

## The SAS System

## The GENMOD Procedure

Model Information	
Data Set	WORK.FORD
Distribution	Binomial
Link Function	Logit
Response Variable (Events)	y
Response Variable (Trials)	total

Number of Observations Read	8
Number of Observations Used	8
Number of Events	42
Number of Trials	2480

Class Level Information		
Class	Levels	Values
speed	4	1 2 3 4
make	2	ford other

Response Profile		
Ordered Value	Binary Outcome	Total Frequency
1	Event	42
2	Nonevent	2438

Parameter Information			
Parameter	Effect	speed	make
Prm1	Intercept		
Prm2	make		ford
Prm3	make		other
Prm4	speed	1	
Prm5	speed	2	
Prm6	speed	3	
Prm7	speed	4	

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	3	7.1847	2.3949
Scaled Deviance	3	7.1847	2.3949
Pearson Chi-Square	3	6.7957	2.2652
Scaled Pearson X2	3	6.7957	2.2652
Log Likelihood		-172.7313	
Full Log Likelihood		-15.2991	
AIC (smaller is better)		40.5981	
AICC (smaller is better)		70.5981	
BIC (smaller is better)		40.9953	

Algorithm converged.

Analysis Of Maximum Likelihood Parameter Estimates								
Parameter		DF	Estimate	Standard Error	Likelihood Ratio 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept		1	-3.1827	0.2735	-3.7576	-2.6806	135.45	<.0001
make	ford	1	1.3513	0.3246	0.7218	2.0033	17.33	<.0001
make	other	0	0.0000	0.0000	0.0000	0.0000	.	.
speed	1	1	-2.7436	0.6116	-4.1797	-1.6963	20.12	<.0001
speed	2	1	-2.8629	0.5385	-4.0857	-1.9179	28.26	<.0001
speed	3	1	-1.5807	0.4571	-2.5755	-0.7517	11.96	0.0005
speed	4	0	0.0000	0.0000	0.0000	0.0000	.	.
Scale		0	1.0000	0.0000	1.0000	1.0000		

**Note:** The scale parameter was held fixed.

LR Statistics For Type 3 Analysis			
Source	DF	Chi-Square	Pr > ChiSq
make	1	17.55	<.0001
speed	3	59.15	<.0001

Observation	y	total	speed	make	Predicted Value	Linear Predictor	Standard Error of the Linear Predictor	HessWgt	Lower	Upper	Raw Residual	Pearson Residual	Deviance Residual	Std Deviance Residual	Std Pearson Residual	Likelihood
1	0.5	172	1	ford	0.0102008	-4.575035	0.595002	1.7366418	0.0032006	0.0320199	-1.25454	-0.951983	-1.123809	-1.810756	-1.533898	-1.646
2	2.5	468	1	other	0.0026613	-5.926288	0.6095227	1.2421587	0.0008074	0.008735	1.2545268	1.125619	0.9890386	1.3477645	1.5338829	1.4366
3	0.5	244	2	ford	0.0090637	-4.694374	0.5222506	2.1914958	0.0032756	0.0248246	-1.71154	-1.156157	-1.395826	-2.200735	-1.822859	-1.983
4	3.5	757	2	other	0.0023626	-6.045627	0.5324829	1.784263	0.0008333	0.0066797	1.7115115	1.2812987	1.1316375	1.6099142	1.8228284	1.7209
5	3	101	3	ford	0.031918	-3.412147	0.4397689	3.1208222	0.0137336	0.072412	-0.223717	-0.126638	-0.128097	-0.203446	-0.201128	-0.20
6	3	328	3	other	0.0084643	-4.7634	0.4472123	2.7527841	0.0035406	0.0200971	0.2237167	0.134838	0.1331004	0.1985365	0.2011284	0.1999
7	21	129	4	ford	0.1380638	-1.831466	0.2370276	15.35128	0.0914522	0.2031212	3.1897726	0.8141181	0.7951929	2.1442174	2.1952488	2.1883
8	8	281	4	other	0.0398213	-3.182719	0.2734666	10.744182	0.0236906	0.0661906	-3.189773	-0.973135	-1.023801	-2.309545	-2.195249	-2.218

## The SAS System

### The LOGISTIC Procedure

Model Information	
Data Set	WORK.FORD
Response Variable (Events)	y
Response Variable (Trials)	total
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	8
Number of Observations Used	8
Sum of Frequencies Read	2480
Sum of Frequencies Used	2480

Response Profile		
Ordered Value	Binary Outcome	Total Frequency
1	Event	42
2	Nonevent	2438

Class Level Information				
Class	Value	Design Variables		
speed	1	1	0	0
	2	0	1	0
	3	0	0	1
	4	0	0	0
make	ford	1		
	other	0		

Model Convergence Status	
Convergence criterion (GCONV=1E-8) satisfied.	

Deviance and Pearson Goodness-of-Fit Statistics				
Criterion	Value	DF	Value/DF	Pr > ChiSq
Deviance	7.1847	3	2.3949	0.0662
Pearson	6.7957	3	2.2652	0.0787

Number of unique profiles: 8

Model Fit Statistics			
Criterion	Intercept Only	Intercept and Covariates	
		Log Likelihood	Full Log Likelihood
AIC	427.866	355.463	40.598
SC	433.682	384.543	69.678
-2 Log L	425.866	345.463	30.598

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	80.4030	4	<.0001
Score	107.6249	4	<.0001
Wald	67.3680	4	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
make	1	17.3292	<.0001
speed	3	48.2754	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq

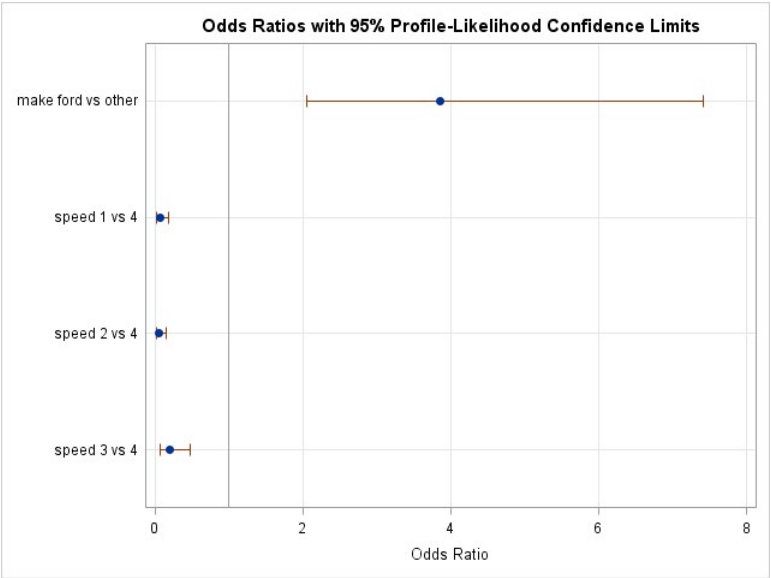
Intercept		1	-3.1827	0.2735	135.4527	<.0001
make	ford	1	1.3513	0.3246	17.3292	<.0001
speed	1	1	-2.7436	0.6116	20.1245	<.0001
speed	2	1	-2.8629	0.5385	28.2639	<.0001
speed	3	1	-1.5807	0.4571	11.9596	0.0005

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	74.6	Somers' D	0.631
Percent Discordant	11.6	Gamma	0.732
Percent Tied	13.8	Tau-a	0.021
Pairs	102396	c	0.815

Parameter Estimates and Profile-Likelihood Confidence Intervals			
Parameter		Estimate	95% Confidence Limits
Intercept		-3.1827	-3.7576 -2.6806
make	ford	1.3513	0.7218 2.0033
speed	1	-2.7436	-4.1797 -1.6963
speed	2	-2.8629	-4.0857 -1.9179
speed	3	-1.5807	-2.5755 -0.7517

Parameter Estimates and Wald Confidence Intervals			
Parameter		Estimate	95% Confidence Limits
Intercept		-3.1827	-3.7187 -2.6467
make	ford	1.3513	0.7150 1.9875
speed	1	-2.7436	-3.9422 -1.5449
speed	2	-2.8629	-3.9184 -1.8075
speed	3	-1.5807	-2.4765 -0.6848

Odds Ratio Estimates and Profile-Likelihood Confidence Intervals				
Effect	Unit	Estimate	95% Confidence Limits	
make ford vs other	1.0000	3.862	2.058	7.413
speed 1 vs 4	1.0000	0.064	0.015	0.183
speed 2 vs 4	1.0000	0.057	0.017	0.147
speed 3 vs 4	1.0000	0.206	0.076	0.472



Odds Ratio Estimates and Wald Confidence Intervals			
Effect	Unit	Estimate	95% Confidence Limits
make ford vs other	1.0000	3.862	2.044 7.297
speed 1 vs 4	1.0000	0.064	0.019 0.213
speed 2 vs 4	1.0000	0.057	0.020 0.164

