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Angular Transformation

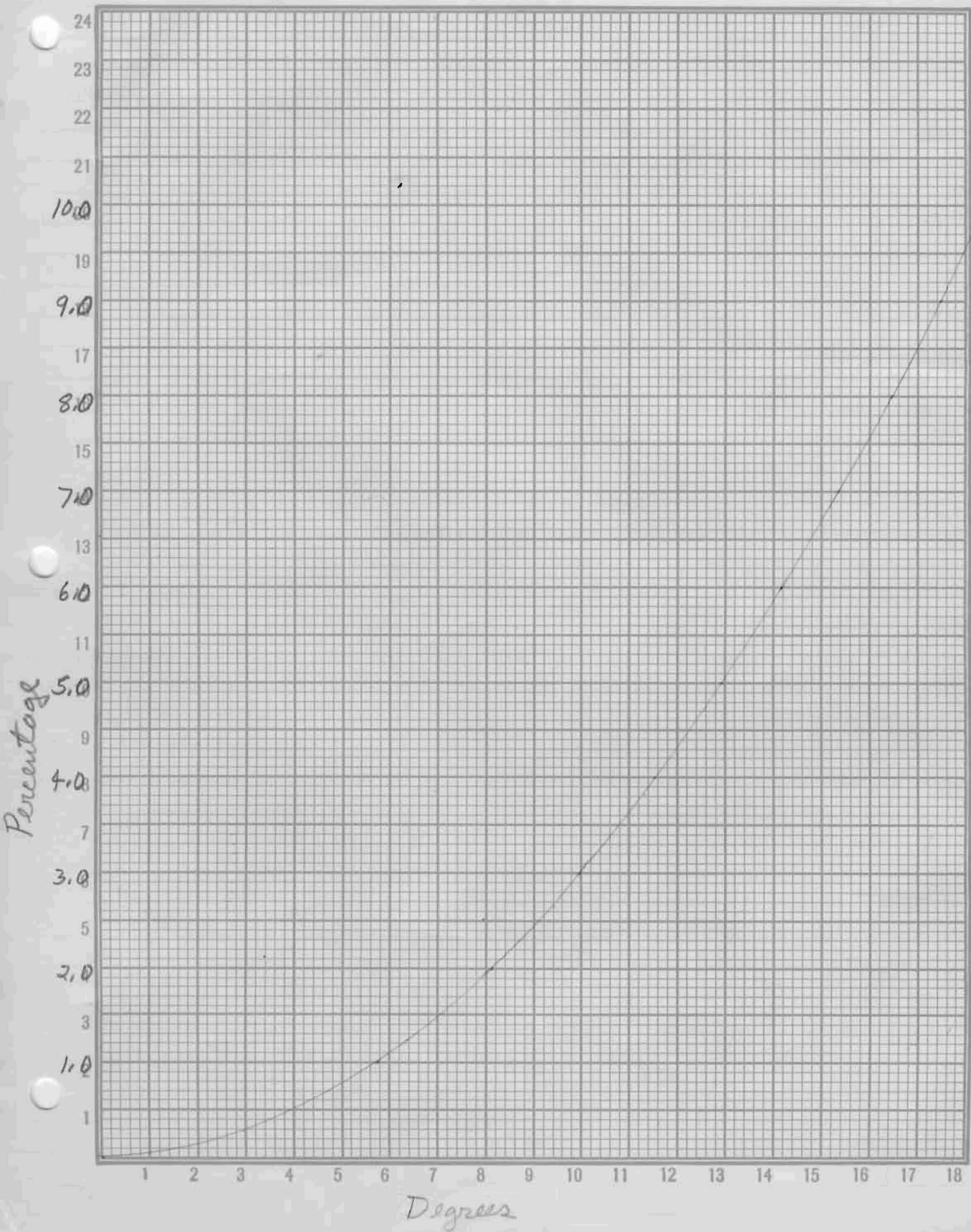
	I.C. Difference				
	Percentage	Degrees	D _W	D _W ²	
	1.41	6.85	-1.08	1.17	$s = (90.95/5)^{1/2}$
	0.29	2.95	-4.98	24.80	= 4.26
	5.73	13.85	+5.92	35.03	3.5 pairs for 5%
	1.22	6.35	-1.58	2.50	5.9 pairs for 1%
	0.85	5.20	-2.73	7.45	
	4.59	12.40	+4.47	20.00	t = 4.56
Sum		47.60		90.95	one chance in
Averages		7.93			$p = .005^{150}$
	3.12	10.15	+2.07	4.29	$s = (9.54/2)^{1/2}$
	2.11	8.30	+0.22	0.05	= 2.185
	1.03	5.80	-2.28	5.20	2.5 pairs 5%
Sum		24.25		9.54	3.5 pairs 1%
Averages		8.08			t = 5.23
					one chance in 30
					p = .03

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	I.C. Difference				
	Percentage	Degrees	Dw	Dw ²	
	1.41	6.85	-1.13	1.28	$s = (100.5/8)^{1/2}$ = 3.55
	0.29	2.95	-5.03	25.30	
	5.73	13.85	+5.87	34.43	3.2 pairs 5%
	1.22	6.35	-1.63	2.66	4.7 pairs 1%
	0.85	5.20	-2.78	7.73	
	4.59	12.40	+4.42	19.55	t = 6.74
	3.12	10.15	+2.17	4.70	p = .0002?
	2.11	8.30	+0.32	0.10	one chance in
	1.03	5.80	-2.18	4.75	> 1000
Sums		71.85		100.50	
Averages		7.98			

Angular Transformation



Linear Computation

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Inverted Color Beans.

Seed	Year	Percent I.C.			Dev.	Dev ²	
		Normal	Reversed	Difference			
Hawaiian Standard	1959	1.82	3.23	1.41	-0.94	0.88	$\sigma = (25.13/5)^{1/2}$
"	1961/2	2.68	3.97	0.29	-2.06	4.25	6.0 pairs for 5%
"	1962/3	3.83	9.56	5.73	+3.38	11.41	9.8 pairs for 1%
1st Year I.C.	1961/2	2.89	4.11	1.22	-1.13	1.28	
"	1962/3	4.34	5.19	0.85	-1.50	2.25	t = 2.57
X-Rayed Std	1962/3	1.36	5.95	4.59	+2.24	5.06	one chance in
Sums		16.92	31.01	14.09		25.13	p = 0.05 ²⁰
Average		2.82	5.17	2.35			
Scarlet Standard	1961/2	3.52	6.64	3.12	+1.03	1.06	$\sigma = (2.18/2)^{1/2}$
Runner	1962/3	1.05	3.16	2.11	+0.02	.00	1.045
X-Rayed Std	1962/3	1.73	2.76	1.03	-1.06	1.12	3.4 pairs for 5%
Sums		6.30	12.56	6.26		2.18	5.1 pairs for 1%
Average		2.10	4.19	2.09			
							t = 3.46
							one chance in
							p = 0.07 ¹⁹

Combined

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Seed	Year	Percent I.C.			Dew	Dew ²	
		Normal	Reversed	Difference			
Hawaiian Standard	1959	1.82	3.23	1.41	-0.85	0.72	$\alpha = (26.96/8)^{1/2}$ = 1.84
"	1961/2	2.68	2.97	0.29	-1.97	3.88	
"	1962/3	3.83	9.56	5.73	+3.47	12.05	
1st Year I.C.	1961/2	2.89	4.11	1.22	-1.04	1.08	5.0 pairs for 5%
"	1962/3	4.34	5.19	0.85	-1.41	1.99	8.1 pairs for 1%
X-Rayed Std	1962/3	1.36	5.95	4.59	+2.33	4.97	
							t = 3.68
Scarlet Standard	1961/2	3.52	6.64	3.12	+0.86	0.74	out lanes in
Runner	1962/3	1.05	3.16	2.11	-0.15	0.02	150
X-Rayed Std.	1962/3	1.73	2.76	1.03	-1.23	1.51	p = 0.007
Sums		23.22	43.57	20.35		26.96	
Averages		2.58	4.84	2.26			

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Synopsis of Inverted Color

Vines	Seed	Year	Normal			Reversed			Lot		
			Beans	Percent	I.C.	Beans	Percent	I.C.	Beans	Percent	I.C.
Hawaiian Standard		1959	2651	49	1.82	2908	97	3.23	5559	146	2.56
"		1961/2	2400	66	2.68	2486	76	2.97	4886	142	2.82
"		1962/3	1106	44	3.83	832	88	9.56	1938	132	6.38
	1st Year I.C.	1961/2	839	25	2.89	840	36	4.11	1679	61	3.50
	"	1962/3	838	38	4.34	840	46	5.19	1678	84	4.76
	✓ 2nd Year I.C.	1962/3	32	0	0	119	3	2.48	151	3	1.96
	X-Rayed Std	1962/3	289	4	1.36	379	24	5.95	668	28	2.49
	Average				2.82			5.17			3.75
	Standard Error				0.46			0.97			0.63
Scarlet Standard		1961/2	962	35	3.52	548	39	6.64	1510	74	4.67
Runner	"	1962/3	3211	34	1.05	2266	74	3.16	5477	108	1.93
	✓ 1st Year I.C.	1962/3	456	4	0.87	993	3	0.30	1449	7	0.48
	X-Rayed Std	1962/3	567	10	1.73	494	14	2.76	1061	24	2.21
	Average				2.10			4.19			2.94
	Standard Error				0.76			1.23			0.91

✓ = Too few I.C. beans to give a significant result, omit these from consideration. (over)

Hawaiian
 Reversed/Normal Ratio 2.06
 Standard Error 0.50

Scarlet Runner
 Ratio 2.00
 Standard Error 0.43

Vines Seed & Year as over	Normal			Reversed			Lot			Reversed/Normal		
	Percent I.C.	Dev.	Dev ²	Percent I.C.	Dev.	Dev ²	Percent I.C.	Dev.	Dev ²	Ratio	Dev	Dev ²
	1.82	-1.00	1.00	3.23	-1.94	3.76	2.56	-1.19	1.42	1.78	-0.28	0.08
	2.68	-0.14	.02	2.97	-2.20	4.84	2.82	-0.93	0.87	1.11	-0.85	0.72
	3.83	+1.01	1.02	9.56	+4.37	19.10	6.38	+2.63	6.91	2.50	+0.44	0.19
	2.89	+0.07	.00	4.11	-1.06	1.12	3.50	-0.25	0.06	1.42	-0.64	0.41
	4.34	+1.52	2.31	5.19	+0.02	.00	4.76	+1.01	1.02	1.20	-0.86	0.74
	—	—	—	—	—	—	—	—	—	—	—	—
	1.36	-1.46	2.13	5.95	+0.78	0.61	2.49	-1.26	1.59	4.37	+2.31	5.34
Sums	16.42	5.20	6.48	31.01	10.37	29.43	22.51	7.27	11.87	12.38	5.38	7.48
Average	2.82	0.87		5.17	1.73		3.75	1.21		2.06	0.90	
	3.52	+1.42	2.02	6.64	+2.45	6.00	4.67	+1.73	3.00	1.89	-0.28	0.08
	1.05	-1.15	1.32	3.16	-1.03	1.06	1.93	-1.01	1.02	3.01	+0.84	0.71
	—	—	—	—	—	—	—	—	—	—	—	—
	1.73	-0.37	0.14	2.76	-1.43	2.04	2.21	-0.73	0.53	1.60	-0.57	0.32
Sums	6.30	2.94	3.48	12.56	4.91	9.10	8.81	3.47	4.55	6.50	1.69	1.11
Average	2.10	0.98		4.19	1.64		2.94	1.16		2.17	0.56	

From Snedecor, "Statistical Methods"

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$$\text{Standard Error} = s_{\bar{x}} = \left[\left(\frac{\sum \text{dev}^2}{n(n-1)} \right) \right]^{1/2}$$

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$$\text{Standard Deviation} = s = \left[\left(\frac{\sum \text{dev}^2}{n-1} \right) \right]^{1/2}$$

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Graph for estimating significance at 5% and 1% levels for n pairs of observations using Standard Deviation

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$$s_{\bar{x}} = s/n^{1/2}$$

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$$\text{Pooled Standard Deviation} = s = \left[\left(\frac{\sum \text{dev}_a^2 + \sum \text{dev}_b^2}{n_a + n_b - 2} \right) \right]^{1/2}$$

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Graph for estimating significance at 5% and 1% levels for two sets of observations a and b .

If more observations are made than indicated on graphs the results are significant to that level. If less are made than required on graphs the results are not significant.

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$$t = \text{value} / s_{\bar{x}} = n^{1/2} \text{value} / s$$

page 58 Table 3.8. Larger t denotes greater significance.