628025	**Pr > A-Sq**	0.0810

Test for normality assumption

The null hypothesis if that the data (the 12 differences) form a random sample from a normal distribution.

The small P-value .0626 shows that the normality assumption is NOT REASONABLE!

Quantiles (Definition 5)	
Level	**Quantile**
100% Max	150.0
99%	150.0
95%	150.0
90%	90.0
75% Q3	52.5
50% Median	32.0
25% Q1	14.5
10%	-1.0
5%	-10.0
1%	-10.0
0% Min	-10.0

Extreme Values					
Lowest			**Highest**		
Order	**Value**	**Freq**	**Order**	**Value**	**Freq**
1	-10	1	7	38	2
2	-1	1	8	41	1
3	13	1	9	64	1
4	16	1	10	90	1
5	23	1	11	150	1

The response variable is D, the difference in cortex weight (in mg)

The TTEST Procedure

Difference: stimulated - notstimulated

summary statistics

N	Mean	Std Dev	Std Err	Minimum	Maximum
12	37.3333	28.4648	8.2171	-12.0000	75.0000

T_calc = 37.3333/8.2171 = 4.54

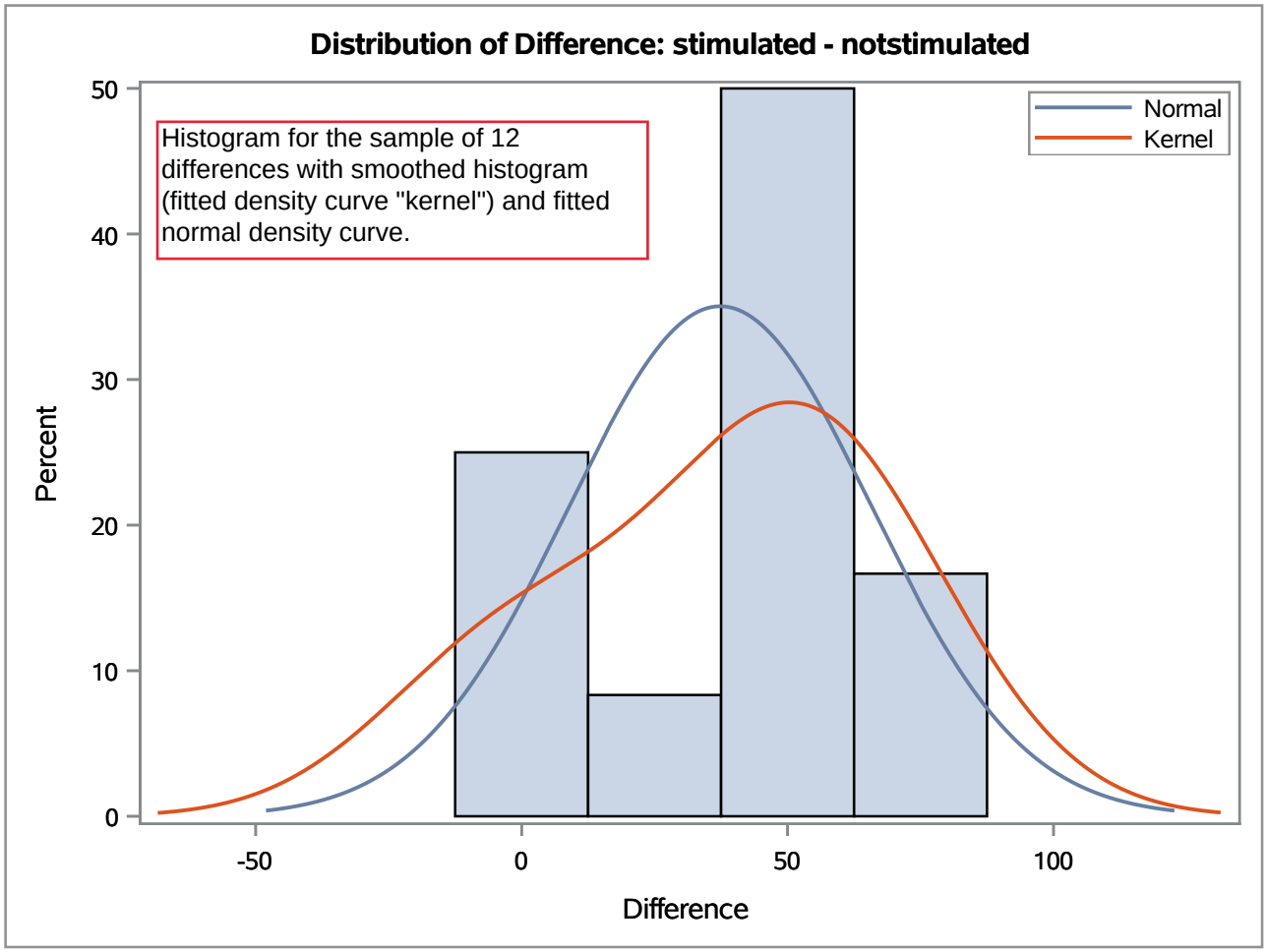
H_1: mu_D notequal to 0 (nondirectional)
P-value=.0008

H_1: mu_D > 0 (directional)
P-value=(.0008)/2=.0004)

Mean	95% CL Mean	
37.3333	19.2477	55.4190

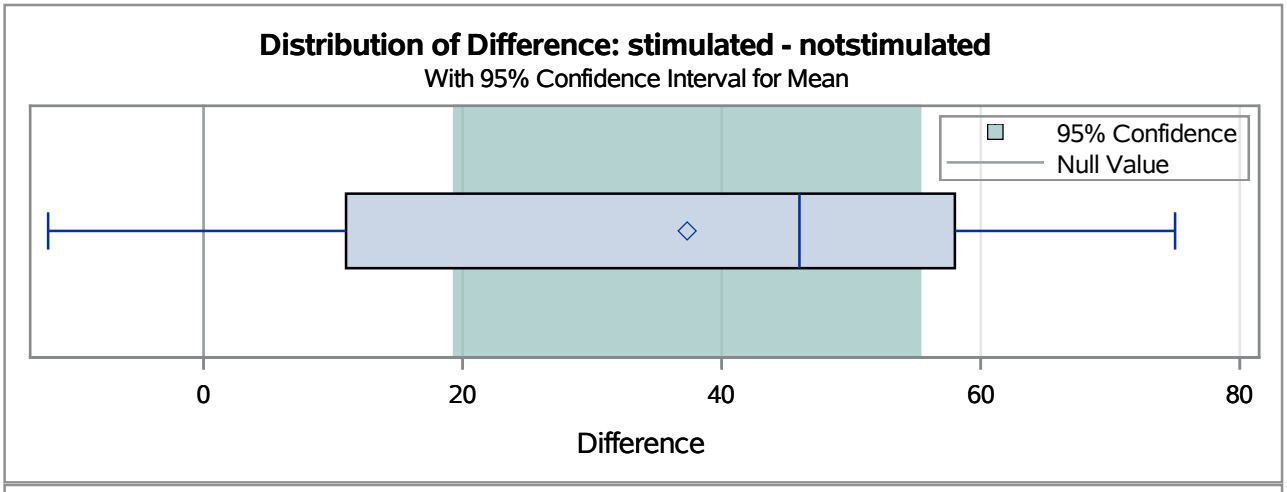
95% confidence interval for mu_D
19.2477 <= mu_D <= 55.4190

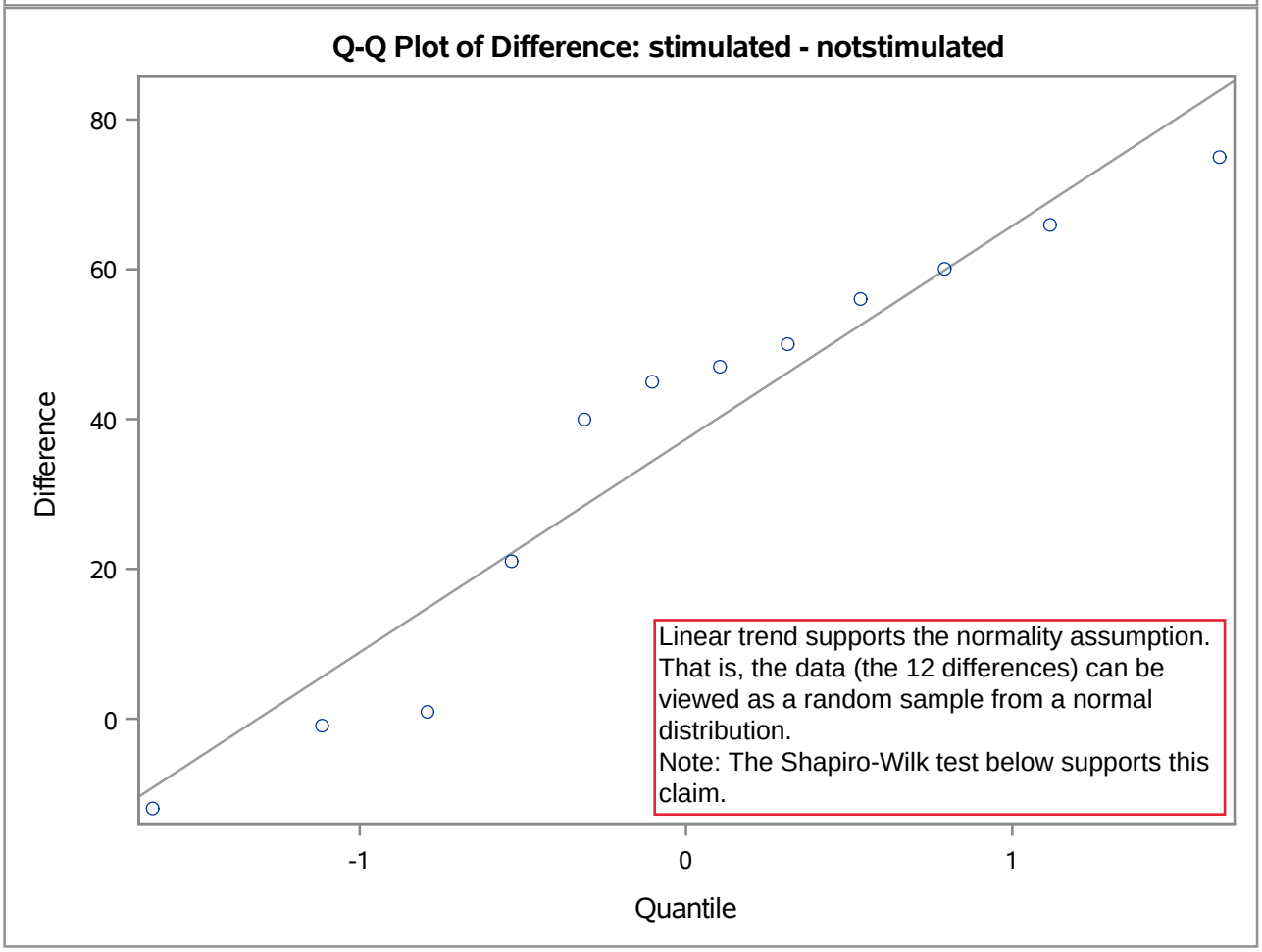
DF	t Value	Pr > |t|
11	4.54	0.0008



The TTEST Procedure

Difference: stimulated - notstimulated





The UNIVARIATE Procedure
Variable: difference

Basic Statistical Measures			
Location		**Variability**	
Mean	37.33333	**Std Deviation**	28.46476
Median	46.00000	**Variance**	810.24242
Mode	.	**Range**	87.00000
		Interquartile Range	47.00000

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.914733	**Pr < W**	0.2452
Kolmogorov-Smirnov	**D**	0.203986	**Pr > D**	>0.1500
Cramer-von Mises	**W-Sq**	0.083514	**Pr > W-Sq**	0.1736
Anderson-Darling	**A-Sq**	0.474651	**Pr > A-Sq**	0.2041

Test for normality assumption

The null hypothesis if that the data (the 12 differences) form a random sample from a normal distribution. The large P-value .2452 shows supports for the normality

Quantiles (Definition 5)	
Level	**Quantile**
100% Max	75
99%	75
95%	75
90%	66
75% Q3	58
50% Median	46
25% Q1	11
10%	-1
5%	-12
1%	-12
0% Min	-12

Extreme Values			
Lowest		**Highest**	
Order	**Value**	**Order**	**Value**
1	-12	8	50
2	-1	9	56
3	1	10	60
4	21	11	66
5	40	12	75