

```

HILOGLINEAR GENDER(1,2) PLATTR(1,2) DEATTR (1,2) VERDICT (1,2)
/CRITERIA ITERATION(20) DELTA(0)
/PRINT=ASSOCIATION ESTIM
/METHOD=BACKWARD
/DESIGN GENDER*PLATTR*DEATTR*VERDICT .

```

## Hierarchical Loglinear Analysis

[DataSet1] C:\D\SPSS\Harass89.sav

### Warnings

For Design 1, .000 has been added to all observed cells for this saturated model, This value may be changed by using the CRITERIA = DELTA subcommand.

### Data Information

		N
Cases	Valid	16
	Out of Range <sup>a</sup>	0
	Missing	0
	Weighted Valid	166
Categories	gender	2
	plattr	2
	deattr	2
	verdict	2

## Design 1

### Goodness-of-Fit Tests

	Chi-Square	df	Sig.
Likelihood Ratio	.000	0	.
Pearson	.000	0	.

### K-Way and Higher-Order Effects

	K	df	Likelihood Ratio		Pearson
			Chi-Square	Sig.	Chi-Square
K-way and Higher Order Effects <sup>a</sup>	1	15	33.431	.004	32.361
	2	11	15.300	.169	15.179
	3	5	6.804	.236	6.701
	4	1	1.697	.193	1.712
K-way Effects <sup>b</sup>	1	4	18.131	.001	17.182
	2	6	8.496	.204	8.479
	3	4	5.108	.276	4.988
	4	1	1.697	.193	1.712

### Partial Associations

Effect	df	Partial Chi-Square	Sig.	Number of Iterations
gender*plattr*deattr	1	.606	.436	2
gender*plattr*verdict	1	.127	.722	3
gender*deattr*verdict	1	.148	.700	3
plattr*deattr*verdict	1	4.761	.029	2
gender*plattr	1	.000	.996	3
gender*deattr	1	.300	.584	2

plattr*deattr	1	.023	.881	3
gender*verdict	1	7.175	.007	2
plattr*verdict	1	.000	.992	3
deattr*verdict	1	1.406	.236	2
gender	1	.000	1.000	2
plattr	1	.217	.641	2
deattr	1	.024	.877	2
verdict	1	17.890	.000	2

#### Parameter Estimates

Effect	Parameter	Estimate	Std. Error	Z	Sig.
gender*plattr*deattr*verdict	1	-.113	.087	-1.303	.193
gender*plattr*deattr	1	-.023	.087	-.262	.793
gender*plattr*verdict	1	-.027	.087	-.307	.759
gender*deattr*verdict	1	-.036	.087	-.413	.679
plattr*deattr*verdict	1	-.172	.087	-1.973	.048
gender*plattr	1	-.008	.087	-.093	.926
gender*deattr	1	-.035	.087	-.398	.691
plattr*deattr	1	.020	.087	.234	.815
gender*verdict	1	-.224	.087	-2.575	.010
plattr*verdict	1	.002	.087	.024	.981
deattr*verdict	1	-.094	.087	-1.083	.279
gender	1	.052	.087	.599	.549
plattr	1	.011	.087	.121	.904
deattr	1	.009	.087	.098	.922
verdict	1	.354	.087	4.072	.000

## Backward Elimination Statistics

Step Summary

Step <sup>a</sup>	Effects	Chi-Square <sup>c</sup>	df	Sig.	Number of Iterations		
0	Generating Class <sup>b</sup>	gender*plattr*d eattr*verdict	.000	0	.		
	Deleted Effect 1	four-way effect is deleted	gender*plattr*d eattr*verdict	1.697	1	.193	3
1	Generating Class <sup>b</sup>	gender*plattr*d eattr, gender*plattr*v erdict, gender*deattr* verdict, plattr*deattr*ve rdict	1.697	1	.193		
	Deleted Effect 1	gender*plattr*d eattr	.606	1	.436	2	
	2	This is deleted.	gender*plattr*v erdict	.127	1	.722	3
	3	gender*deattr* verdict	.148	1	.700	3	
	4	plattr*deattr*ve rdict	4.761	1	.029	2	

2	Generating Class <sup>b</sup>	gender*plattr*deattr, gender*deattr*verdict, plattr*deattr*verdict	1.824	2	.402	
	Deleted Effect 1	gender*plattr*deattr	.562	1	.453	2
	2 This is deleted	gender*deattr*verdict	.187	1	.665	3
	3	plattr*deattr*verdict	4.709	1	.030	2
3	Generating Class <sup>b</sup>	gender*plattr*deattr, plattr*deattr*verdict, gender*verdict	2.011	3	.570	
	Deleted Effect 1 This is deleted.	gender*plattr*deattr	.563	1	.453	2
	2	plattr*deattr*verdict	4.704	1	.030	3
	3	gender*verdict	7.648	1	.006	2
4	Generating Class <sup>b</sup>	plattr*deattr*verdict, gender*verdict, gender*plattr, gender*deattr	2.573	4	.632	
	Deleted Effect 1	plattr*deattr*verdict	4.231	1	.040	3
	2	gender*verdict	7.175	1	.007	2

	3 This is deleted.	gender*plattr	.000	1	.994	2
	4	gender*deattr	.300	1	.584	2
5	Generating Class <sup>b</sup>	plattr*deattr*verdict, gender*verdict, gender*deattr	2.574	5	.765	
	Deleted Effect 1	plattr*deattr*verdict	4.231	1	.040	3
	2	gender*verdict	7.175	1	.007	2
	3 This is deleted.	gender*deattr	.300	1	.584	2
6	Generating Class <sup>b</sup>	plattr*deattr*verdict, gender*verdict	2.873	6	.825	
	Deleted Effect 1	plattr*deattr*verdict	4.231	1	.040	2
	None					
	2	gender*verdict	6.971	1	.008	2
7	Generating Class <sup>b</sup> This is the final model	plattr*deattr*verdict, gender*verdict	2.873	6	.825	

a. At each step, the effect with the largest significance level for the Likelihood Ratio Change is deleted, provided the significance level is larger than .050.

b. Statistics are displayed for the best model at each step after step 0.

c. For 'Deleted Effect', this is the change in the Chi-Square after the effect is deleted from the model.

#### Goodness-of-Fit Tests

	Chi-Square	df	Sig.
Likelihood Ratio	2.873	6	.825
Pearson	2.832	6	.830

**Do not reject the null hypothesis of good fit.**

---

```
LOGLINEAR VERDICT (1,2) BY GENDER (1,2) PLATTR (1,2) DEATTR (1,2) /
PRINT=ESTIM / CRITERIA DELTA(0) /
DESIGN=VERDICT, VERDICT BY GENDER, VERDICT BY PLATTR, VERDICT BY DEATTR,
VERDICT BY GENDER BY PLATTR, VERDICT BY GENDER BY DEATTR,
VERDICT BY PLATTR BY DEATTR,
VERDICT BY GENDER BY PLATTR BY DEATTR .
```

## Loglinear: Saturated Logit Model

```
* * * * * LOG LINEAR ANALYSIS * * * * *
```

### DATA Information

```
16 unweighted cases accepted.
0 cases rejected because of out-of-range factor values.
0 cases rejected because of missing data.
166 weighted cases will be used in the analysis.
```

### FACTOR Information

Factor	Level	Label
verdict	2	
gender	2	
plattr	2	
deattr	2	

### Correspondence Between Effects and Columns of Design/Model 1

Starting Column	Ending Column	Effect Name
1	1	VERDICT
2	2	VERDICT BY GENDER
3	3	VERDICT BY PLATTR
4	4	VERDICT BY DEATTR
5	5	VERDICT BY GENDER BY PLATTR
6	6	VERDICT BY GENDER BY DEATTR
7	7	VERDICT BY PLATTR BY DEATTR
8	8	VERDICT BY GENDER BY PLATTR BY DEATTR

---

\*\*\* ML converged at iteration 2.

Maximum difference between successive iterations = .00000.

-----  
Goodness-of-Fit test statistics

Likelihood Ratio Chi Square = .00000 DF = 0 P = .  
Pearson Chi Square = .00000 DF = 0 P = .  
-----

Estimates for Parameters

VERDICT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
1	.3541516680	.08697	4.07206	.18369	.52461

VERDICT BY GENDER

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
2	-.2239699337	.08697	-2.57522	-.39443	-.05351

VERDICT BY PLATTR

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
3	.0021186948	.08697	.02436	-.16834	.17258

VERDICT BY DEATTR

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
4	-.0942214753	.08697	-1.08337	-.26468	.07624

VERDICT BY GENDER BY PLATTR

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
5	-.0266967625	.08697	-.30696	-.19716	.14377

VERDICT BY GENDER BY DEATTR

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
-----------	--------	-----------	---------	-------------	-------------

6	-.0359602591	.08697	-.41347	-.20642	.13450
VERDICT BY PLATTR BY DEATTR					
Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
7	-.1716013763	.08697	-1.97309	-.34206	-.00114
VERDICT BY GENDER BY PLATTR BY DEATTR					
Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
8	-.1133401601	.08697	-1.30319	-.28380	.05712

Several steps left out of this output, see “Four Variable LOGIT Analysis: The 1989 Sexual Harassment Study” for a description of these steps.

```
LOGLINEAR VERDICT (1,2) BY GENDER (1,2) PLATTR (1,2) DEATTR (1,2) /
PRINT=DEFAULT ESTIM /
DESIGN=VERDICT, VERDICT BY GENDER,
VERDICT BY PLATTR BY DEATTR /
DESIGN=VERDICT, VERDICT BY GENDER .
```

### Loglinear: Logit Trimmed Down to Only Three Parameters

\*\*\*\*\* LOG LINEAR ANALYSIS \*\*\*\*\*

Observed, Expected Frequencies and Residuals

Factor	Code	OBS. count & PCT.	EXP. count & PCT.	Residual	Std. Resid.	Adj. Resid.
					None exceed 1	
verdict	Guilty					
gender	Male					
plattr	Unattrac					
deattr	Unattrac	7.00 (35.00)	9.44 (47.22)	-2.4445	-.7954	-1.4096
deattr	Attractv	17.00 (73.91)	15.04 (65.37)	1.9639	.5065	1.1317
plattr	Attractv					
deattr	Unattrac	13.00 (65.00)	13.07 (65.37)	-.0748	-.0207	-.0442
deattr	Attractv	10.00 (50.00)	9.44 (47.22)	.5555	.1807	.3203
gender	Female					
plattr	Unattrac					

deattr	Unattrac	16.00 (72.73)	15.25 (69.31)	.7514	.1924	.4496
deattr	Attractv	17.00 (80.95)	17.36 (82.66)	-.3578	-.0859	-.2524
plattr	Attractv					
deattr	Unattrac	15.00 (75.00)	16.53 (82.66)	-1.5313	-.3766	-1.0940
deattr	Attractv	15.00 (75.00)	13.86 (69.31)	1.1377	.3056	.6929
verdict	Not_Guil					
gender	Male					
plattr	Unattrac					
deattr	Unattrac	13.00 (65.00)	10.56 (52.78)	2.4445	.7524	1.4096
deattr	Attractv	6.00 (26.09)	7.96 (34.63)	-1.9639	-.6959	-1.1317
plattr	Attractv					
deattr	Unattrac	7.00 (35.00)	6.93 (34.63)	.0748	.0284	.0442
deattr	Attractv	10.00 (50.00)	10.56 (52.78)	-.5555	-.1710	-.3203
gender	Female					
plattr	Unattrac					
deattr	Unattrac	6.00 (27.27)	6.75 (30.69)	-.7514	-.2892	-.4496
deattr	Attractv	4.00 (19.05)	3.64 (17.34)	.3578	.1875	.2524
plattr	Attractv					
deattr	Unattrac	5.00 (25.00)	3.47 (17.34)	1.5313	.8222	1.0940
deattr	Attractv	5.00 (25.00)	6.14 (30.69)	-1.1377	-.4592	-.6929

Goodness-of-Fit test statistics **Fit is still good.**

Likelihood Ratio Chi Square = 3.28297 DF = 5 P = .656  
 Pearson Chi Square = 3.28808 DF = 5 P = .656

Analysis of Dispersion

Source of Variation	Dispersion		DF
	Entropy	Concentration	
Due to Model	5.904	5.189	
Due to Residual	100.213	69.028	
Total	106.117	74.217	165

Measures of Association - See <http://faculty.chass.ncsu.edu/garson/PA765/logit.htm> -- I find these measures useless.

Entropy = .055641  
 Concentration = .069914

Estimates for Parameters

VERDICT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
1	.3625648330	.08649	4.19219	.19305	.53208

VERDICT BY GENDER

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
2	-.2314839459	.08638	-2.67981	-.40079	-.06218

VERDICT BY PLATTR BY DEATTR

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
3	-.1866832685	.08590	-2.17326	-.35505	-.01832

From the coefficient for verdict, the odds of a guilty verdict are  $e^{2(.3626)} = 2.07$ , pretty close to the observed odds of 110 guilty/56 not guilty = 1.96.

From the coefficients for verdict and for verdict by gender, the conditional odds of a guilty verdict for the men are:  $.363 - .231 \implies e^{2(.132)} = 1.30$ , pretty close to the observed odds of 47/36 = 1.31. For the women,  $.363 + .231 = .594 \implies e^{2(.594)} = 3.28$ , pretty close to the observed odds of 63/20 = 3.15.

The observed odds ratio for the effect of gender is  $1.31/3.15 = 0.42$ . Inverting this for easier interpretation, the odds of a recommendation for a guilty verdict were 2.4 times higher for female jurors than for male jurors.

From the coefficient for verdict by gender, the odds ratio is  $e^{4(-.231)} = .40$ , pretty close to the observed odds ratio. From the conditional odds from the model, the odds ratio is  $1.30/3.28 = .40$  as well.

DESIGN=VERDICT, VERDICT BY GENDER . Tried Dropping One More Parameter.

\*\*\*\*\* LOG LINEAR ANALYSIS \*\*\*\*\*

Correspondence Between Effects and Columns of Design/Model 2

Starting Column	Ending Column	Effect Name
1	1	VERDICT
2	2	VERDICT BY GENDER

\*\*\* ML converged at iteration 3.  
 Maximum difference between successive iterations = .00062.

Observed, Expected Frequencies and Residuals

Factor	Code	OBS. count & PCT.	EXP. count & PCT.	Residual	Std. Resid.	Adj. Resid.
verdict	Guilty					
gender	Male					
plattr	Unattrac					
deattr	Unattrac	7.00 (35.00)	11.33 (56.63)	-4.3253	-1.2853	-2.2400
deattr	Attractv	17.00 (73.91)	13.02 (56.63)	3.9759	1.1017	1.9675
plattr	Attractv					
deattr	Unattrac	13.00 (65.00)	11.33 (56.63)	1.6747	.4976	.8673
deattr	Attractv	10.00 (50.00)	11.33 (56.63)	-1.3253	-.3938	-.6864
gender	Female					
plattr	Unattrac					
deattr	Unattrac	16.00 (72.73)	16.70 (75.90)	-.6988	-.1710	-.4064
deattr	Attractv	17.00 (80.95)	15.94 (75.90)	1.0602	.2656	.6259
plattr	Attractv					
deattr	Unattrac	15.00 (75.00)	15.18 (75.90)	-.1807	-.0464	-.1085
deattr	Attractv	15.00 (75.00)	15.18 (75.90)	-.1807	-.0464	-.1085
verdict	Not_Guil					
gender	Male					
plattr	Unattrac					
deattr	Unattrac	13.00 (65.00)	8.67 (43.37)	4.3253	1.4686	2.2400
deattr	Attractv	6.00 (26.09)	9.98 (43.37)	-3.9759	-1.2588	-1.9675
plattr	Attractv					
deattr	Unattrac	7.00 (35.00)	8.67 (43.37)	-1.6747	-.5686	-.8673
deattr	Attractv	10.00 (50.00)	8.67 (43.37)	1.3253	.4500	.6864
gender	Female					

plattr	Unattrac					
deattr	Unattrac	6.00 (27.27)	5.30 (24.10)	.6988	.3035	.4064
deattr	Attractv	4.00 (19.05)	5.06 (24.10)	-1.0602	-.4713	-.6259
plattr	Attractv					
deattr	Unattrac	5.00 (25.00)	4.82 (24.10)	.1807	.0823	.1085
deattr	Attractv	5.00 (25.00)	4.82 (24.10)	.1807	.0823	.1085

Goodness-of-Fit test statistics

Likelihood Ratio Chi Square = 8.12053 DF = 6 P = .229  
 Pearson Chi Square = 7.96727 DF = 6 P = .241

**On the previous step the  $\chi^2$  was 3.283. Dropping the Verdict by Plattr by Deattr parameter increasing the  $\chi^2$  by 4.838 to 8.121. For a  $\chi^2$  on one *df*, the .05 critical value is 3.84, so this increase reflects a significant decrease in the fit between the model and the data. Also, note the four cells with large standardized residuals.**

Analysis of Dispersion

Source of Variation	Dispersion		DF
	Entropy	Concentration	
Due to Model	3.486	3.084	
Due to Residual	102.632	71.133	
Total	106.117	74.217	165

Measures of Association

Entropy = .032847  
 Concentration = .041558

Estimates for Parameters

VERDICT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
1	.3535076803	.08475	4.17107	.18739	.51962

VERDICT BY GENDER

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
2	-.2201933488	.08475	-2.59808	-.38631	-.05408

```

CROSSTABS VARIABLES=PLATTR(1,2) DEATTR(1,2) VERDICT(1,2) GENDER(1,2)
/ TABLES PLATTR BY VERDICT BY DEATTR
/ TABLES DEATTR BY VERDICT BY PLATTR
/ TABLES GENDER BY VERDICT
/cells=count row /statistics=chisq .

```

## Crosstabs

**plattr \* verdict \* deattr**

Crosstabulation

				verdict		Total
				Guilty	Not_Guilty	
<b>deattr</b>						
<b>Unattractv</b>	plattr	Unattractv	Count	23	19	42
			% within plattr	54.8%	45.2%	100.0%
	Attractv	Count	28	12	40	
		% within plattr	70.0%	30.0%	100.0%	
	Total	Count	51	31	82	
		% within plattr	62.2%	37.8%	100.0%	
<b>Attractv</b>	plattr	Unattractv	Count	34	10	44
			% within plattr	77.3%	22.7%	100.0%
	Attractv	Count	25	15	40	
		% within plattr	62.5%	37.5%	100.0%	
	Total	Count	59	25	84	
		% within plattr	70.2%	29.8%	100.0%	

### Chi-Square Tests

deattr	Value	df	Asymp. Sig. (2-sided)
Likelihood Ratio	2.037	1	.154
N of Valid Cases	82		
Likelihood Ratio	2.194	1	.139
N of Valid Cases	84		

When the defendant was unattractive, he lost the case more often when the plaintiff was attractive (70%) than when she was unattractive (55%), but this difference fell short of significance.

When the defendant was attractive, he lost the case more often when the plaintiff was unattractive ((77%) than when she was attractive (62%), but this difference fell short of significance.

The difference between the two simple effects, which are in opposite directions, is large enough for the interaction to be significant.

**deattr \* verdict \* plattr** – Same interaction from another perspective

**Crosstabulation**

plattr				verdict		Total
				Guilty	Not_Guilty	
Unattractv	deattr	Unattractv	Count	23	19	42
			% within deattr	54.8%	45.2%	100.0%
	Attractv	Unattractv	Count	34	10	44
			% within deattr	77.3%	22.7%	100.0%
	Total	Unattractv	Count	57	29	86
			% within deattr	66.3%	33.7%	100.0%
Attractv	deattr	Unattractv	Count	28	12	40
			% within deattr	70.0%	30.0%	100.0%
	Attractv	Unattractv	Count	25	15	40
			% within deattr	62.5%	37.5%	100.0%
	Total	Unattractv	Count	53	27	80
			% within deattr	66.3%	33.8%	100.0%

**Chi-Square Tests**

plattr		Value	df	Asymp. Sig. (2-sided)
Likelihood Ratio	N of Valid Cases	4.929	1	.026
		86		
Likelihood Ratio	N of Valid Cases	.504	1	.478
		80		

When the plaintiff was unattractive, she won the case significantly more often when the defendant was attractive (77%) than when he was unattractive (55%).

When the plaintiff was attractive, the effect of defendant attractiveness fell well short of statistical significance.

**gender \* verdict**

**Crosstabulation**

			verdict		Total
			Guilty	Not_Guilty	
gender	Male	Count	47	36	83
		% within gender	56.6%	43.4%	100.0%
	Female	Count	63	20	83
		% within gender	75.9%	24.1%	100.0%
Total		Count	110	56	166
		% within gender	66.3%	33.7%	100.0%

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Likelihood Ratio	6.971	1	.008		