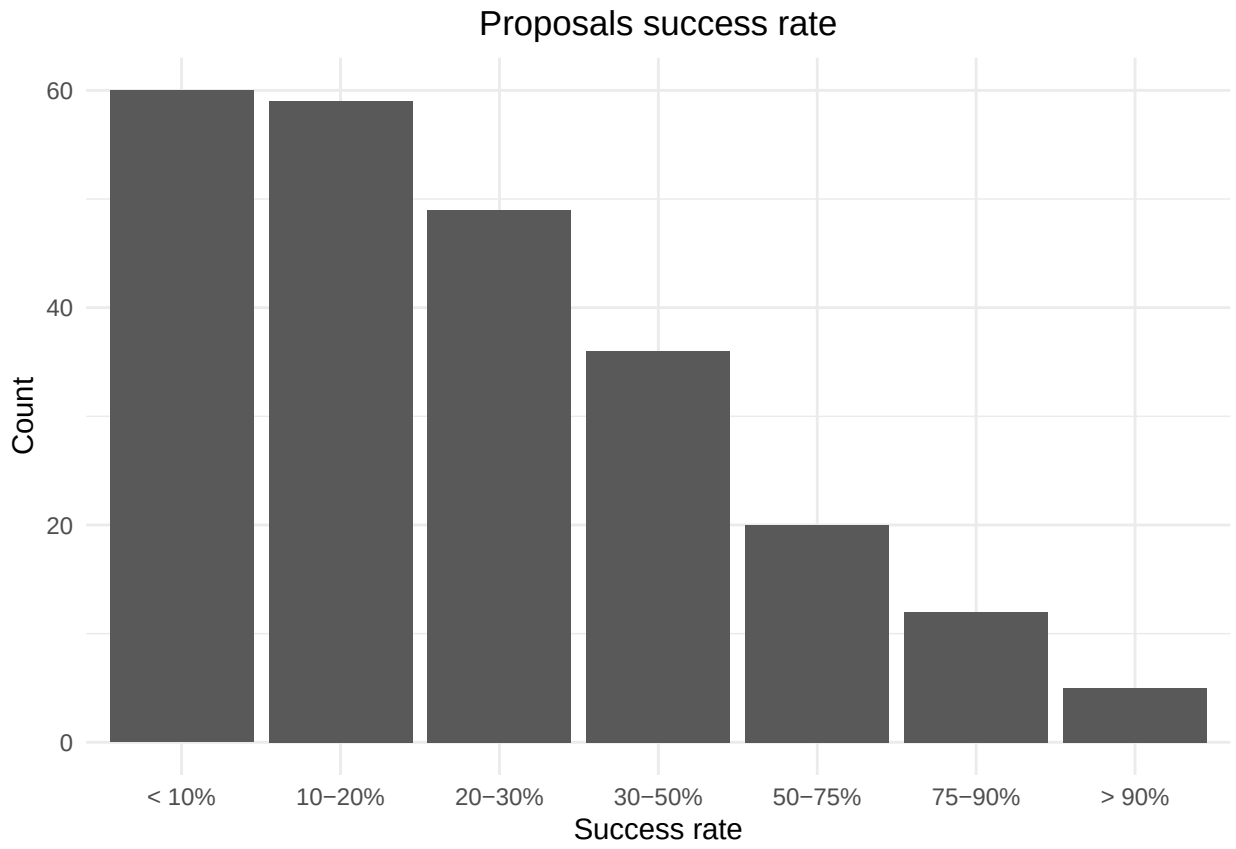
Ordinal Logistic Regression or Proportional Odds Logistic Regression


Proposals success rate
60
40
20
0
Count
< 10%
10−20%
20−30%
30−50%
50−75%
75−90%
> 90%
Success rate

Model with NP1 as reference

```
## Call:
## polr(formula = SR ~ H + NP + RS + AGR + TA + DWH + DS, data = lm_DF,
##     Hess = TRUE)
##
## Coefficients:
##         Value Std. Error t value
## H     0.03833    0.01175   3.261
## NP2  -1.28546    0.28085  -4.577
## NP3  -1.66718    0.32585  -5.116
## RS2  -0.51631    0.24118  -2.141
## AGR   0.14862    0.07231   2.055
## TA   -0.01300    0.01193  -1.090
## DWH2  5.06833    1.92275   2.636
## DWH3  2.47242    1.23830   1.997
## DWH4  1.89274    1.18050   1.603
## DWH5  1.29137    1.16577   1.108
## DS2  -1.07287    0.53664  -1.999
## DS3  -0.99160    0.50727  -1.955
##
## Intercepts:
##     Value   Std. Error t value
## 1|2 -1.2483  1.4829    -0.8418
## 2|3  0.0314  1.4856     0.0211
## 3|4  1.1207  1.4858     0.7543
## 4|5  2.1753  1.4884     1.4615
## 5|6  3.1955  1.5015     2.1282
## 6|7  4.6663  1.5537     3.0034
##
## Residual Deviance: 764.5134
## AIC: 800.5134
```

```
##            Value Std. Error     t value p value
## H     0.03832773 0.01175298  3.26110676  0.0011
## NP2  -1.28546381 0.28084668 -4.57710172  0.0000
## NP3  -1.66718351 0.32585178 -5.11638606  0.0000
## RS2  -0.51631450 0.24117686 -2.14081276  0.0323
## AGR   0.14861945 0.07230861  2.05534937  0.0398
## TA   -0.01299727 0.01192738 -1.08970067  0.2758
## DWH2  5.06832543 1.92275238  2.63597408  0.0084
## DWH3  2.47242426 1.23830387  1.99662160  0.0459
## DWH4  1.89273844 1.18049621  1.60334140  0.1089
## DWH5  1.29136868 1.16576813  1.10774060  0.2680
## DS2  -1.07286842 0.53663903 -1.99923667  0.0456
## DS3  -0.99160385 0.50726931 -1.95478780  0.0506
## 1|2  -1.24825516 1.48292317 -0.84175309  0.3999
## 2|3   0.03139745 1.48556477  0.02113502  0.9831
## 3|4   1.12070770 1.48584584  0.75425571  0.4507
## 4|5   2.17529737 1.48839067  1.46150967  0.1439
## 5|6   3.19548819 1.50152783  2.12815782  0.0333
## 6|7   4.66626708 1.55365255  3.00341739  0.0027
```

Model with NP3 as reference

```
## Call:
## polr(formula = SR ~ H + NP + RS + AGR + TA + DWH + DS, data = lm_DF,
##     Hess = TRUE)
##
## Coefficients:
##         Value Std. Error t value
## H     0.03833    0.01175   3.261
## NP1   1.66719    0.32585   5.116
## NP2   0.38173    0.31062   1.229
## RS2  -0.51631    0.24118  -2.141
## AGR   0.14862    0.07231   2.055
## TA   -0.01300    0.01193  -1.090
## DWH2  5.06827    1.92275   2.636
## DWH3  2.47240    1.23830   1.997
## DWH4  1.89271    1.18050   1.603
## DWH5  1.29135    1.16577   1.108
## DS2  -1.07286    0.53664  -1.999
## DS3  -0.99160    0.50727  -1.955
##
## Intercepts:
##     Value   Std. Error t value
## 1|2  0.4189  1.5009     0.2791
## 2|3  1.6986  1.5090     1.1257
## 3|4  2.7879  1.5151     1.8401
## 4|5  3.8425  1.5212     2.5259
## 5|6  4.8627  1.5364     3.1650
## 6|7  6.3335  1.5898     3.9838
##
## Residual Deviance: 764.5134
## AIC: 800.5134
```

```
##            Value Std. Error    t value p value
## H     0.03832725 0.01175291  3.2610861  0.0011
## NP1   1.66718955 0.32585196  5.1164018  0.0000
## NP2   0.38172684 0.31061642  1.2289332  0.2191
## RS2  -0.51631184 0.24117697 -2.1408007  0.0323
## AGR   0.14862016 0.07230864  2.0553581  0.0398
## TA   -0.01299717 0.01192738 -1.0896913  0.2758
## DWH2  5.06827226 1.92275138  2.6359478  0.0084
## DWH3  2.47240048 1.23830301  1.9966038  0.0459
## DWH4  1.89270982 1.18049528  1.6033184  0.1089
## DWH5  1.29134771 1.16576717  1.1077235  0.2680
## DS2  -1.07285993 0.53663945 -1.9992193  0.0456
## DS3  -0.99159872 0.50726974 -1.9547760  0.0506
## 1|2   0.41892478 1.50092356  0.2791113  0.7802
## 2|3   1.69858873 1.50898290  1.1256514  0.2603
## 3|4   2.78789346 1.51510399  1.8400674  0.0658
## 4|5   3.84248254 1.52123289  2.5259002  0.0115
## 5|6   4.86267250 1.53641042  3.1649567  0.0016
## 6|7   6.33345835 1.58979549  3.9838195  0.0001
```

Model with all variables NP1, DWH5 and DS1 as reference

```
## Call:
## polr(formula = SR ~ H + AGR + NP + DWH + DS, data = lm_DF, Hess = TRUE)
##
## Coefficients:
##         Value Std. Error t value
## H     0.03722    0.01181   3.151
## AGR   0.17739    0.06979   2.542
## NP3  -1.63972    0.32484  -5.048
## NP2  -1.23300    0.27863  -4.425
## DWH1 -1.36063    1.10357  -1.233
## DWH2  3.37532    1.52154   2.218
## DWH3  1.24627    0.45390   2.746
## DWH4  0.60896    0.27408   2.222
## DS2  -1.01196    0.53924  -1.877
## DS3  -1.00692    0.51289  -1.963
##
## Intercepts:
##     Value   Std. Error t value
## 1|2 -1.4292  0.7323    -1.9515
## 2|3 -0.1641  0.7296    -0.2249
## 3|4  0.9112  0.7294     1.2492
## 4|5  1.9523  0.7371     2.6484
## 5|6  2.9632  0.7597     3.9003
## 6|7  4.4165  0.8572     5.1521
##
## Residual Deviance: 770.3984
## AIC: 802.3984
```

```
##            Value Std. Error    t value p value
## H     0.03722294 0.01181129  3.1514702  0.0016
## AGR   0.17739240 0.06979462  2.5416341  0.0110
## NP3  -1.63971899 0.32484270 -5.0477322  0.0000
## NP2  -1.23299913 0.27862866 -4.4252417  0.0000
## DWH1 -1.36062705 1.10357437 -1.2329274  0.2176
## DWH2  3.37531513 1.52153616  2.2183601  0.0265
## DWH3  1.24626894 0.45390149  2.7456815  0.0060
## DWH4  0.60896175 0.27408191  2.2218240  0.0263
## DS2  -1.01196460 0.53924125 -1.8766454  0.0606
## DS3  -1.00692074 0.51288731 -1.9632397  0.0496
## 1|2  -1.42919283 0.73234609 -1.9515265  0.0510
## 2|3  -0.16406369 0.72958761 -0.2248718  0.8221
## 3|4   0.91124070 0.72944059  1.2492322  0.2116
## 4|5   1.95226591 0.73714467  2.6484162  0.0081
## 5|6   2.96320809 0.75973999  3.9002924  0.0001
## 6|7   4.41646814 0.85722091  5.1520770  0.0000
```

Model with all variables, NP3, DWH1 and DS1 as reference

```
## Call:
## polr(formula = SR ~ H + AGR + NP + DWH + DS, data = lm_DF, Hess = TRUE)
##
## Coefficients:
##         Value Std. Error t value
## H     0.03722    0.01181   3.152
## AGR   0.17739    0.06979   2.542
## NP1   1.63972    0.32484   5.048
## NP2   0.40669    0.30806   1.320
## DWH5  1.36066    1.10358   1.233
## DWH2  4.73582    1.87628   2.524
## DWH3  2.60695    1.17593   2.217
## DWH4  1.96962    1.11967   1.759
## DS2  -1.01203    0.53924  -1.877
## DS3  -1.00699    0.51289  -1.963
##
## Intercepts:
##     Value   Std. Error t value
## 1|2  1.5711  1.2904     1.2175
## 2|3  2.8362  1.3034     2.1759
## 3|4  3.9115  1.3151     2.9744
## 4|5  4.9525  1.3247     3.7386
## 5|6  5.9635  1.3412     4.4464
## 6|7  7.4167  1.4031     5.2861
##
## Residual Deviance: 770.3984
## AIC: 802.3984
```

```
##            Value Std. Error   t value p value
## H     0.03722378 0.01181143  3.151504  0.0016
## AGR   0.17738686 0.06979454  2.541558  0.0110
## NP1   1.63971554 0.32484230  5.047728  0.0000
## NP2   0.40669418 0.30806071  1.320175  0.1868
## DWH5  1.36066199 1.10358122  1.232951  0.2176
## DWH2  4.73582081 1.87627924  2.524049  0.0116
## DWH3  2.60695463 1.17592902  2.216932  0.0266
## DWH4  1.96962256 1.11967353  1.759104  0.0786
## DS2  -1.01203146 0.53923964 -1.876775  0.0605
## DS3  -1.00699229 0.51288594 -1.963384  0.0496
## 1|2   1.57109259 1.29040931  1.217515  0.2234
## 2|3   2.83619683 1.30344861  2.175918  0.0296
## 3|4   3.91151352 1.31506238  2.974394  0.0029
## 4|5   4.95253487 1.32471693  3.738561  0.0002
## 5|6   5.96346030 1.34120129  4.446357  0.0000
## 6|7   7.41672752 1.40306569  5.286087  0.0000
```