Logistic Regression

```
##   x freq
## 1 0  199
## 2 1  201
```

Null Model

```
##
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.182  -1.182   1.173   1.173   1.173
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)     0.01       0.10     0.1     0.92
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 554.51  on 399  degrees of freedom
## Residual deviance: 554.51  on 399  degrees of freedom
## AIC: 556.51
##
## Number of Fisher Scoring iterations: 3
```

Logistic Regression: Full MOdel

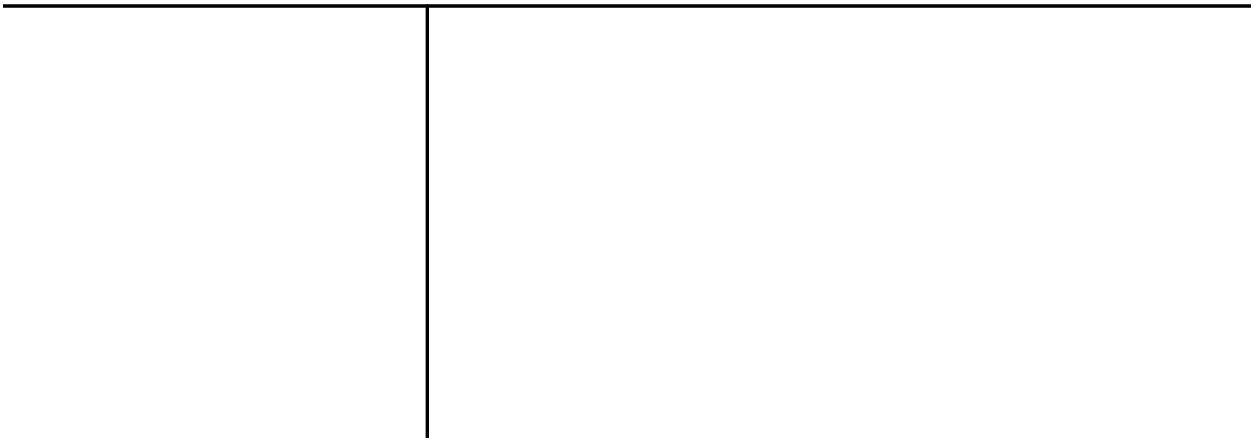
```
##
## Call:
## glm(formula = SR ~ ., family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.3937  -0.8778   0.1414   0.9306   2.0267
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  2.230401   1.699205   1.313  0.18931
## NASA         0.014450   0.023512   0.615  0.53885
## TA          -0.021424   0.020840  -1.028  0.30394
## EXT         -0.056071   0.056676  -0.989  0.32250
## AGR          0.036832   0.076015   0.485  0.62801
## CS          -0.069279   0.080971  -0.856  0.39222
## NT          -0.042332   0.080987  -0.523  0.60118
## OP          -0.025355   0.069074  -0.367  0.71357
## AV           0.022551   0.024553   0.918  0.35837
## EM           0.016780   0.031442   0.534  0.59357
## Task        -0.017442   0.034810  -0.501  0.61632
## H            0.014280   0.007935   1.800  0.07194 .
## RS2         -0.292905   0.248395  -1.179  0.23832
## WH2          0.100993   0.475878   0.212  0.83193
## TWR         -0.004117   0.008973  -0.459  0.64635
## BR2         -0.007057   0.251794  -0.028  0.97764
## NP2         -1.256660   0.280167  -4.485 7.28e-06 ***
## NP3         -1.858111   0.338782  -5.485 4.14e-08 ***
## FA2         -0.086435   0.320508  -0.270  0.78741
## FA3          0.408818   0.562427   0.727  0.46730
## FA4          2.939186   0.795394   3.695  0.00022 ***
## FA5          0.730857   0.715208   1.022  0.30684
## FA6          1.384358   0.528729   2.618  0.00884 **
## AP           0.170882   0.328306   0.520  0.60272
## AR          -0.103344   0.100691  -1.026  0.30473
## DWH2        -0.281804   0.428534  -0.658  0.51080
## DWR         -0.001436   0.007428  -0.193  0.84669
## T2           0.429712   0.252834   1.700  0.08921 .
## DS2         -0.351553   0.294625  -1.193  0.23278
## Rank1       -0.020893   0.339076  -0.062  0.95087
## Rank2        0.335126   0.355780   0.942  0.34622
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 554.51  on 399  degrees of freedom
## Residual deviance: 440.85  on 369  degrees of freedom
## AIC: 502.85
##
## Number of Fisher Scoring iterations: 5
```

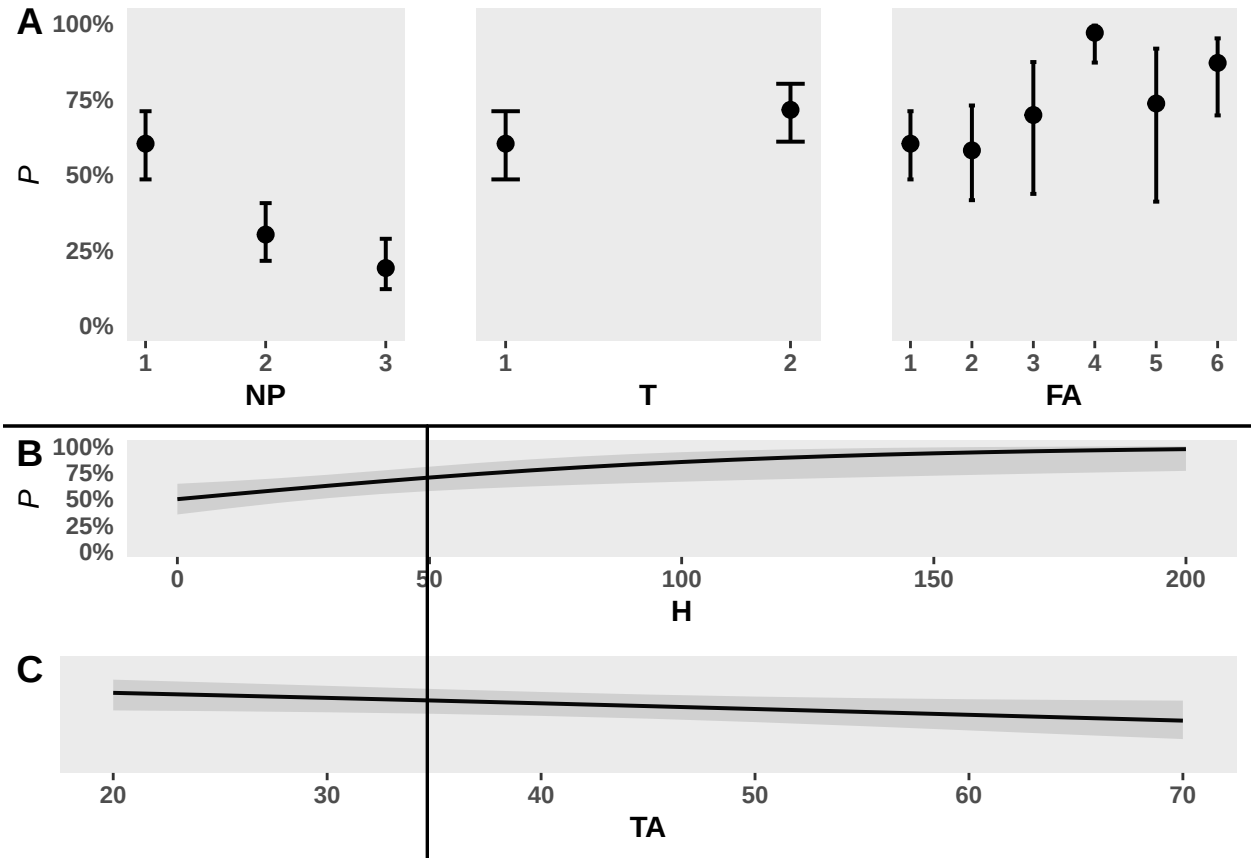
Backward Elimination Model selection

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##
## Final Model:
## SR ~ TA + H + NP + FA + T
##
##
##      Step Df    Deviance Resid. Df Resid. Dev      AIC
## 1                             369   440.8513 502.8513
## 2  - Rank  2 1.509620396       371   442.3609 500.3609
## 3    - BR  1 0.001695748       372   442.3626 498.3626
## 4   - DWR  1 0.020179557       373   442.3828 496.3828
## 5    - WH  1 0.054652690       374   442.4374 494.4374
## 6    - OP  1 0.143989982       375   442.5814 492.5814
## 7   - AGR  1 0.238018918       376   442.8194 490.8194
## 8  - Task  1 0.292156478       377   443.1116 489.1116
## 9    - EM  1 0.257450629       378   443.3690 487.3690
## 10   - NT  1 0.311459566       379   443.6805 485.6805
## 11 - NASA  1 0.364744331       380   444.0452 484.0452
## 12  - DWH  1 0.447536428       381   444.4928 482.4928
## 13  - TWR  1 0.436483134       382   444.9293 480.9293
## 14   - AP  1 0.522343783       383   445.4516 479.4516
## 15   - CS  1 0.599626322       384   446.0512 478.0512
## 16   - AV  1 0.801235031       385   446.8525 476.8525
## 17  - EXT  1 0.641823048       386   447.4943 475.4943
## 18   - AR  1 1.053584227       387   448.5479 474.5479
## 19   - RS  1 1.807657749       388   450.3555 474.3555
## 20   - DS  1 1.874727682       389   452.2303 474.2303
```

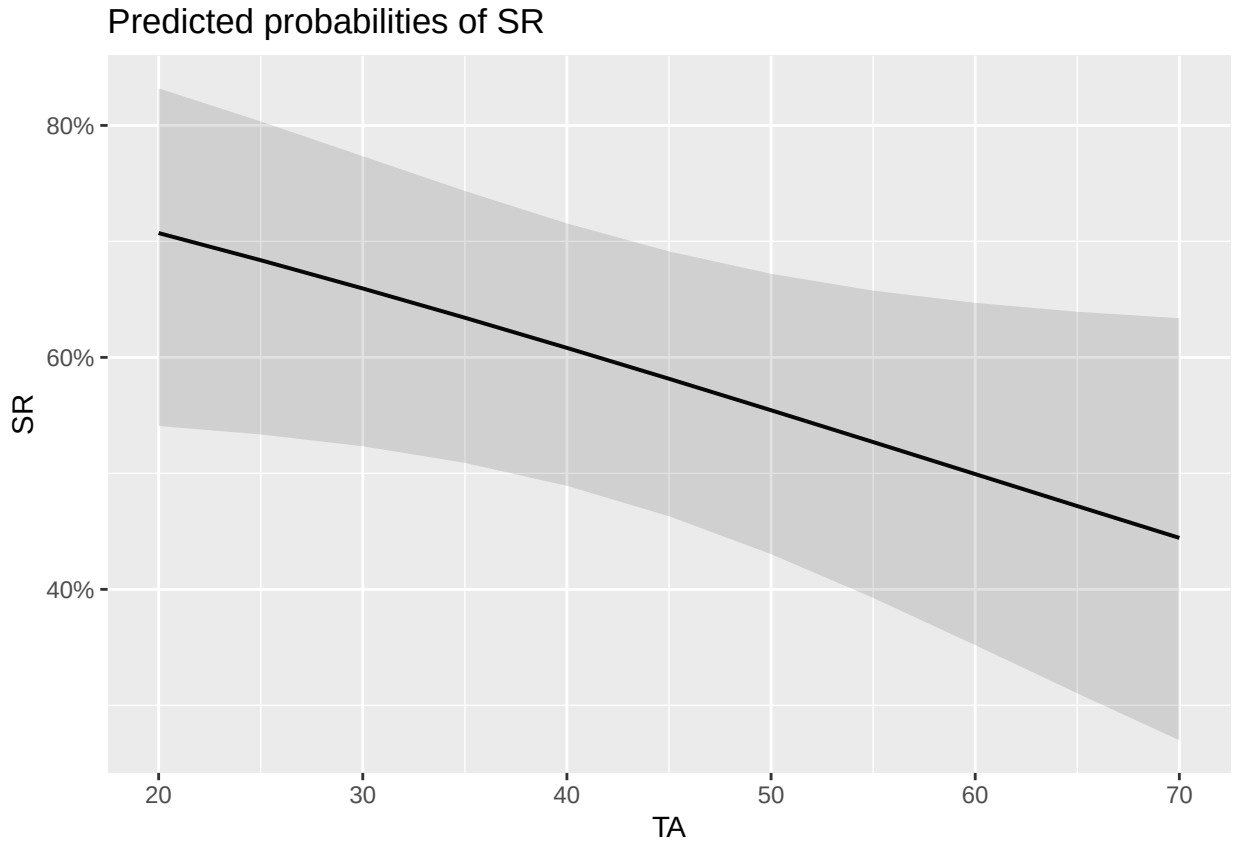
Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + NP + FA + T, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.4160  -0.8988   0.1561   0.8906   2.0568
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.890697   0.615764   1.446  0.14804
## TA          -0.022102   0.011683  -1.892  0.05852 .
## H            0.017321   0.006592   2.628  0.00860 **
## NP2         -1.255150   0.267413  -4.694 2.68e-06 ***
## NP3         -1.859964   0.303392  -6.131 8.76e-10 ***
## FA2         -0.092050   0.305850  -0.301  0.76344
## FA3          0.419226   0.536637   0.781  0.43468
## FA4          3.057238   0.781172   3.914 9.09e-05 ***
## FA5          0.607016   0.672966   0.902  0.36706
## FA6          1.485359   0.514963   2.884  0.00392 **
## T2           0.501837   0.233954   2.145  0.03195 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 554.51  on 399  degrees of freedom
## Residual deviance: 452.23  on 389  degrees of freedom
## AIC: 474.23
##
## Number of Fisher Scoring iterations: 5
```

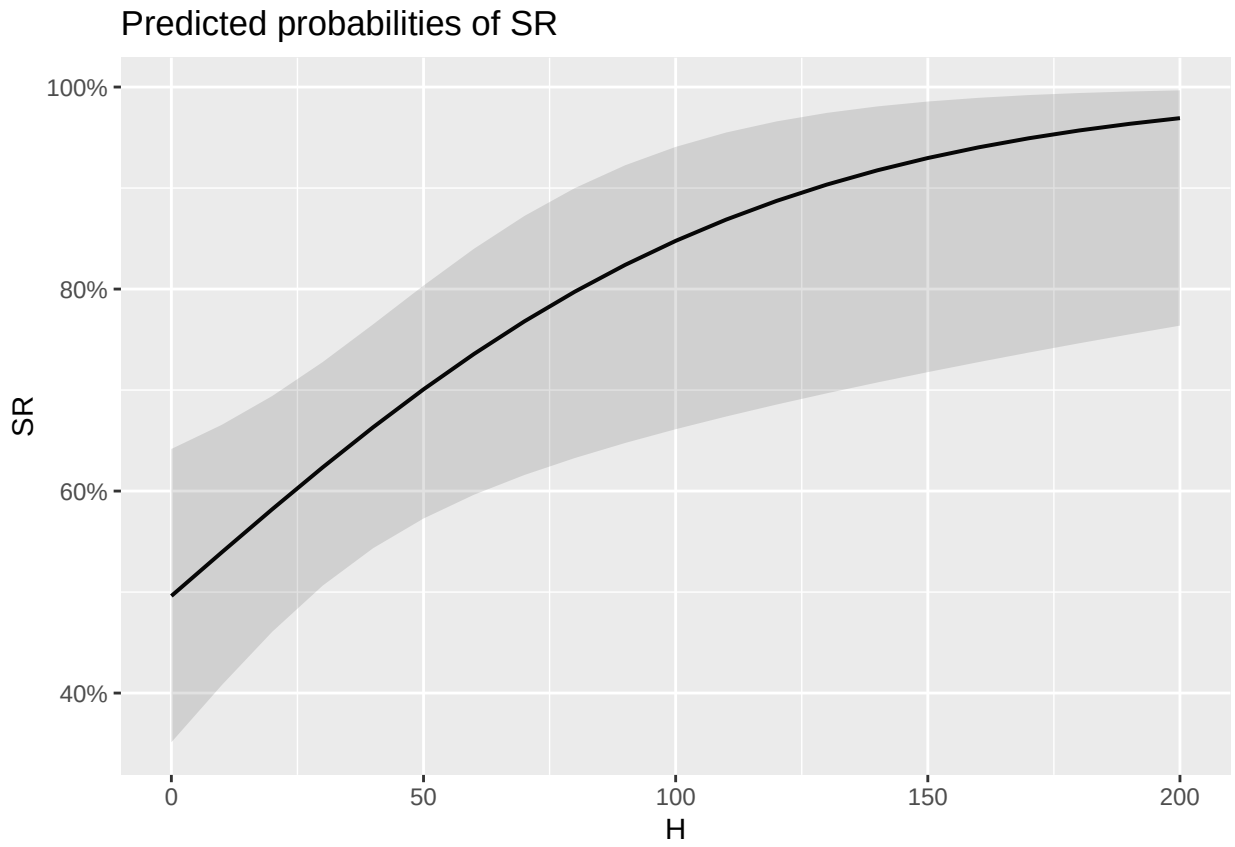




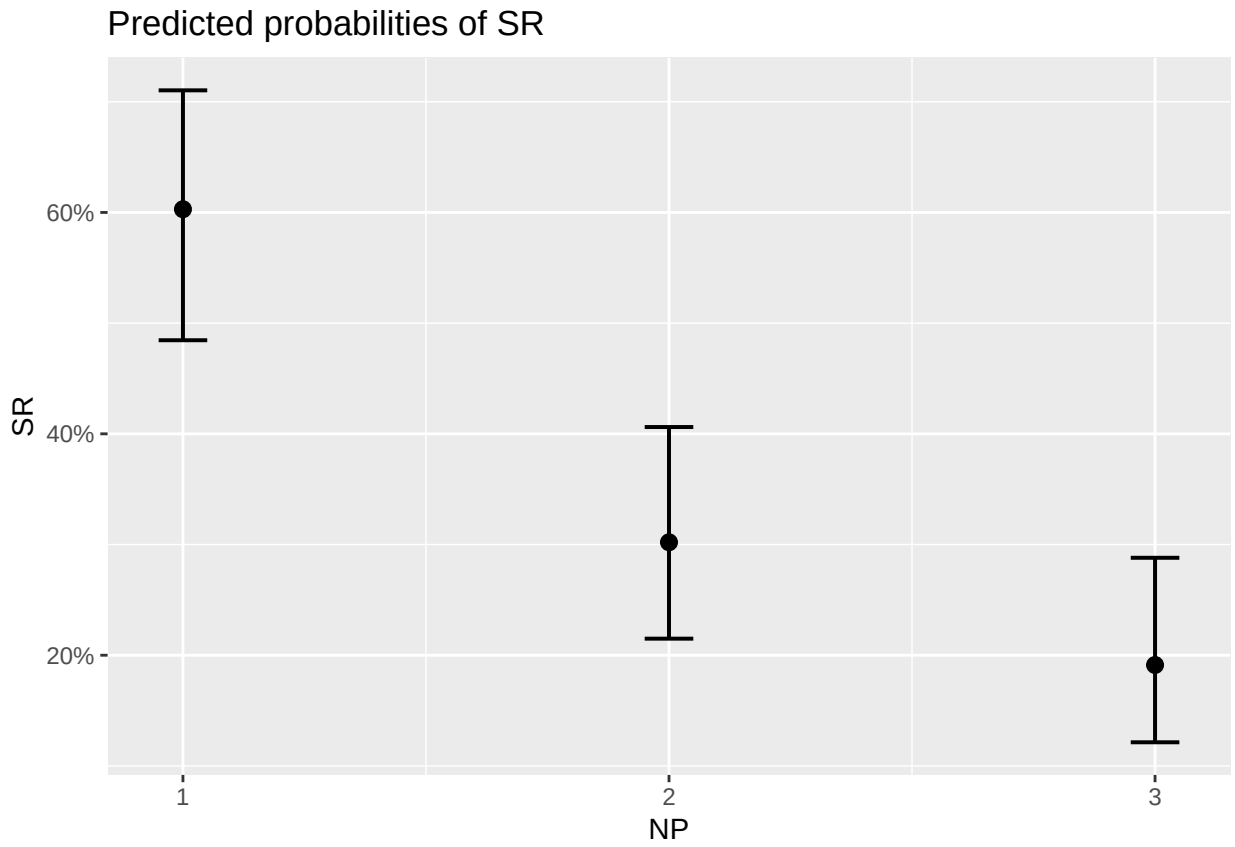

```
## Data were 'prettified'. Consider using `terms="TA [all]"` to get smooth plots.

## Data were 'prettified'. Consider using `terms="H [all]"` to get smooth plots.

## $TA
```



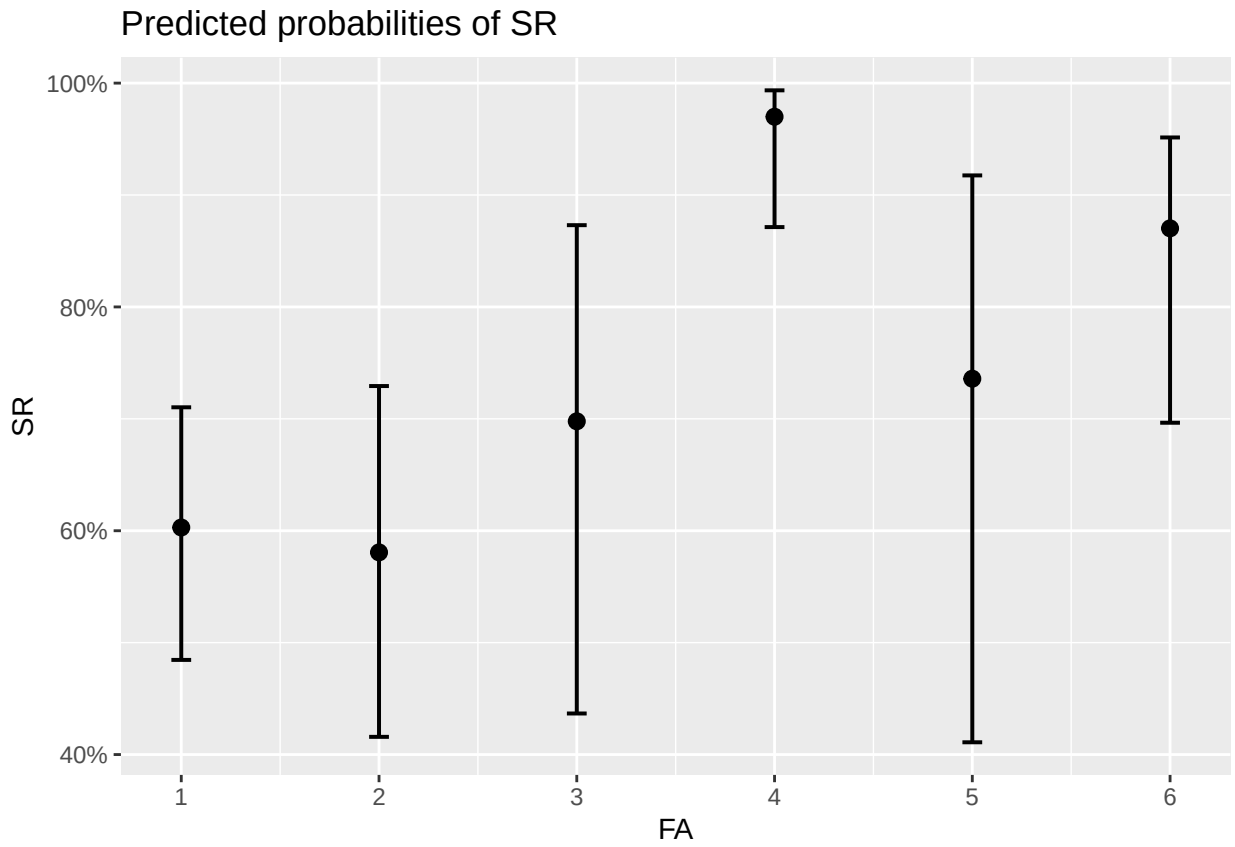

```
##
## $H
```


Predicted probabilities of SR
100%
80%
60%
40%
SR
0
50
100
150
200
H

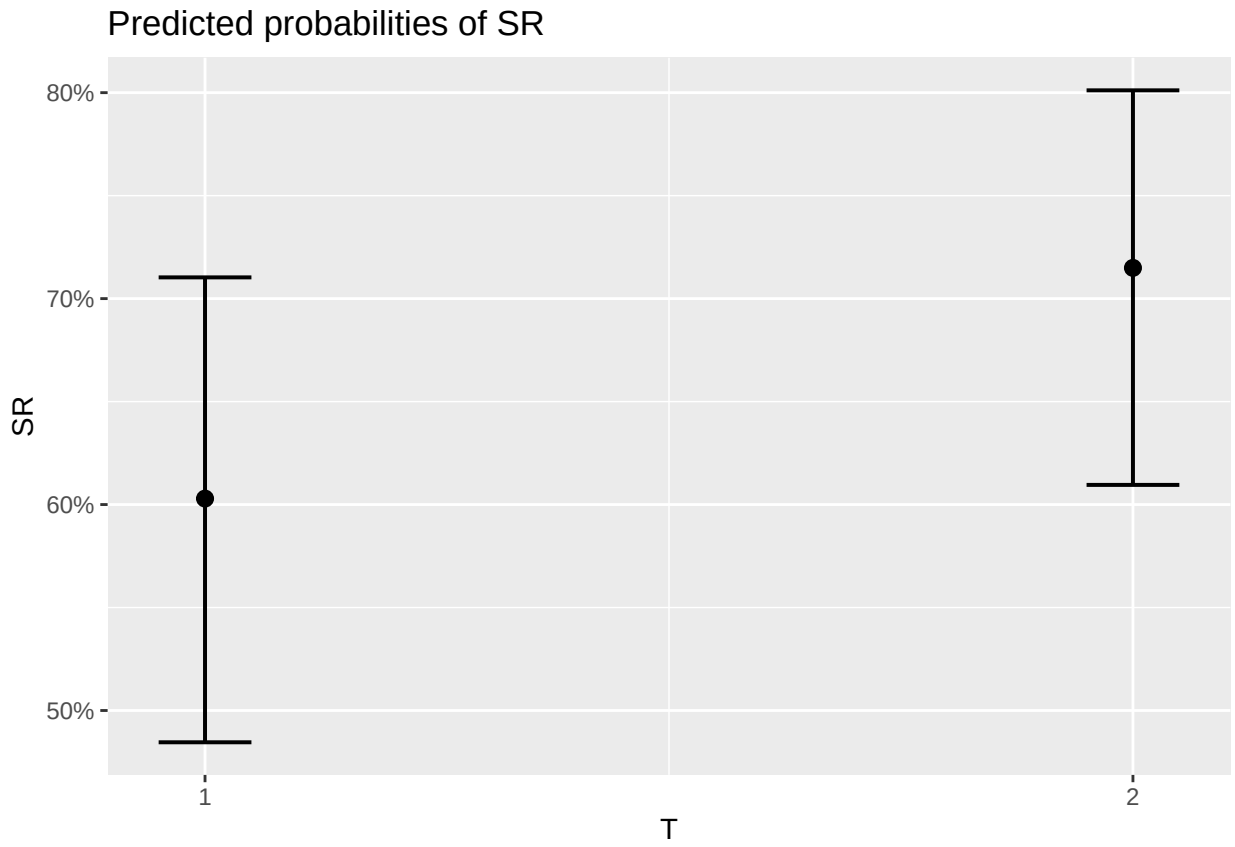
```
##
## $NP
```




```
##
## $FA
```




```
##
## $T
```


Predicted probabilities of SR
80%
70%
60%
50%
SR
1
2
T

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + NP + FA + T
## Model 3: SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##   Resid. Df Resid. Dev Df Deviance Pr(>Chi)
## 1       399     554.51
## 2       389     452.23 10  102.277   <2e-16 ***
## 3       369     440.85 20   11.379   0.9358
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Forward Selection

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## SR ~ 1
##
## Final Model:
## SR ~ NP + FA + H + T + TA
##
##
##   Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                         399   554.5077 556.5077
## 2 + NP  2 49.974377       397   504.5334 510.5334
## 3 + FA  5 32.089198       392   472.4442 488.4442
## 4  + H  1 10.671741       391   461.7724 479.7724
## 5  + T  1  5.916505       390   455.8559 475.8559
## 6 + TA  1  3.625665       389   452.2303 474.2303
```

Forward Selection model

```
##
## Call:
## glm(formula = SR ~ NP + DS + H + RS + FA + TA + Rank, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.3666  -0.8675   0.1765   0.9412   2.0583
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.397685   0.671843   2.080 0.037491 *
## NP2         -1.251189   0.269550  -4.642 3.45e-06 ***
## NP3         -1.921629   0.310684  -6.185 6.20e-10 ***
## DS2         -0.468718   0.257104  -1.823 0.068294 .
## H            0.012569   0.007497   1.677 0.093631 .
## RS2         -0.288276   0.241397  -1.194 0.232400
## FA2         -0.047295   0.305380  -0.155 0.876921
## FA3          0.390359   0.547148   0.713 0.475572
## FA4          2.888785   0.780073   3.703 0.000213 ***
## FA5          0.707990   0.705013   1.004 0.315271
## FA6          1.501650   0.514687   2.918 0.003527 **
## TA          -0.016160   0.012270  -1.317 0.187834
## Rank1        0.005325   0.326935   0.016 0.987005
## Rank2        0.339018   0.344117   0.985 0.324534
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 554.51  on 399  degrees of freedom
## Residual deviance: 450.15  on 386  degrees of freedom
## AIC: 478.15
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + NP + FA + T
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##   Resid. Df Resid. Dev Df Deviance Pr(>Chi)
## 1       399     554.51
## 2       389     452.23 10  102.277   <2e-16 ***
## 3       386     450.15  3    2.082   0.5556
## 4       369     440.85 17    9.297   0.9305
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Step_wise method

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## SR ~ 1
##
## Final Model:
## SR ~ NP + FA + H + T + TA
##
##
##   Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                         399   554.5077 556.5077
## 2 + NP  2 49.974377       397   504.5334 510.5334
## 3 + FA  5 32.089198       392   472.4442 488.4442
## 4  + H  1 10.671741       391   461.7724 479.7724
## 5  + T  1  5.916505       390   455.8559 475.8559
## 6 + TA  1  3.625665       389   452.2303 474.2303

##
## Call:
## glm(formula = SR ~ NP + FA + H + T + TA, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.4160  -0.8988   0.1561   0.8906   2.0568
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.890697   0.615764   1.446  0.14804
## NP2         -1.255150   0.267413  -4.694 2.68e-06 ***
## NP3         -1.859964   0.303392  -6.131 8.76e-10 ***
## FA2         -0.092050   0.305850  -0.301  0.76344
## FA3          0.419226   0.536637   0.781  0.43468
## FA4          3.057238   0.781172   3.914 9.09e-05 ***
## FA5          0.607016   0.672966   0.902  0.36706
## FA6          1.485359   0.514963   2.884  0.00392 **
## H            0.017321   0.006592   2.628  0.00860 **
## T2           0.501837   0.233954   2.145  0.03195 *
## TA          -0.022102   0.011683  -1.892  0.05852 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 554.51  on 399  degrees of freedom
## Residual deviance: 452.23  on 389  degrees of freedom
## AIC: 474.23
##
## Number of Fisher Scoring iterations: 5
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + NP + FA + T
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + FA + H + T + TA
## Model 5: SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##   Resid. Df Resid. Dev Df Deviance Pr(>Chi)
## 1       399     554.51
## 2       389     452.23 10  102.277   <2e-16 ***
## 3       386     450.15  3    2.082   0.5556
## 4       389     452.23 -3   -2.082   0.5556
## 5       369     440.85 20   11.379   0.9358
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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