

STATISTICAL ECOLOGY
Stat 555

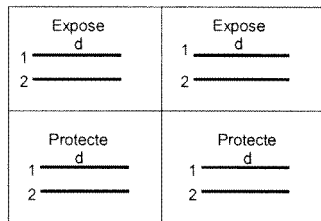
Power: Two-way analysis of variance

EXAMPLE : ABSIZE.MPJ

Purpose: to determine if abalone size varies along wave-exposure gradients in two populations, Santa Cruz Island and Año Nuevo Island, California.

Data: Shell lengths of black abalone (*Haliotis cracherodii*) were measured in mm's at two populations, at two wave exposure regimes at each population, and on two transects at each wave-exposure regime.

Population 1 Population 2



MTB > ANOVA 'Size' = Pop! Wave Transect;
SUBC> Random 'Transect'.

ANOVA: Size versus Pop, Wave, Transect

Factor	Type	Levels	Values
Pop	fixed	2	1, 2
Wave	fixed	2	1, 2
Transect	random	2	1, 2

Blocks

Analysis of Variance for Size

Source	DF	SS	MS	F	P
Pop	1	28275.8	28275.8	63.17	0.000
Wave	1	955.5	955.5	2.13	0.146
Pop*Wave	1	339.3	339.3	0.76	0.385
Transect	1	2797.3	2797.3	6.25	0.013
Error	155	69378.0	447.6		
Total	159	101745.8			

S = 21.1566 R-Sq = 31.81% R-Sq(adj) = 30.05%

MEANS

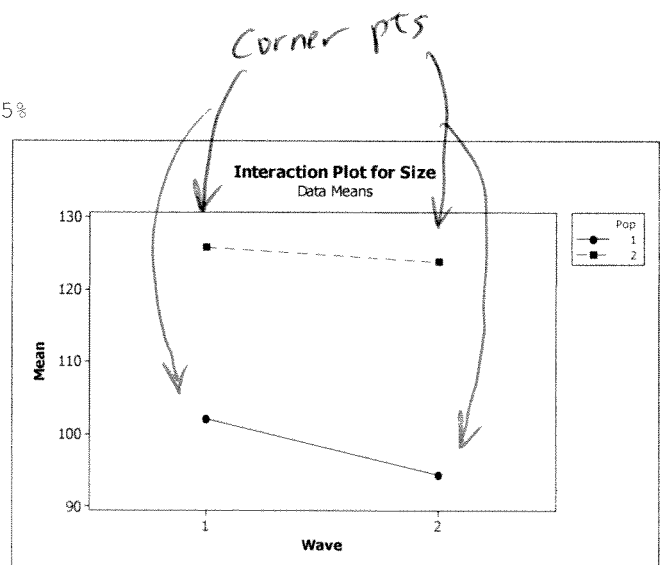
Pop	N	Size
1	80	98.18
2	80	124.76

} 26.6

Wave	N	Size
1	80	113.91
2	80	109.03

} 4.88

Effect size



For Wave-exposure:

Stat 555: Power: Two-way ANOVA

```
MTB > Power;
SUBC>   FFDesign 2 4;
SUBC>   Reps 20;
SUBC>   Effect 4.88;
SUBC>   CPBlock 0;
SUBC>   Sigma 21.51;
SUBC>   Blocks 2;
SUBC>   FitB;
SUBC>   GPCurve.
```

Power and Sample Size

2-Level Factorial Design

Alpha = 0.05 Assumed standard deviation = 21

Factors: 2 Base Design: 2, 4
Blocks: 2

Including blocks in model.

Center Points	Per	Block	Effect	Reps	Total Runs	Power
		0	4.88	20	80	0.170481

```
MTB > Power;
SUBC>   FFDesign 2 4;
SUBC>   Reps 20;
SUBC>   Effect 26.6;
SUBC>   CPBlock 0;
SUBC>   Sigma 21.51;
SUBC>   Blocks 2;
SUBC>   FitB;
SUBC>   GPCurve.
```

Power and Sample Size

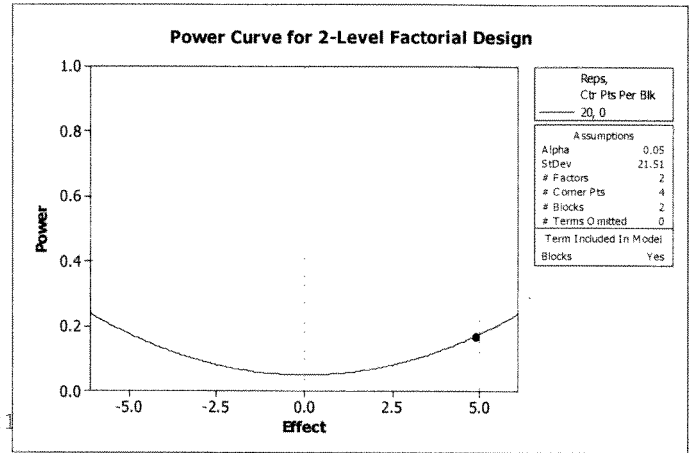
2-Level Factorial Design

Alpha = 0.05 Assumed standard deviation = 21.51

Factors: 2 Base Design: 2, 4
Blocks: 2

Including blocks in model.

Center Points	Per	Block	Effect	Reps	Total Runs	Power
		0	26.6	20	80	0.999766



For population:

