final_project_v2.R

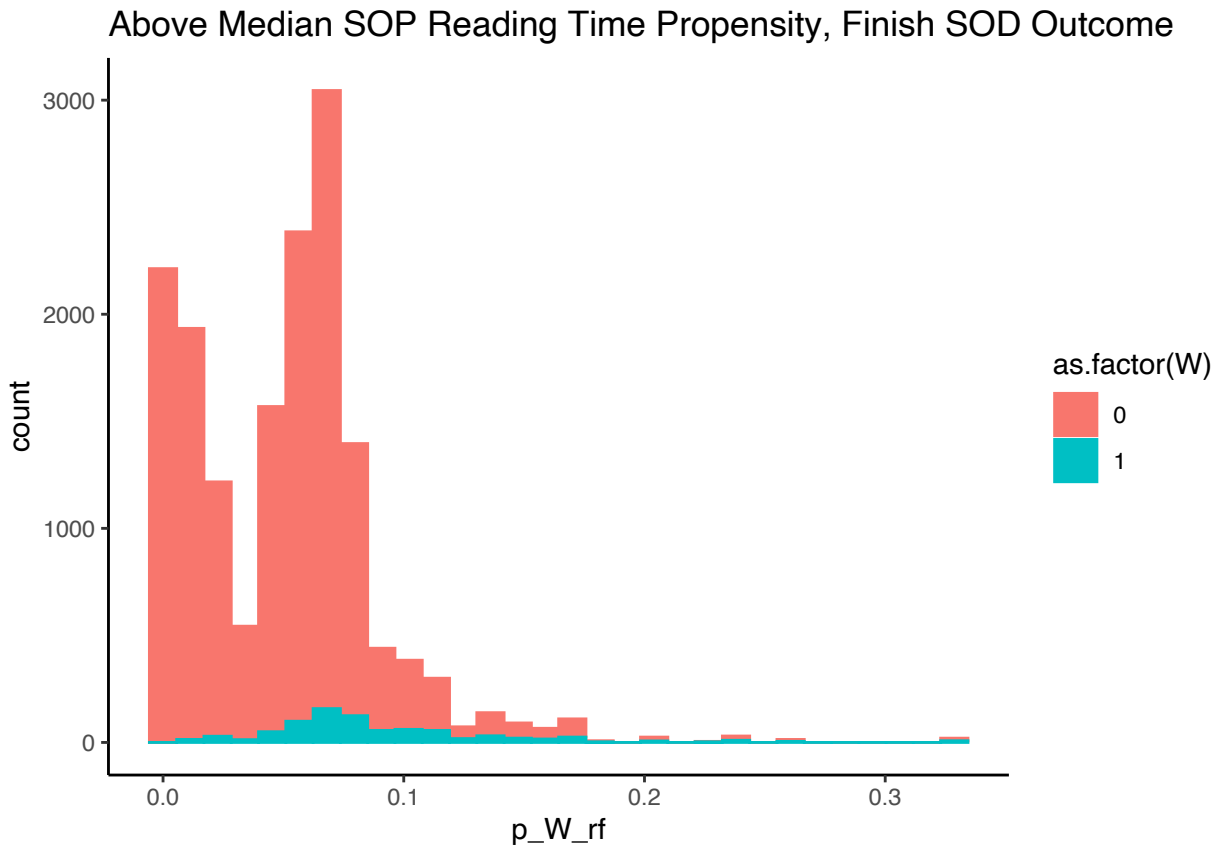
mlinegar

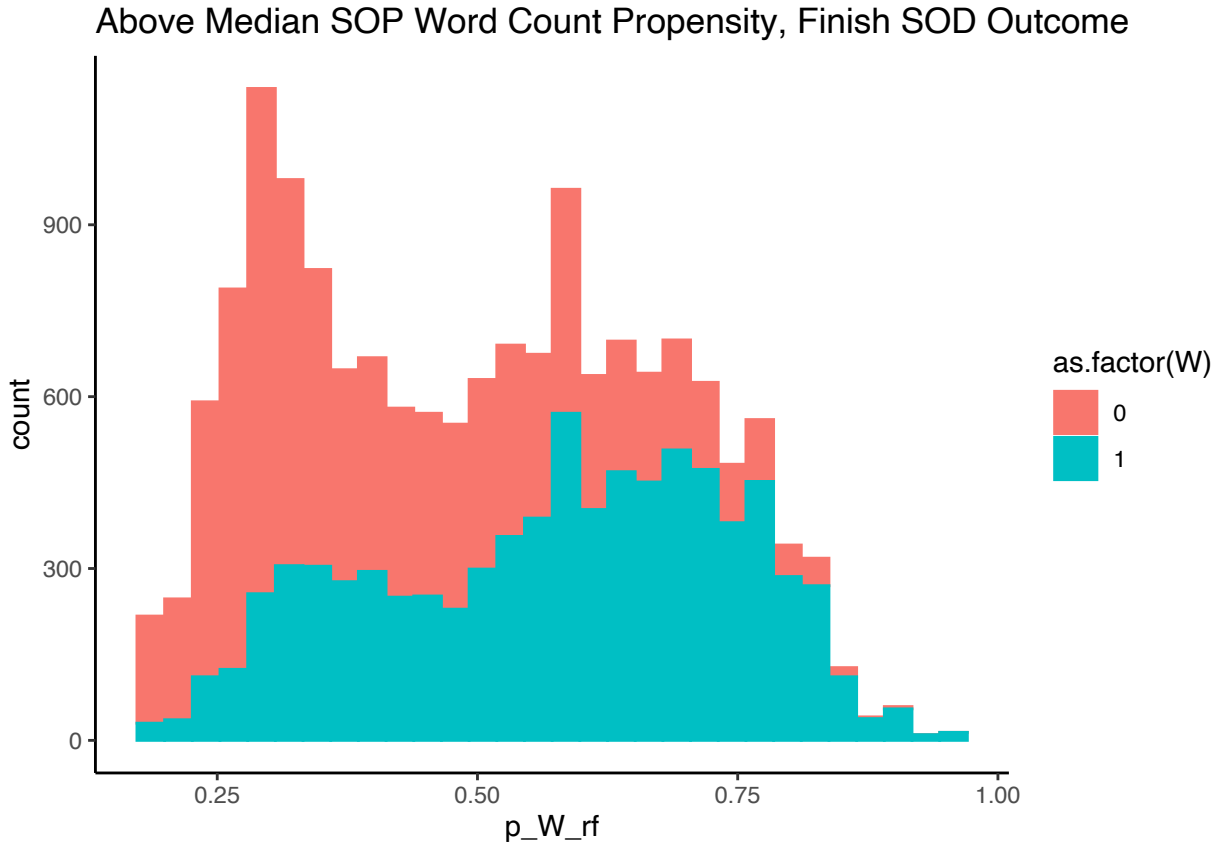
2020-06-05

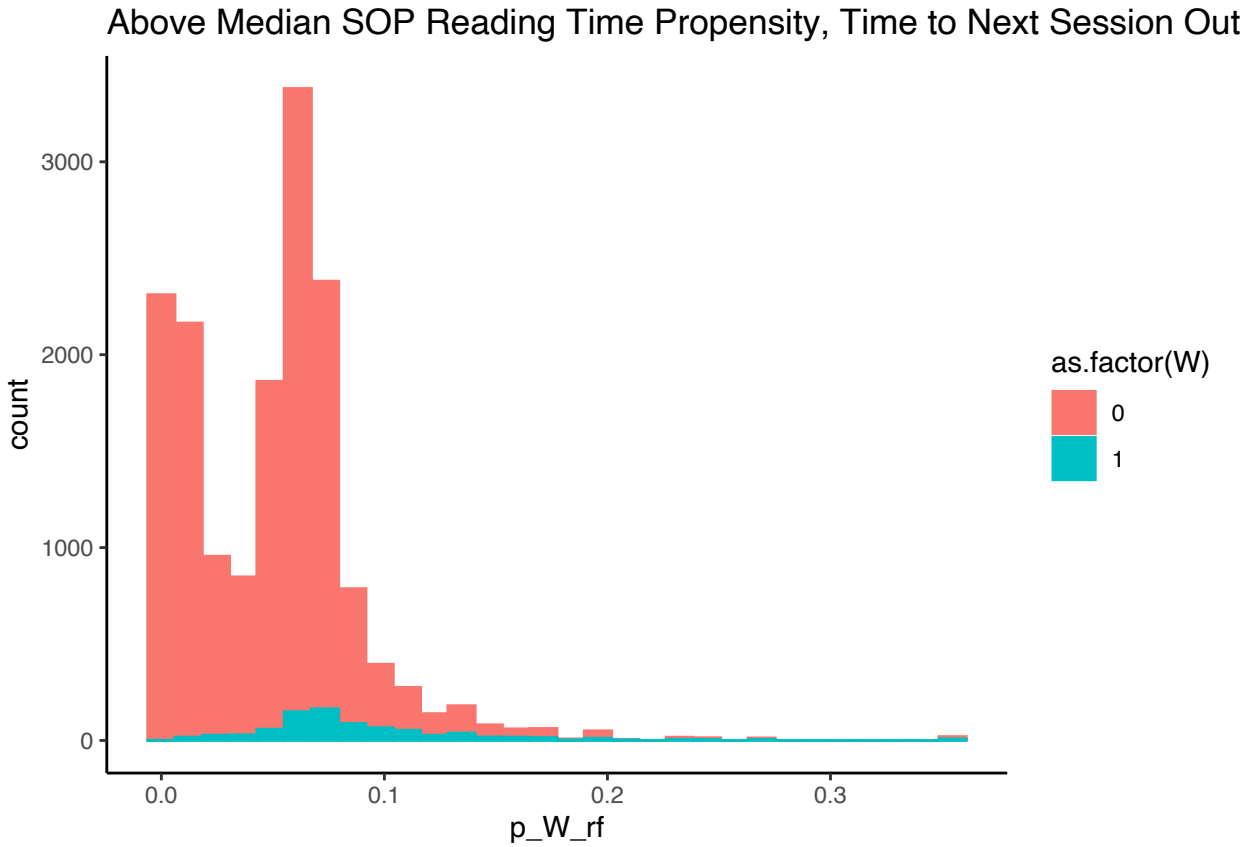
Contents

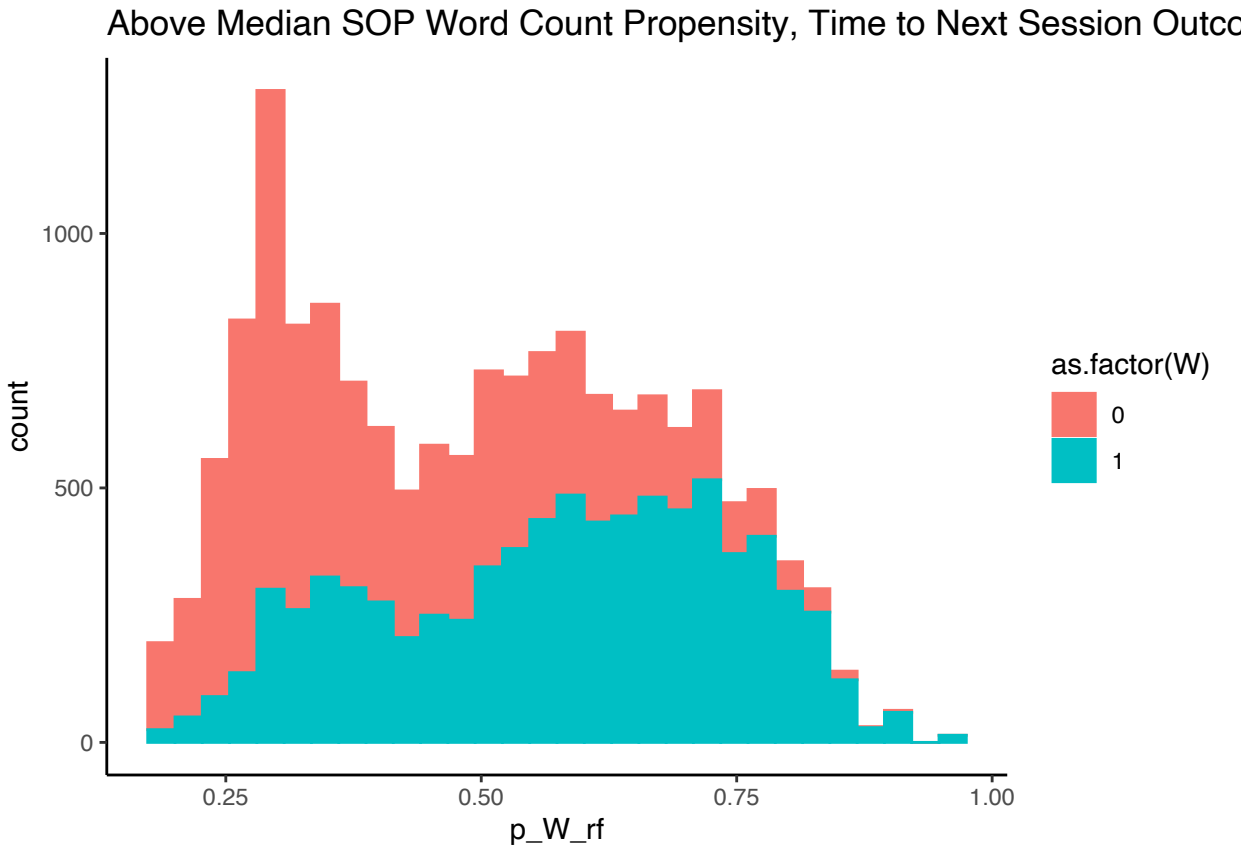

```
#### SETUP ####
```

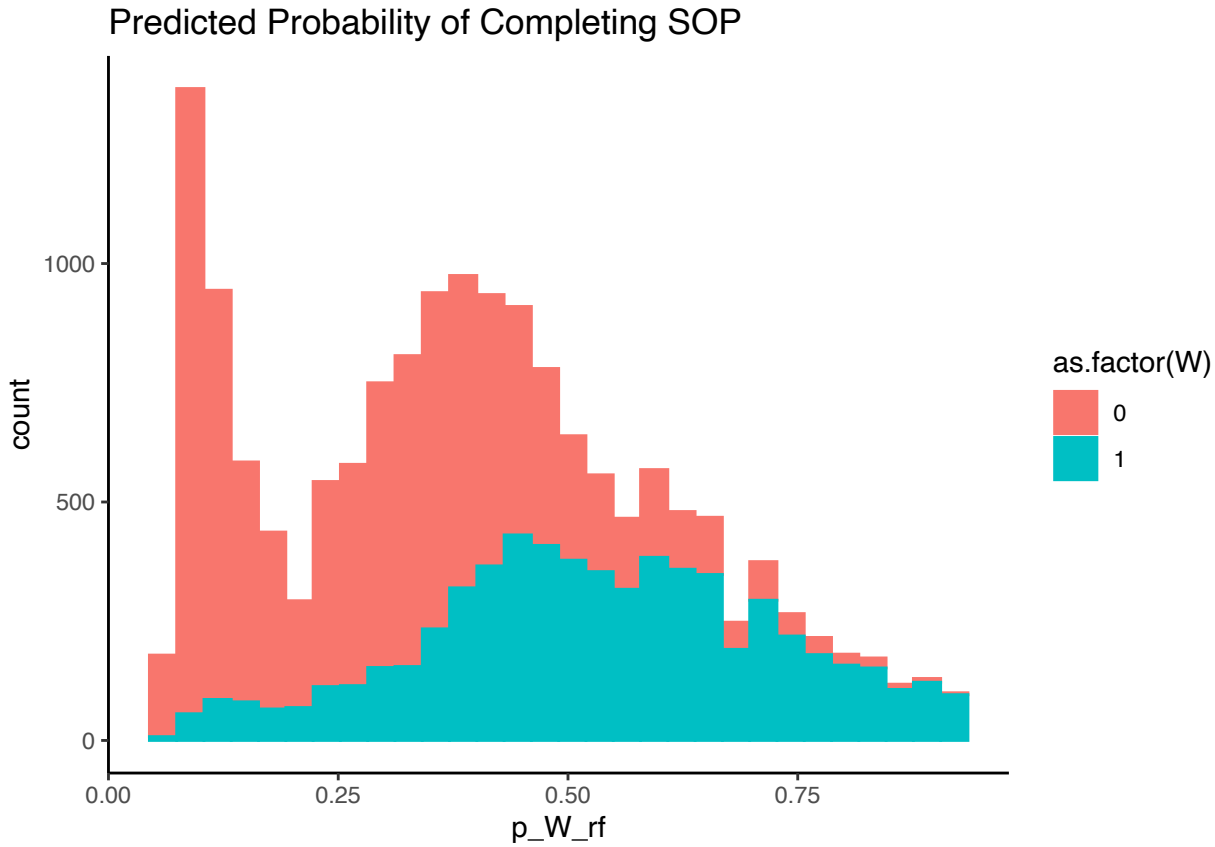
```
## Skipping install of 'amlinear' from a github remote, the SHA1 (83ee1d18) has not changed since last i
##   Use `force = TRUE` to force installation

## Skipping install of 'causalTree' from a github remote, the SHA1 (48604762) has not changed since last
##   Use `force = TRUE` to force installation

## Skipping install of 'sufrep' from a github remote, the SHA1 (317be9e7) has not changed since last ins
##   Use `force = TRUE` to force installation

## Skipping install of 'policytree' from a github remote, the SHA1 (3e42a771) has not changed since last
##   Use `force = TRUE` to force installation
```

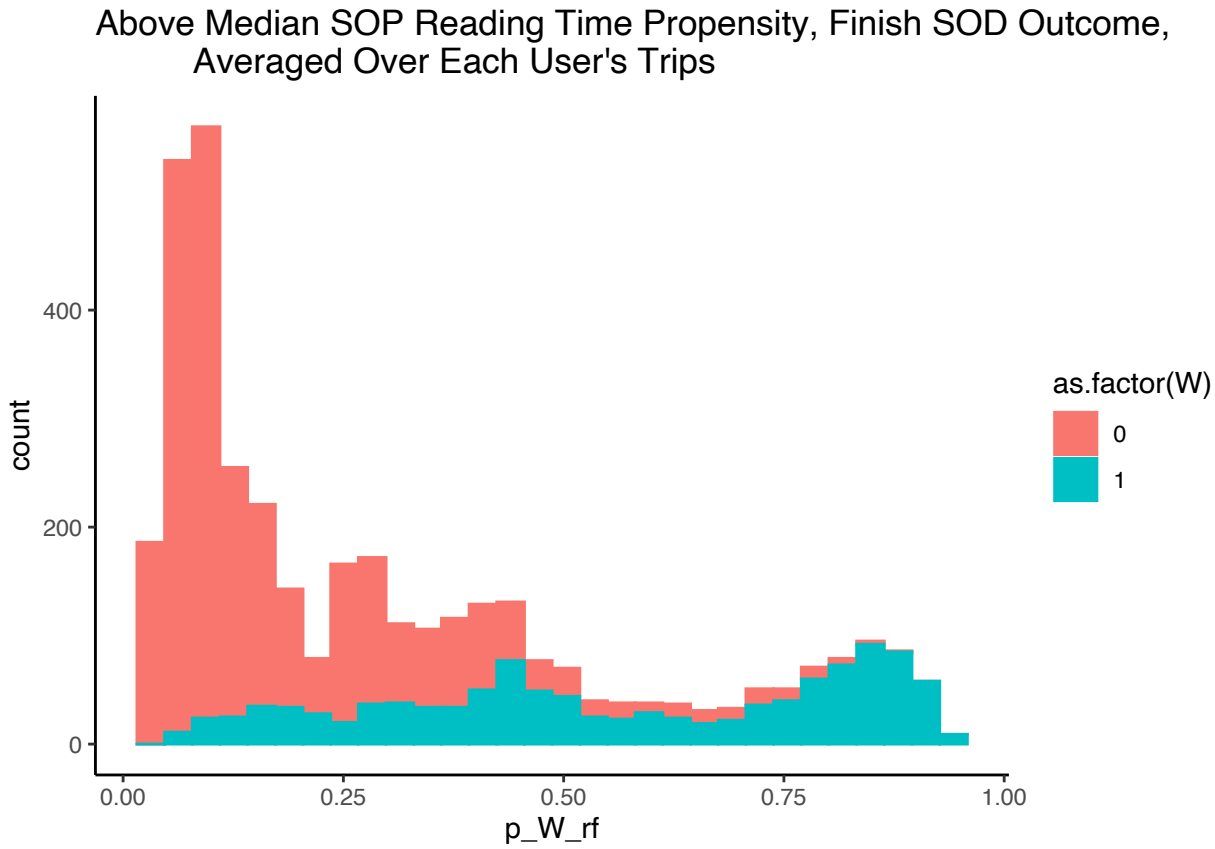

Above Median SOP Reading Time Propensity, Finish SOD Outcome
count
3000
2000
1000
0
0.0
0.1
0.2
0.3
p_W_rf
as.factor(W)
0
1

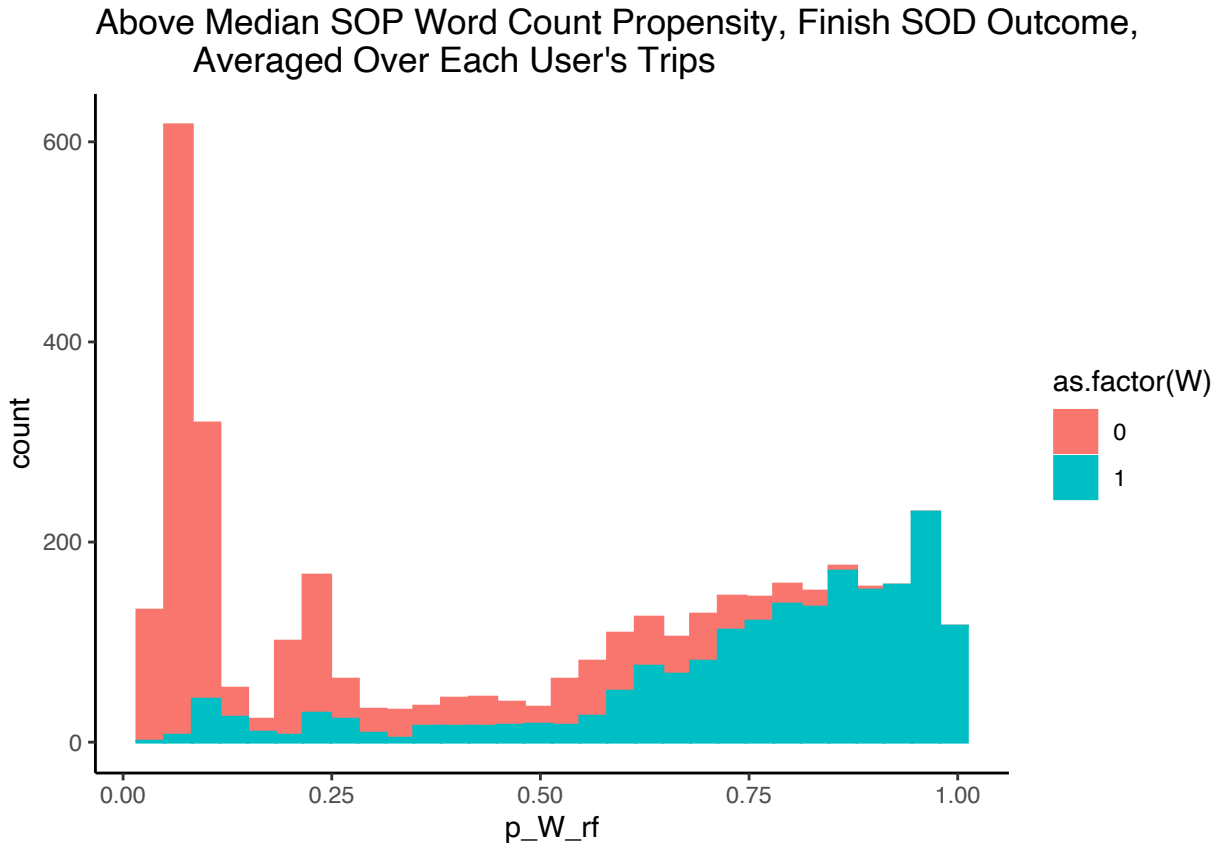

Above Median SOP Word Count Propensity, Finish SOD Outcome
count
900
600
300
0
0.25
0.50
0.75
1.00
p_W_rf
as.factor(W)
0
1

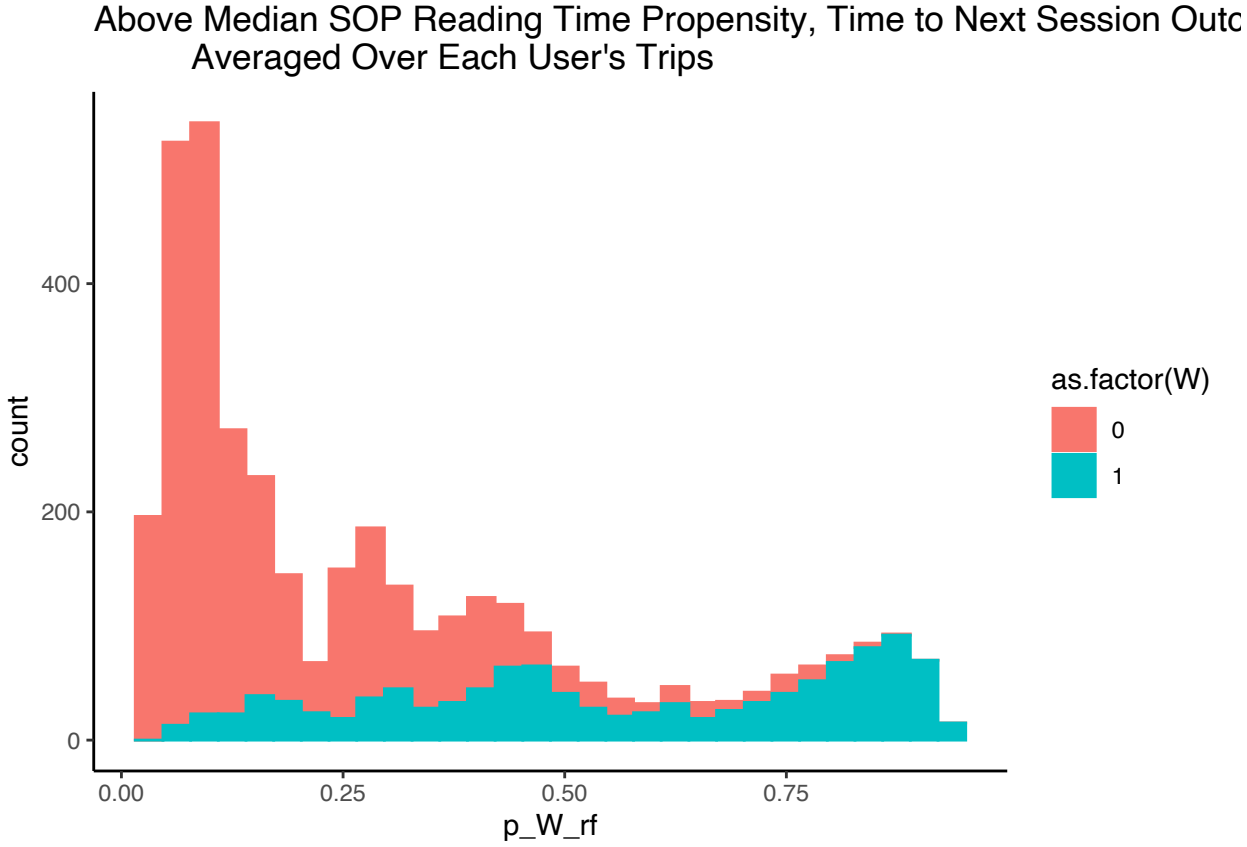

Above Median SOP Reading Time Propensity, Time to Next Session Out
count
3000
2000
1000
0
0.0
0.1
0.2
0.3
p_W_rf
as.factor(W)
0
1

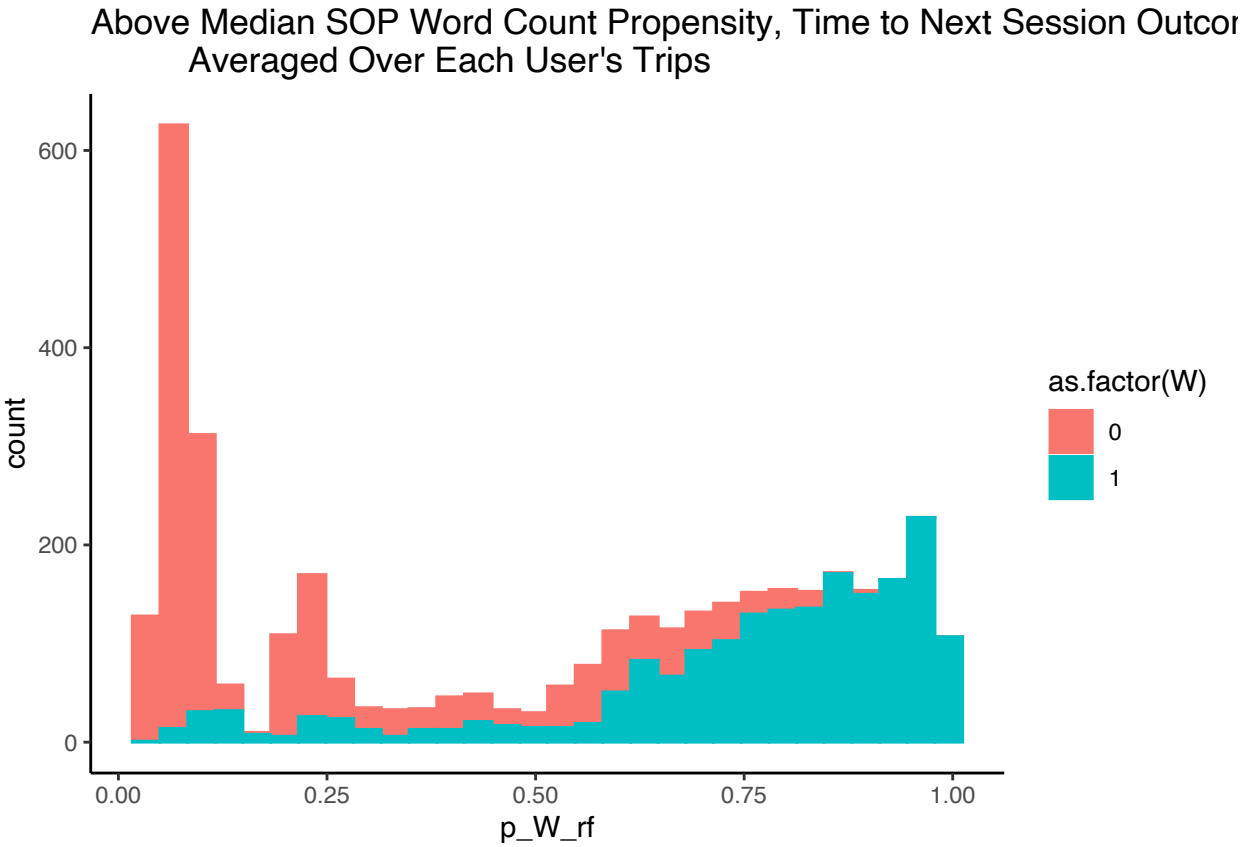

Above Median SOP Word Count Propensity, Time to Next Session Outcc
count
1000
500
0
0.25
0.50
0.75
1.00
p_W_rf
as.factor(W)
0
1

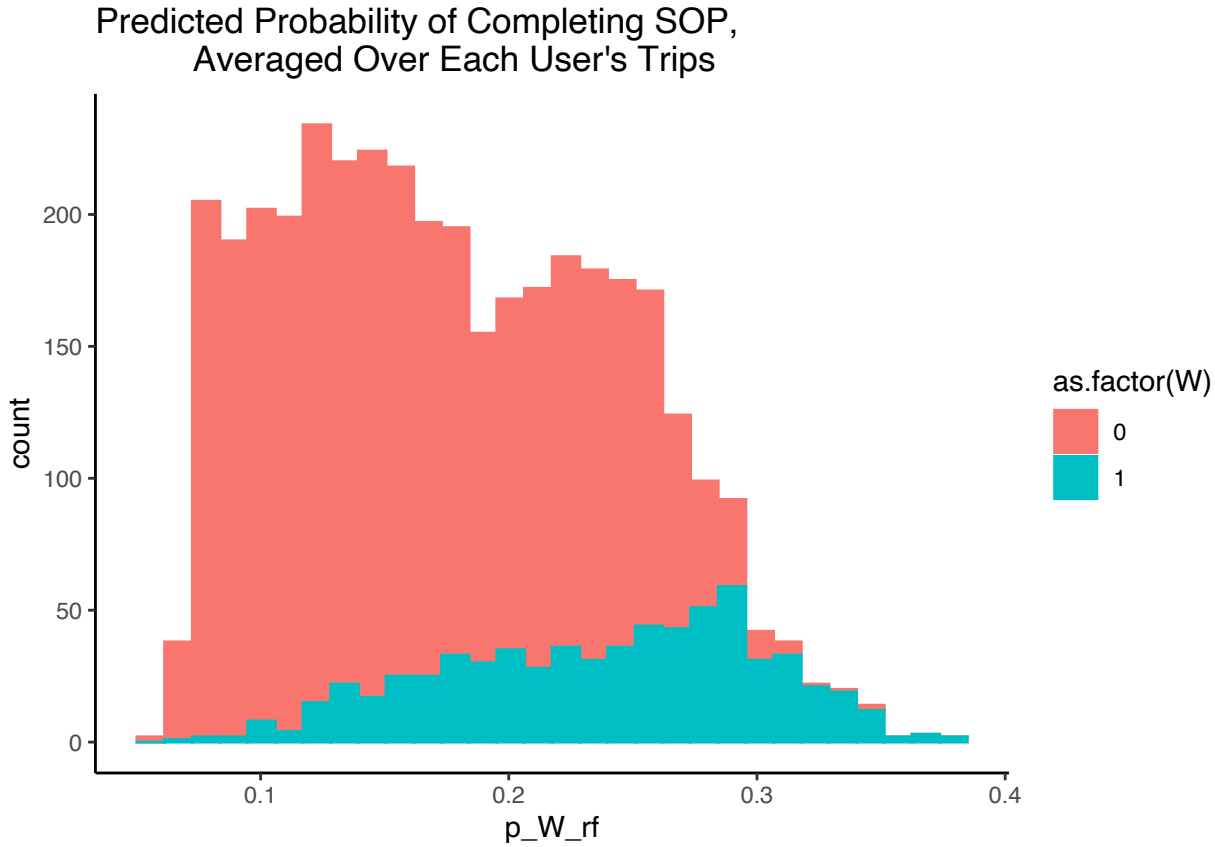

Predicted Probability of Completing SOP
count
1000
500
0
0.00
0.25
0.50
0.75
p_W_rf
as.factor(W)
0
1


Above Median SOP Reading Time Propensity, Finish SOD Outcome,
Averaged Over Each User's Trips
count
400
200
0
0.00
0.25
0.50
0.75
1.00
p_W_rf
as.factor(W)
0
1


Above Median SOP Word Count Propensity, Finish SOD Outcome,
Averaged Over Each User's Trips
600
400
200
0
count
0.00
0.25
0.50
0.75
1.00
p_W_rf
as.factor(W)
0
1


Above Median SOP Reading Time Propensity, Time to Next Session Outc
Averaged Over Each User's Trips
400
200
0
count
0.00
0.25
0.50
0.75
p_W_rf
as.factor(W)
0
1


Above Median SOP Word Count Propensity, Time to Next Session Outcor
Averaged Over Each User's Trips
600
400
200
0
count
0.00
0.25
0.50
0.75
1.00
p_W_rf
as.factor(W)
0
1


Predicted Probability of Completing SOP,
Averaged Over Each User's Trips
200
150
100
50
0
count
0.1
0.2
0.3
0.4
p_W_rf
as.factor(W)
0
1

1 Rate at Which Users Finish Stories of the Day by Length

Table 1:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.103	-0.134	-0.072	0.062
logistic_propensity_weighted_regression	-0.034	-0.109	0.041	0.149
IPW_logistic	0.051	-0.132	0.234	0.366
AIPW_linear_plus_logistic	-0.050	-0.122	0.023	0.145
IPW_forest	-0.196	-0.377	-0.016	0.362
AIPW_ate_causal_forest	-0.056	-0.120	0.008	0.127
AIPW_linear_plus_forest	-0.047	-0.113	0.020	0.133

2 Rate at Which Users Finish Stories of the Day by Word Count

Table 2:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.087	-0.118	-0.056	0.062
logistic_propensity_weighted_regression	-0.040	-0.070	-0.010	0.060
IPW_logistic	-0.010	-0.081	0.062	0.143
AIPW_linear_plus_logistic	-0.040	-0.069	-0.012	0.057
IPW_forest	-0.038	-0.107	0.032	0.139
AIPW_ate_causal_forest	-0.030	-0.059	-0.001	0.058
AIPW_linear_plus_forest	-0.032	-0.060	-0.005	0.055

3 Rate at Which Users Finish Stories of the Day by Length

Table 3:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.022	-0.104	0.059	0.163
logistic_propensity_weighted_regression	0.137	-0.096	0.371	0.467
IPW_logistic	0.224	-0.083	0.532	0.615
AIPW_linear_plus_logistic	0.103	-0.119	0.326	0.445
IPW_forest	-0.097	-0.328	0.134	0.462
AIPW_ate_causal_forest	0.125	-0.055	0.305	0.360
AIPW_linear_plus_forest	0.063	-0.102	0.228	0.330

4 Rate at Which Users Finish Stories of the Day by Word Count

[1] 8002 [1] 8005

Table 4:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.012	-0.085	0.061	0.146
logistic_propensity_weighted_regression	0.100	0.019	0.182	0.162
IPW_logistic	0.129	0.027	0.230	0.204
AIPW_linear_plus_logistic	0.094	0.015	0.172	0.157
IPW_forest	0.081	-0.011	0.172	0.183
AIPW_ate_causal_forest	0.068	-0.010	0.146	0.157
AIPW_linear_plus_forest	0.094	0.024	0.164	0.140

5 Effect of Finishing SOD on Time to Next Session

Table 5:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	0.043	-0.037	0.123	0.160
logistic_propensity_weighted_regression	-0.097	-0.176	-0.018	0.157
IPW_logistic	-0.129	-0.227	-0.031	0.197
AIPW_linear_plus_logistic	-0.116	-0.192	-0.039	0.153
IPW_forest	-0.091	-0.182	0	0.182
AIPW_ate_causal_forest	-0.020	-0.109	0.069	0.178
AIPW_linear_plus_forest	-0.037	-0.107	0.032	0.139

We now estimate the CATE, and use it to construct quartiles. We then report the ATE as estimated with AIPW from our causal forest estimate across quartiles.

Table 6:

	ntile	avg_cf_cate	aipw_estimate	aipw_std.err
1	1	-0.276	0.060	0.127
2	2	-0.039	-0.090	0.056
3	3	0.018	0.067	0.055
4	4	0.157	-0.088	0.065

6 Rate at Which Users on Their Average Trip Finish Stories of the Day by Length

[1] 1114 [1] 2444

Table 7:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.129	-0.176	-0.082	0.095
logistic_propensity_weighted_regression	-0.073	-0.139	-0.007	0.131
IPW_logistic	-0.097	-0.194	0	0.193
AIPW_linear_plus_logistic	-0.080	-0.139	-0.022	0.116
IPW_forest	-0.203	-0.280	-0.125	0.155
AIPW_ate_causal_forest	-0.111	-0.188	-0.034	0.154
AIPW_linear_plus_forest	-0.080	-0.129	-0.031	0.097

7 Rate at Which Users on Their Average Trip Finish Stories of the Day by Word Count

[1] 1712 [1] 1575

Table 8:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.124	-0.175	-0.074	0.102
logistic_propensity_weighted_regression	-0.112	-0.216	-0.008	0.208
IPW_logistic	-0.217	-0.368	-0.067	0.302
AIPW_linear_plus_logistic	-0.088	-0.183	0.007	0.190
IPW_forest	0.013	-0.072	0.099	0.171
AIPW_ate_causal_forest	-0.104	-0.192	-0.016	0.175
AIPW_linear_plus_forest	-0.074	-0.130	-0.019	0.111

8 Rate at Which Users on Their Average Trip Finish Stories of the Day by Length

[1] 1114 [1] 2444

Table 9:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-1.110	-1.310	-0.905	0.404
logistic_propensity_weighted_regression	-0.552	-0.807	-0.296	0.511
IPW_logistic	-0.639	-1.020	-0.256	0.767
AIPW_linear_plus_logistic	-0.558	-0.787	-0.328	0.458
IPW_forest	-0.804	-1.160	-0.451	0.706
AIPW_ate_causal_forest	-0.011	-0.339	0.316	0.656
AIPW_linear_plus_forest	-0.380	-0.614	-0.146	0.468

9 Rate at Which Users on Their Average Trip Finish Stories of the Day by Word Count

[1] 1712 [1] 1575

Table 10:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	0.077	-0.165	0.318	0.484
logistic_propensity_weighted_regression	-0.040	-0.575	0.495	1.070
IPW_logistic	-0.477	-1.210	0.255	1.470
AIPW_linear_plus_logistic	0.055	-0.477	0.588	1.060
IPW_forest	0.582	0.059	1.100	1.040
AIPW_ate_causal_forest	0.854	0.225	1.480	1.260
AIPW_linear_plus_forest	0.192	-0.189	0.572	0.761

10 Effect of Finishing SOD on Time to Next Session

[1] 669 [1] 3010

Table 11:

	ATE	lower_ci	upper_ci	ci_length
RCT_gold_standard	-0.081	-0.391	0.228	0.619
logistic_propensity_weighted_regression	-0.104	-0.457	0.248	0.706
IPW_logistic	-0.187	-0.640	0.267	0.907
AIPW_linear_plus_logistic	-0.223	-0.552	0.107	0.659
IPW_forest	-0.592	-0.962	-0.222	0.740
AIPW_ate_causal_forest	-0.170	-0.475	0.135	0.609
AIPW_linear_plus_forest	-0.217	-0.491	0.056	0.547

We now estimate the CATE, and use it to construct quartiles. We then report the ATE as estimated with AIPW from our causal forest estimate across quartiles.

Table 12:

	ntile	avg_cf_cate	aipw_estimate	aipw_std.err
1	1	-0.440	0.398	0.379
2	2	-0.267	0.241	0.340
3	3	-0.154	-0.209	0.284
4	4	0.026	-1.120	0.239

policy_tree object Tree depth: 2 Actions: 1: 0 2: 1 Variable splits: (1) split_variable: reading_qa_accuracy split_value: 72.88 (2) split_variable: reading_qa_accuracy split_value: 51.43 (4) * action: 1 (5) * action: 2 (3) split_variable: grade_level split_value: 3 (6) * action: 2 (7) * action: 1