

Networks Retrieval Study

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1 Reading the Data File

```
> net = read.csv("CompiledData_E4.csv", header = TRUE, sep = ",")
> #net = net %>% filter(!Subject %in% c(5, 1, 2, 6, 3, 7))
```

2 Item Analysis

```
> library(dplyr)
> net_itemacc = group_by(net, ActualTarget) %>%
+   summarize_at(vars(TargetAccuracy), mean) %>%
+   arrange(TargetAccuracy)
> net_primeitem_acc = group_by(net, ActualPrime, ActualTarget) %>%
+   summarize_at(vars(PrimeFirstResp_ACC), mean) %>%
+   arrange(ActualTarget, PrimeFirstResp_ACC)
> net_primeitem_acc = net_primeitem_acc %>% filter(PrimeFirstResp_ACC ≤ 0.1 |
+   PrimeFirstResp_ACC == "1")
> overall_sub_acc = group_by(net, Subject) %>%
+   summarize_at(vars(TargetAccuracy), mean)
>
```

3 Figures

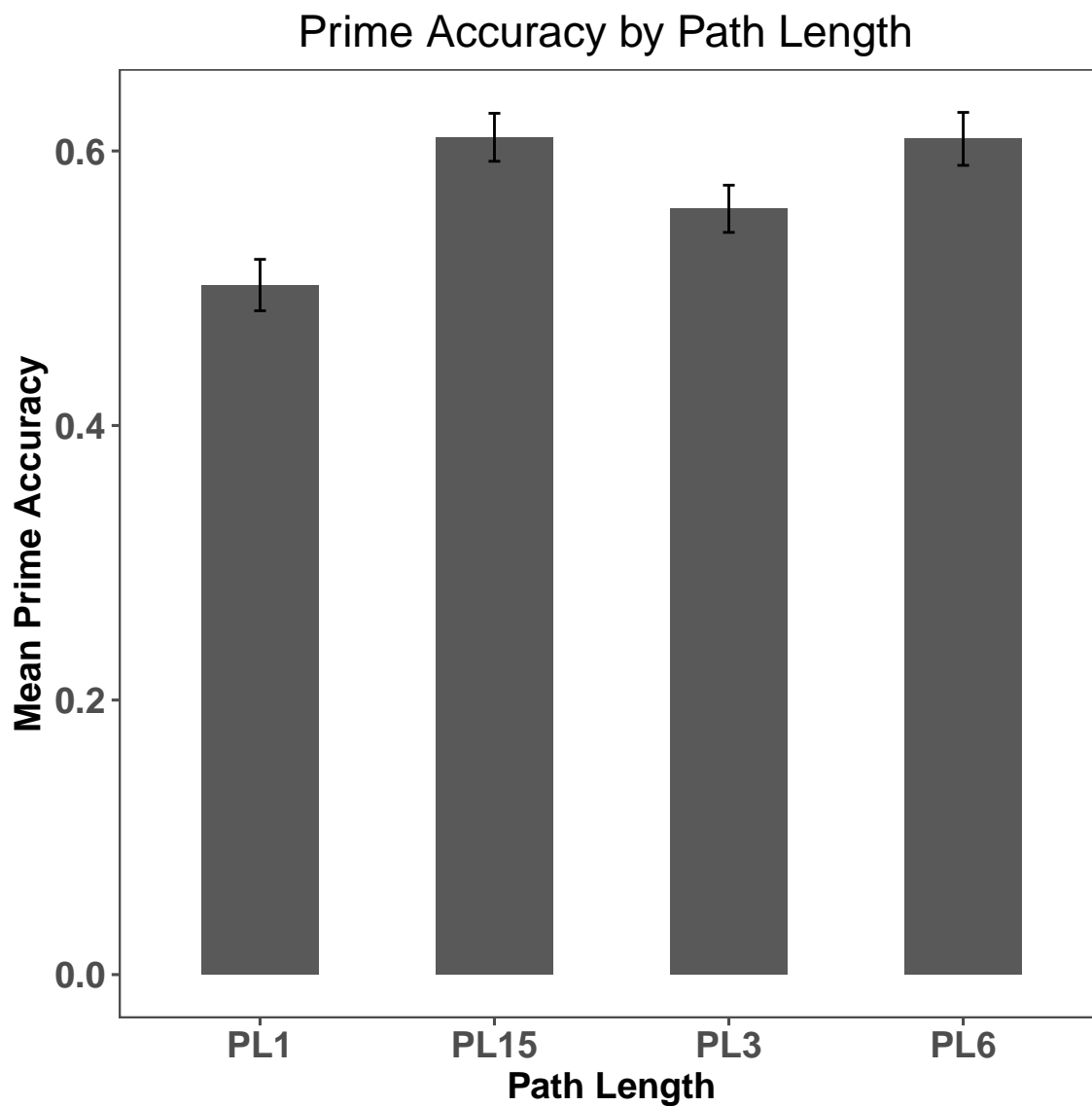
3.1 Prime Accuracy

```
> net_primeacc = group_by(net, Subject, pathlength) %>%
+   summarize_at(vars(PrimeFirstResp_ACC), mean)
> netprime_rmisc = Rmisc::summarySE(net_primeacc,
+   measurevar = "PrimeFirstResp_ACC",
+   groupvars = c("pathlength"))
> netprime_rmisc$pathlength = as.factor(netprime_rmisc$pathlength)
> library(ggplot2)
> library(ggthemes)
> netprime_rmisc %>%
```

```

+ ggplot(aes(x = pathlength,
+           y = PrimeFirstResp_ACC))+
+   geom_bar(stat = "identity", position = "dodge",
+           width = 0.5)+
+   geom_errorbar(aes(ymin = PrimeFirstResp_ACC - se,
+                     ymax = PrimeFirstResp_ACC + se),
+                 width=.05, position=position_dodge(.5)) +
+   theme_few()+
+   scale_fill_wsj()+
+   xlab("Path Length") + ylab("Mean Prime Accuracy") +
+   ggtitle("Prime Accuracy by Path Length ") +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
+         axis.title = element_text(face = "bold", size = rel(1.2)),
+         legend.title = element_text(face = "bold", size = rel(1.2)),
+         plot.title = element_text( size = rel(1.4), hjust = .5))
>

```



3.2 Target Accuracy

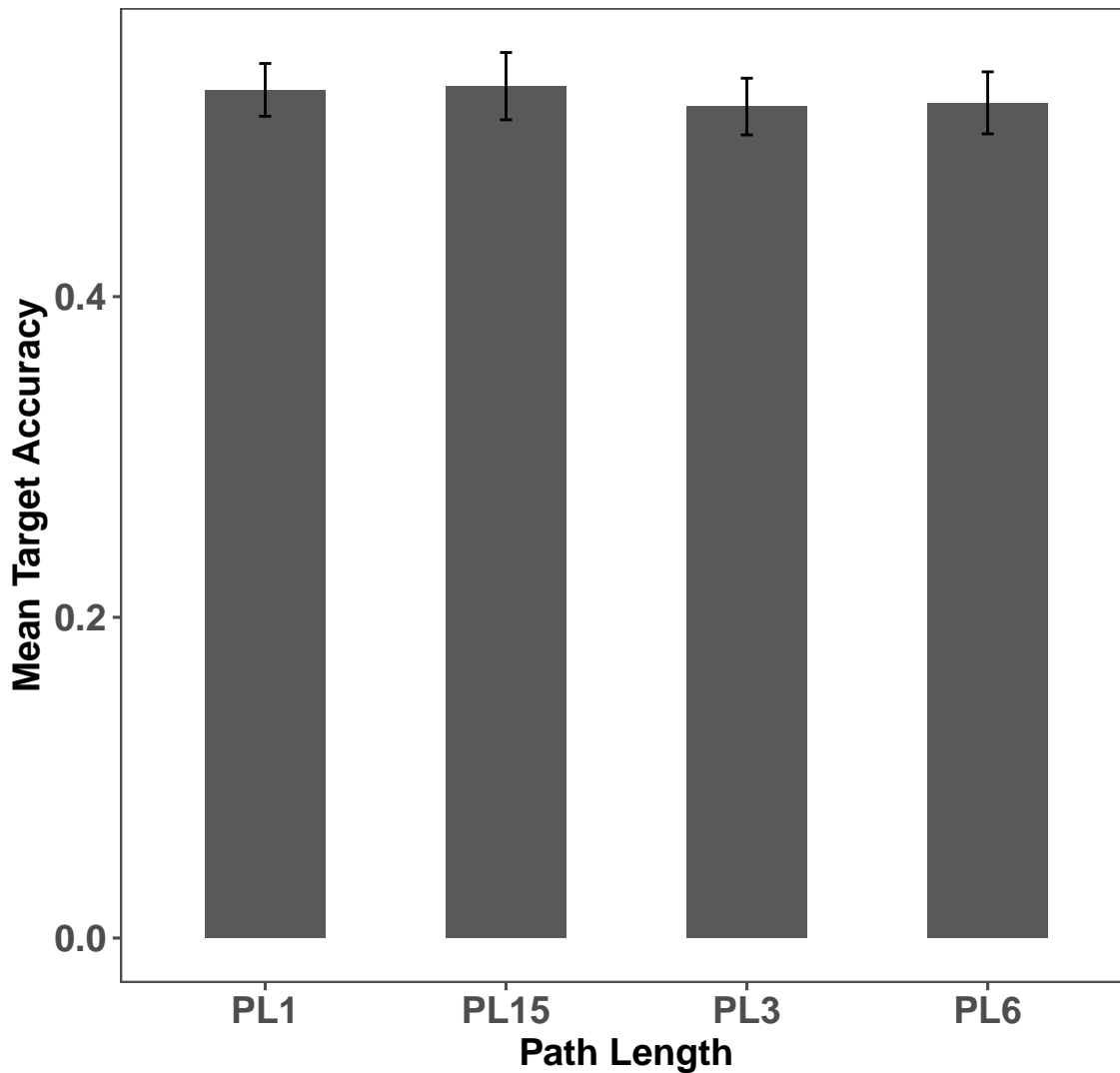
```
> net_targetacc = group_by(net, Subject, pathlength) %>%  
+   summarize_at(vars(TargetAccuracy), mean)  
> nettarget_rmisc = Rmisc::summarySE(net_targetacc,  
+   measurevar = "TargetAccuracy",  
+   groupvars = c("pathlength"))  
> nettarget_rmisc$pathlength = as.factor(nettarget_rmisc$pathlength)  
> library(ggplot2)  
> library(ggthemes)
```

```

> nettarget_rmisc %>%
+ ggplot(aes(x = pathlength,
+           y = TargetAccuracy))+
+   geom_bar(stat = "identity", position = "dodge",
+           width = 0.5)+
+   geom_errorbar(aes(ymin = TargetAccuracy - se,
+                     ymax = TargetAccuracy + se),
+                 width=.05, position=position_dodge(.5)) +
+   theme_few()+
+   scale_fill_wsj()+
+   xlab("Path Length") + ylab("Mean Target Accuracy") +
+   ggtitle("Target Accuracy by Path Length") +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
+         axis.title = element_text(face = "bold", size = rel(1.2)),
+         legend.title = element_text(face = "bold", size = rel(1.2)),
+         plot.title = element_text( size = rel(1.4), hjust = .5))
>

```

Target Accuracy by Path Length



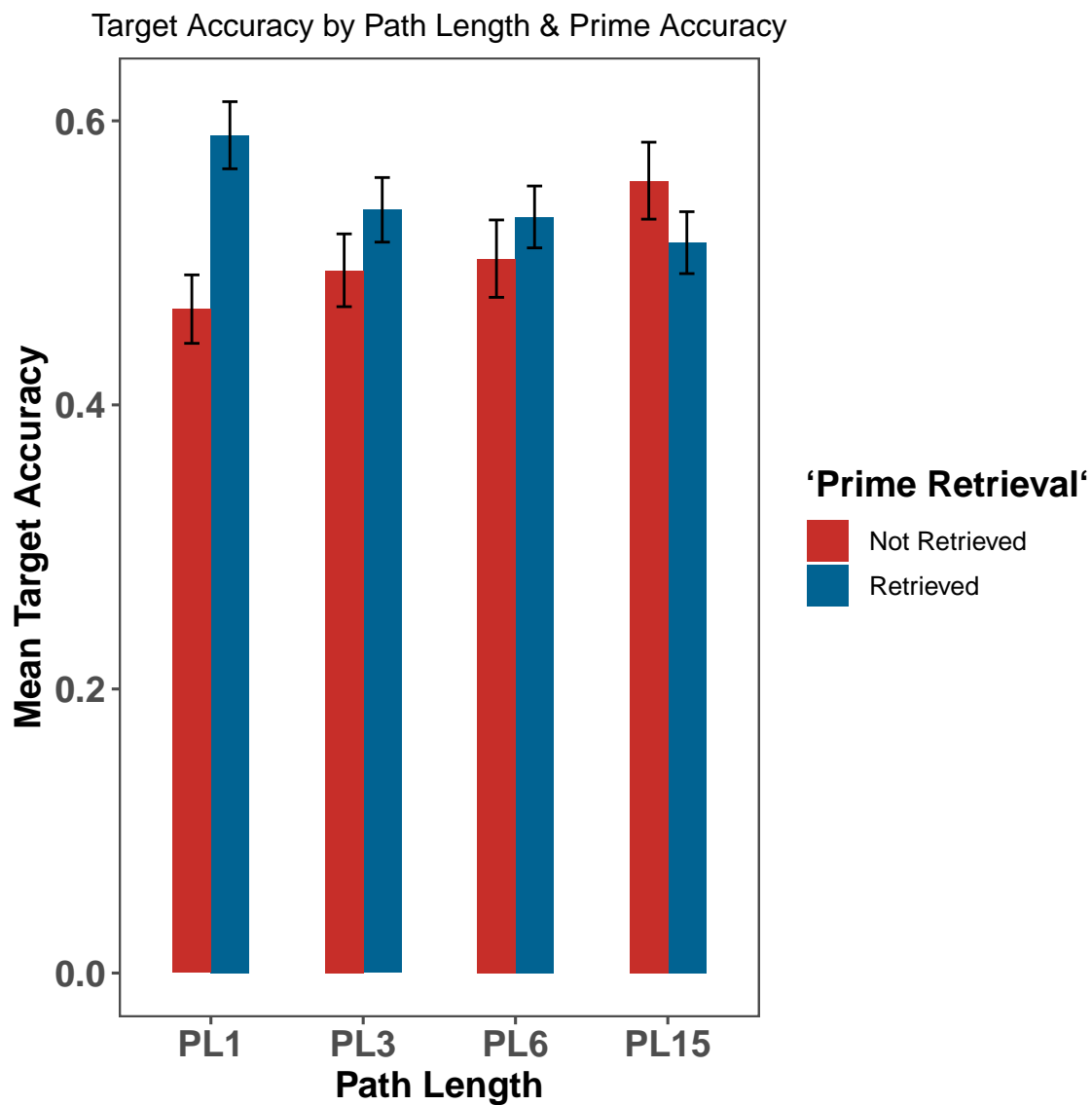
3.3 Prime Retrieval

```
> net_subject = group_by(net, Subject, pathlength, PrimeFirstResp_ACC) %>%
+   summarize_at(vars(TargetAccuracy), mean)
> net_rmisc = Rmisc::summarySE(net,
+                               measurevar = "TargetAccuracy",
+                               groupvars = c("pathlength", "PrimeFirstResp_ACC"))
> net_rmisc$PrimeFirstResp_ACC = as.factor(net_rmisc$PrimeFirstResp_ACC)
> net_rmisc$pathlength = as.factor(net_rmisc$pathlength)
> net_rmisc$pathlengthfac = ordered(as.factor(as.character(net_rmisc$pathlength))),
```

```

+               levels = c("PL1", "PL3", "PL6", "PL15"))
> library(ggplot2)
> library(ggthemes)
> net_rmisc %>% mutate(`Prime Retrieval` = factor(PrimeFirstResp_ACC,
+               levels = unique(PrimeFirstResp_ACC),
+               labels = c("Not Retrieved", "Retrieved")))%>%
+ ggplot(aes(x = pathlengthfac,
+           y = TargetAccuracy,
+           fill = `Prime Retrieval`, group = `Prime Retrieval`))+
+ geom_bar(stat = "identity", position = "dodge",
+         width = 0.5)+
+ geom_errorbar(aes(ymin = TargetAccuracy - se,
+                 ymax = TargetAccuracy + se),
+               width=.2, position=position_dodge(.5)) +
+ theme_few()+
+ scale_fill_wsj()+
+ xlab("Path Length") + ylab("Mean Target Accuracy") +
+ ggtitle("Target Accuracy by Path Length & Prime Accuracy") +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
+         axis.title = element_text(face = "bold", size = rel(1.2)),
+         legend.title = element_text(face = "bold", size = rel(1.2)),
+         plot.title = element_text( size = rel(1), hjust = .5))
>

```



4 AOV

4.1 Target Accuracy

```
> net_targetacc$Subject = as.factor(net_targetacc$Subject)
> net_targetacc$pathlength = as.factor(net_targetacc$pathlength)
> targetacc_aov = aov(data = net_targetacc, TargetAccuracy ~ pathlength +
+                      Error(Subject/pathlength))
> summary(targetacc_aov)
```

```
Error: Subject
      Df Sum Sq Mean Sq F value Pr(>F)
Residuals 47  1.756  0.03736
```

```
Error: Subject:pathlength
      Df Sum Sq Mean Sq F value Pr(>F)
pathlength  3  0.0055  0.001822  0.184  0.907
Residuals 141  1.3973  0.009910
```

4.2 Prime Accuracy

```
> net_primeacc$Subject = as.factor(net_primeacc$Subject)
> net_primeacc$pathlength = as.factor(net_primeacc$pathlength)
> primeacc_aov = aov(data = net_primeacc, PrimeFirstResp_ACC ~ pathlength +
+                      Error(Subject/pathlength))
> summary(primeacc_aov)
```

```
Error: Subject
      Df Sum Sq Mean Sq F value Pr(>F)
Residuals 47  1.542  0.03282
```

```
Error: Subject:pathlength
      Df Sum Sq Mean Sq F value Pr(>F)
pathlength  3  0.3758  0.12527  12.26 3.58e-07 ***
Residuals 141  1.4413  0.01022
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

4.3 Effect of Retrieval

```
> net_subject$pathlength = as.factor(net_subject$pathlength)
> net_subject$Subject = as.factor(net_subject$Subject)
> net_subject$PrimeFirstResp_ACC = as.factor(net_subject$PrimeFirstResp_ACC)
> ## AOV
> retrieval_aov = aov(data = net_subject,
+                      TargetAccuracy ~ PrimeFirstResp_ACC*pathlength +
+                      Error(Subject/(PrimeFirstResp_ACC*pathlength)))
> summary(retrieval_aov)
```

```
Error: Subject
      Df Sum Sq Mean Sq F value Pr(>F)
Residuals 47  3.391  0.07215
```

```
Error: Subject:PrimeFirstResp_ACC
      Df Sum Sq Mean Sq F value Pr(>F)
```



```

PrimeFirstResp_ACC  1  0.0129  0.01287    0.461   0.501
Residuals           47  1.3130  0.02794

Error: Subject:pathlength
      Df Sum Sq Mean Sq F value Pr(>F)
pathlength    3   0.033  0.01112    0.49   0.69
Residuals   141   3.202  0.02271

Error: Subject:PrimeFirstResp_ACC:pathlength
      Df Sum Sq Mean Sq F value Pr(>F)
PrimeFirstResp_ACC:pathlength    3   0.361  0.12026    3.27 0.0232 *
Residuals                     141   5.186  0.03678
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

> ## LMER
>
> net$pathlength = as.factor(net$pathlength)
> net$Subject = as.factor(net$Subject)
> net$PrimeFirstResp_ACC = as.factor(net$PrimeFirstResp_ACC)
> library(optimx)
> library(lme4)
> retrieval_model = glmer(data = net,
+                           TargetAccuracy ~ pathlength*PrimeFirstResp_ACC +
+                           (1|Subject) + (1|Stimuli1), family = "binomial",
+                           control = glmerControl(optimizer = "optimx",
+                                                    calc.derivs = FALSE,
+                           optCtrl = list(method = "nlminb", starttests = FALSE, kkt = FALSE)))
> summary(retrieval_model)

```

```

Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: TargetAccuracy ~ pathlength * PrimeFirstResp_ACC + (1 | Subject) +
(1 | Stimuli1)
Data: net
Control:
glmerControl(optimizer = "optimx", calc.derivs = FALSE, optCtrl = list(method = "nlminb",
starttests = FALSE, kkt = FALSE))

      AIC      BIC    logLik deviance df.resid
3824.8   3886.2  -1902.4   3804.8     3446

Scaled residuals:
      Min       1Q   Median       3Q      Max
-4.4698 -0.6475  0.2139  0.6497  3.8589

Random effects:

```

```

Groups      Name      Variance Std.Dev.
Stimuli1 (Intercept) 2.3631   1.5372
Subject   (Intercept) 0.2276   0.4771
Number of obs: 3456, groups: Stimuli1, 72; Subject, 48

Fixed effects:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    -0.007773   0.228308  -0.034   0.9728
pathlengthPL15    0.284371   0.178286   1.595   0.1107
pathlengthPL3     0.059384   0.174275   0.341   0.7333
pathlengthPL6     0.088339   0.175690   0.503   0.6151
PrimeFirstResp_ACC1 0.414188   0.172704   2.398   0.0165 *
pathlengthPL15:PrimeFirstResp_ACC1 -0.563928   0.245406  -2.298   0.0216 *
pathlengthPL3:PrimeFirstResp_ACC1 -0.286751   0.244274  -1.174   0.2404
pathlengthPL6:PrimeFirstResp_ACC1 -0.300875   0.244572  -1.230   0.2186
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
      (Intr) ptPL15 pthPL3 pthPL6 PFR_AC pPL15: pPL3:P
pthlngtPL15 -0.346
pthlngthPL3 -0.357  0.454
pthlngthPL6 -0.349  0.447  0.469
PrmFrR_ACC1 -0.380  0.482  0.494  0.489
pPL15:PFR_A  0.264 -0.760 -0.345 -0.340 -0.698
pPL3:PFR_AC  0.268 -0.339 -0.749 -0.355 -0.703  0.490
pPL6:PFR_AC  0.263 -0.335 -0.357 -0.752 -0.700  0.487  0.505

```

```
> car::Anova(retrieval_model)
```

```
Analysis of Deviance Table (Type II Wald chisquare tests)
```

```
Response: TargetAccuracy
```

	Chisq	Df	Pr(>Chisq)
pathlength	0.6496	3	0.8850
PrimeFirstResp_ACC	2.1035	1	0.1470
pathlength:PrimeFirstResp_ACC	5.2968	3	0.1513

5 Demasking RTs

```

> library(dplyr)
> net_firsttrim_target = subset(net,
+                               net$RTrecogniseTarget > 250 &
+                               net$RTrecogniseTarget < 7000)
> net_firsttrim_prime = subset(net,
+                               net$RTrecognisePrime > 250 &

```

```

+                               net$RTrecognisePrime < 7000)
> net_firstttrim_targetdef = subset(net,
+                               net$TargetDefRT > 250 &
+                               net$TargetDefRT < 9000)

```

RTRecogniseprime

```

> ## FOR PRIME
> ## aggregate per subject all IVs and DVs
> meanRT = group_by(net_firstttrim_prime, Subject) %>%
+   summarise_at(vars(RTrecognisePrime), mean)
> colnames(meanRT) = c("Subject",
+   "MeanRTrecogPrime")
> sdRT = group_by(net_firstttrim_prime, Subject) %>%
+   summarise_at(vars(RTrecognisePrime), sd)
> colnames(sdRT) = c("Subject",
+   "sdRTrecogPrime")
> RT_agg = merge(meanRT, sdRT, by = "Subject")
> ## merge aggregate info with long data
> net_z_prime = merge(net_firstttrim_prime,
+   RT_agg, by = "Subject", all.x = T)
> ## person and grand-mean centered scores using original and aggregate
> library(dplyr)
> net_z_prime = net_z_prime %>% mutate(zPrimeRecogRT =
+   (RTrecognisePrime -
+   MeanRTrecogPrime)/sdRTrecogPrime)
> ## checking: subject level means should be zero
>
> sub_pic = group_by(net_z_prime, Subject) %>%
+   summarise_at(vars(zPrimeRecogRT), mean)

```

RTRecogniseTarget

```

> ## FOR TARGET
> ## aggregate per subject all IVs and DVs
> meanRT = group_by(net_firstttrim_target, Subject) %>%
+   summarise_at(vars(RTrecogniseTarget), mean)
> colnames(meanRT) = c("Subject", "MeanRTrecogTarget")
> sdRT = group_by(net_firstttrim_target, Subject) %>%
+   summarise_at(vars(RTrecogniseTarget), sd)
> colnames(sdRT) = c("Subject", "sdRTrecogTarget")
> RT_agg = merge(meanRT, sdRT, by = "Subject")
> ## merge aggregate info with long data
> net_z_target= merge(net_firstttrim_target,
+   RT_agg, by = "Subject", all.x = T)
> ## person and grand-mean centered scores using original and aggregate

```

```

> library(dplyr)
> net_z_target = net_z_target %>% mutate( zTargetRecogRT =
+                                         (RTrecogniseTarget -
+                                         MeanRTrecogTarget)/sdRTrecogTarget)
> ## checking: subject level means should be zero
>
> sub_pic = group_by(net_z_target, Subject) %>%
+   summarise_at(vars(zTargetRecogRT), mean)
>

```

6 Trimming z-RTs

```

> net_z_trimmed_prime = subset(net_z_prime,
+                               net_z_prime$zPrimeRecogRT < 3 &
+                               net_z_prime$zPrimeRecogRT > -3)
> net_z_trimmed_target = subset(net_z_target,
+                                net_z_target$zTargetRecogRT < 3 &
+                                net_z_target$zTargetRecogRT > -3)
>

```

7 Repeating z-scoring

7.1 For prime

```

> ## aggregate per subject all IVs and DVs
> meanRT_prime = group_by(net_z_trimmed_prime, Subject) %>%
+   summarise_at(vars(RTrecognisePrime), mean)
> colnames(meanRT_prime) = c("Subject",
+                             "MeanRTrecogPrime_trim")
> sdRT_prime = group_by(net_z_trimmed_prime, Subject) %>%
+   summarise_at(vars(RTrecognisePrime), sd)
> colnames(sdRT_prime) = c("Subject",
+                           "sdRTrecogPrime_trim")
> RT_agg_prime = merge(meanRT_prime, sdRT_prime, by = "Subject")
> ## merge aggregate info with long data
> net_final_z_prime = merge(net_z_trimmed_prime,
+                            RT_agg_prime, by = "Subject", all.x = T)
> ## person and grand-mean centered scores using original and aggregate
> library(dplyr)
> net_final_z_prime = net_final_z_prime %>%
+   mutate( zPrimeRecogRT_trim =
+           (RTrecognisePrime -
+           MeanRTrecogPrime_trim)/sdRTrecogPrime_trim)
> ## checking: subject level means should be zero
>

```

```
> sub_pic = group_by(net_final_z_prime, Subject) %>%
+   summarise_at(vars(zPrimeRecogRT_trim), mean)
>
```

7.2 For Target

```
> ## aggregate per subject all IVs and DVs
> meanRT_target = group_by(net_z_trimmed_target, Subject) %>%
+   summarise_at(vars(RTrecogniseTarget), mean)
> colnames(meanRT_target) = c("Subject",
+   "MeanRTrecogTarget_trim")
> sdRT_target = group_by(net_z_trimmed_target, Subject) %>%
+   summarise_at(vars(RTrecogniseTarget), sd)
> colnames(sdRT_target) = c("Subject",
+   "sdRTrecogTarget_trim")
> RT_agg_target = merge(meanRT_target, sdRT_target, by = "Subject")
> ## merge aggregate info with long data
> net_final_z_target = merge(net_z_trimmed_target,
+   RT_agg_target, by = "Subject", all.x = T)
> ## person and grand-mean centered scores using original and aggregate
> library(dplyr)
> net_final_z_target = net_final_z_target %>%
+   mutate( zTargetRecogRT_trim =
+   (RTrecogniseTarget -
+   MeanRTrecogTarget_trim)/sdRTrecogTarget_trim)
> ## checking: subject level means should be zero
>
> sub_pic = group_by(net_final_z_target, Subject) %>%
+   summarise_at(vars(zTargetRecogRT_trim), mean)
>
```

7.3 Combining z-RT Prime and Target

```
> ## now we have separately z-scored RTprime and RTtarget. Need to combine.
> ## taking only necessary columns
> net_final_z_prime2 = net_final_z_prime[,c(1,4,34)]
> net_final_z = merge(net_final_z_target,
+   net_final_z_prime2,
+   by = c("Subject", "Trial"))
>
```

8 Linear Models

```

> # Mean RT to retrieve Target as a function of Prime Condition
>
> # Effect of RT prime on Accuracy
> library(lme4)
> library(lmerTest)
> RTprime_acc_model = glmer(data = net_final_z,
+                           TargetAccuracy ~ zPrimeRecogRT_trim*pathlength +
+                           (1|Subject) + (1|Stimuli1), family = binomial )
> summary(RTprime_acc_model)

```

```

Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: TargetAccuracy ~ zPrimeRecogRT_trim * pathlength + (1 | Subject) +
(1 | Stimuli1)
Data: net_final_z

      AIC      BIC   logLik deviance df.resid
3669.5   3730.5  -1824.7   3649.5     3296

Scaled residuals:
    Min       1Q   Median       3Q      Max
-4.4403 -0.6573  0.2236  0.6516  3.5634

Random effects:
 Groups   Name      Variance Std.Dev.
Stimuli1 (Intercept) 2.4175   1.5548
Subject  (Intercept) 0.2384   0.4882
Number of obs: 3306, groups: Stimuli1, 72; Subject, 48

Fixed effects:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    0.2244949   0.2145389    1.046   0.295
zPrimeRecogRT_trim -0.0158394   0.0871814   -0.182   0.856
pathlengthPL15    -0.0038643   0.1185447   -0.033   0.974
pathlengthPL3     -0.0444858   0.1186873   -0.375   0.708
pathlengthPL6     -0.0232283   0.1188323   -0.195   0.845
zPrimeRecogRT_trim:pathlengthPL15 0.0008804   0.1217133    0.007   0.994
zPrimeRecogRT_trim:pathlengthPL3  0.0268590   0.1235306    0.217   0.828
zPrimeRecogRT_trim:pathlengthPL6  0.0995457   0.1254506    0.794   0.427

Correlation of Fixed Effects:
      (Intr) zPrRRT_ ptPL15 pthPL3 pthPL6 zPRRT_:PL1 zPRRT_:PL3
zPrmRcgRT_t -0.014
pthlngtPL15 -0.277  0.025
pthlngtPL3  -0.278  0.025  0.504
pthlngtPL6  -0.277  0.024  0.503  0.502

```

zPRRT_:PL15	0.011	-0.716	-0.032	-0.017	-0.018		
zPrRRT_:PL3	0.011	-0.714	-0.017	-0.034	-0.017	0.505	
zPrRRT_:PL6	0.013	-0.693	-0.017	-0.017	0.003	0.492	0.496

```
> car::Anova(RTprime_acc_model)
```

Analysis of Deviance Table (Type II Wald chisquare tests)

Response: TargetAccuracy

	Chisq	Df	Pr(>Chisq)
zPrimeRecogRT_trim	0.1066	1	0.7441
pathlength	0.1754	3	0.9815
zPrimeRecogRT_trim:pathlength	0.8263	3	0.8432

```
> options(contrasts = c("contr.sum","contr.poly"))
> anova(RTprime_acc_model)
```

Analysis of Variance Table

	Df	Sum Sq	Mean Sq	F value
zPrimeRecogRT_trim	1	0.10961	0.109615	0.1096
pathlength	3	0.17694	0.058981	0.0590
zPrimeRecogRT_trim:pathlength	3	0.83629	0.278764	0.2788

```
> RTprime_RT_model = lmer(data = net_final_z,
+                           zTargetRecogRT_trim ~ zPrimeRecogRT_trim*pathlength +
+                           (1|Subject) + (1|Stimuli1) )
> summary(RTprime_RT_model)
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: zTargetRecogRT_trim ~ zPrimeRecogRT_trim * pathlength + (1 | Subject) + (1 | Stimuli1)
Data: net_final_z

REML criterion at convergence: 8887.6

Scaled residuals:

Min	1Q	Median	3Q	Max
-2.6406	-0.6232	-0.2314	0.4217	4.6935

Random effects:

Groups	Name	Variance	Std.Dev.
Stimuli1	(Intercept)	1.686e-01	4.106e-01
Subject	(Intercept)	5.846e-20	2.418e-10
Residual		8.093e-01	8.996e-01

Number of obs: 3306, groups: Stimuli1, 72; Subject, 48

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	8.195e-04	5.087e-02	6.954e+01	0.016
zPrimeRecogRT_trim	1.359e-01	1.626e-02	3.256e+03	8.354
pathlength1	-3.371e-02	2.717e-02	3.228e+03	-1.241
pathlength2	4.432e-02	2.718e-02	3.228e+03	1.631
pathlength3	-3.706e-02	2.710e-02	3.227e+03	-1.367
zPrimeRecogRT_trim:pathlength1	-8.416e-03	2.789e-02	3.256e+03	-0.302
zPrimeRecogRT_trim:pathlength2	-1.536e-02	2.807e-02	3.262e+03	-0.547
zPrimeRecogRT_trim:pathlength3	-1.739e-02	2.787e-02	3.257e+03	-0.624

Pr(>|t|)

(Intercept)	0.987
zPrimeRecogRT_trim	<2e-16 ***
pathlength1	0.215
pathlength2	0.103
pathlength3	0.172
zPrimeRecogRT_trim:pathlength1	0.763
zPrimeRecogRT_trim:pathlength2	0.584
zPrimeRecogRT_trim:pathlength3	0.533

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:

	(Intr)	zPrRRT_	pthln1	pthln2	pthln3	zPRRT_:1	zPRRT_:2
zPrmRcgRT_t	0.003						
pathlength1	0.000	-0.031					
pathlength2	0.000	-0.007	-0.334				
pathlength3	-0.001	-0.011	-0.331	-0.331			
zPrmRcRT_:1	-0.009	-0.016	-0.029	0.021	0.022		
zPrmRcRT_:2	-0.003	-0.021	0.022	-0.004	0.010	-0.319	
zPrmRcRT_:3	-0.003	-0.025	0.023	0.008	-0.004	-0.325	-0.320

```
> car::Anova(RTprime_RT_model)
```

Analysis of Deviance Table (Type II Wald chisquare tests)

Response: zTargetRecogRT_trim

	Chisq	Df	Pr(>Chisq)
zPrimeRecogRT_trim	68.6025	1	<2e-16 ***
pathlength	5.0852	3	0.1657
zPrimeRecogRT_trim:pathlength	2.0680	3	0.5584

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```
> options(contrasts = c("contr.sum","contr.poly"))
> anova(RTprime_RT_model)
```

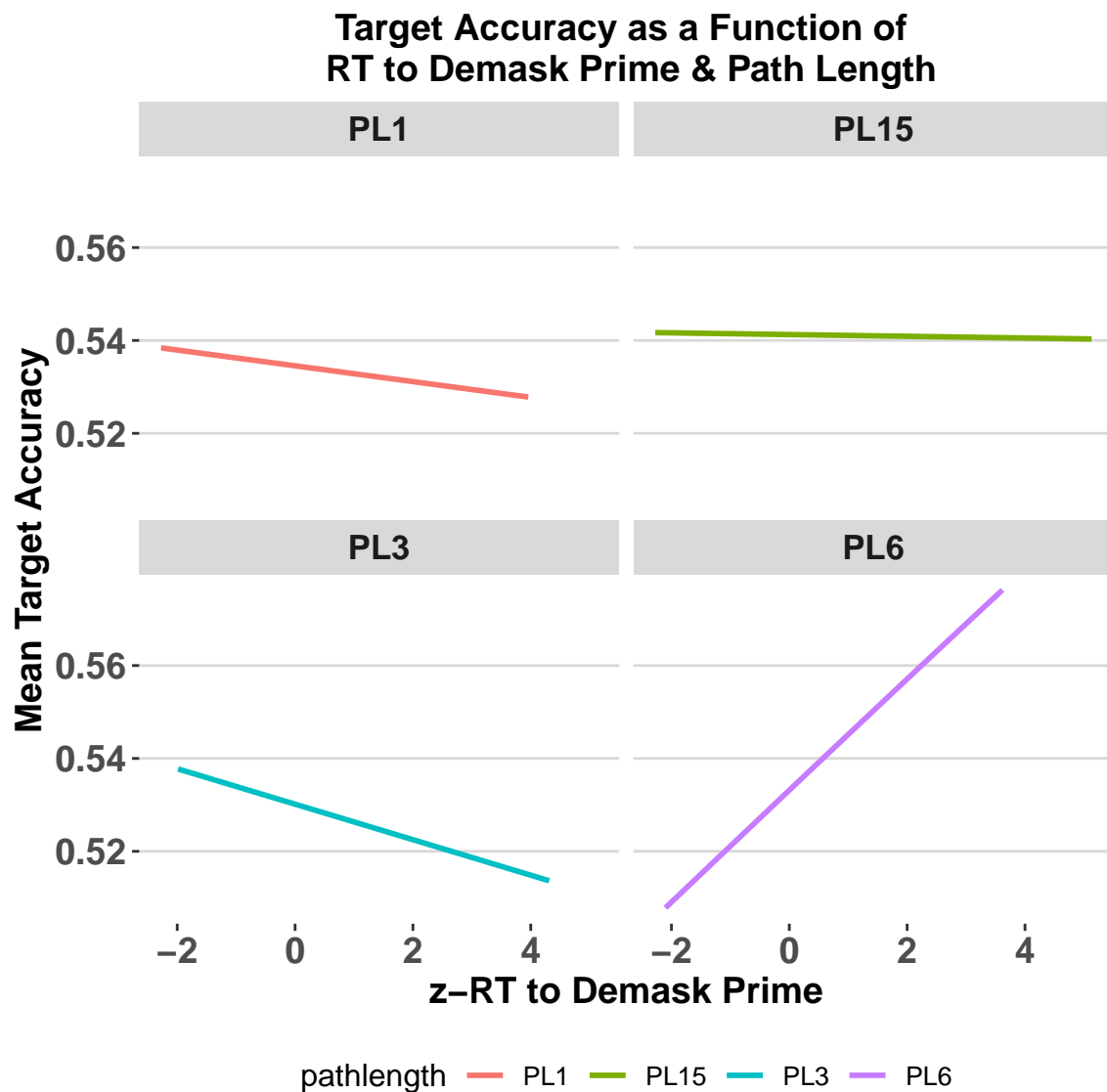


```
Type III Analysis of Variance Table with Satterthwaite's method
              Sum Sq Mean Sq NumDF  DenDF F value Pr(>F)
zPrimeRecogRT_trim    56.480   56.480      1 3256.1  69.7916 <2e-16 ***
pathlength             4.255    1.418      3 3227.5   1.7528  0.1541
zPrimeRecogRT_trim:pathlength  1.674    0.558      3 3257.1   0.6893  0.5585
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
>
```

8.1 Acc Figure

```
> net_final_z %>%
+   ggplot(aes(x = zPrimeRecogRT_trim, y = TargetAccuracy,
+             group = pathlength, color = pathlength)) +
+   geom_smooth(method = "glm", se = FALSE, method.args = list(family = "binomial"))+
+   facet_wrap(~pathlength)+
+   xlab("z-RT to Demask Prime") + ylab ("Mean Target Accuracy")+
+   ggtitle("Target Accuracy as a Function of \n RT to Demask Prime & Path Length")+
+   theme_hc() +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
+         axis.title = element_text(face = "bold", size = rel(1.2)),
+         strip.text.x = element_text(face = "bold", size = rel(1.4)),
+         plot.title = element_text(face = "bold", size = rel(1.2), hjust = .5))
```

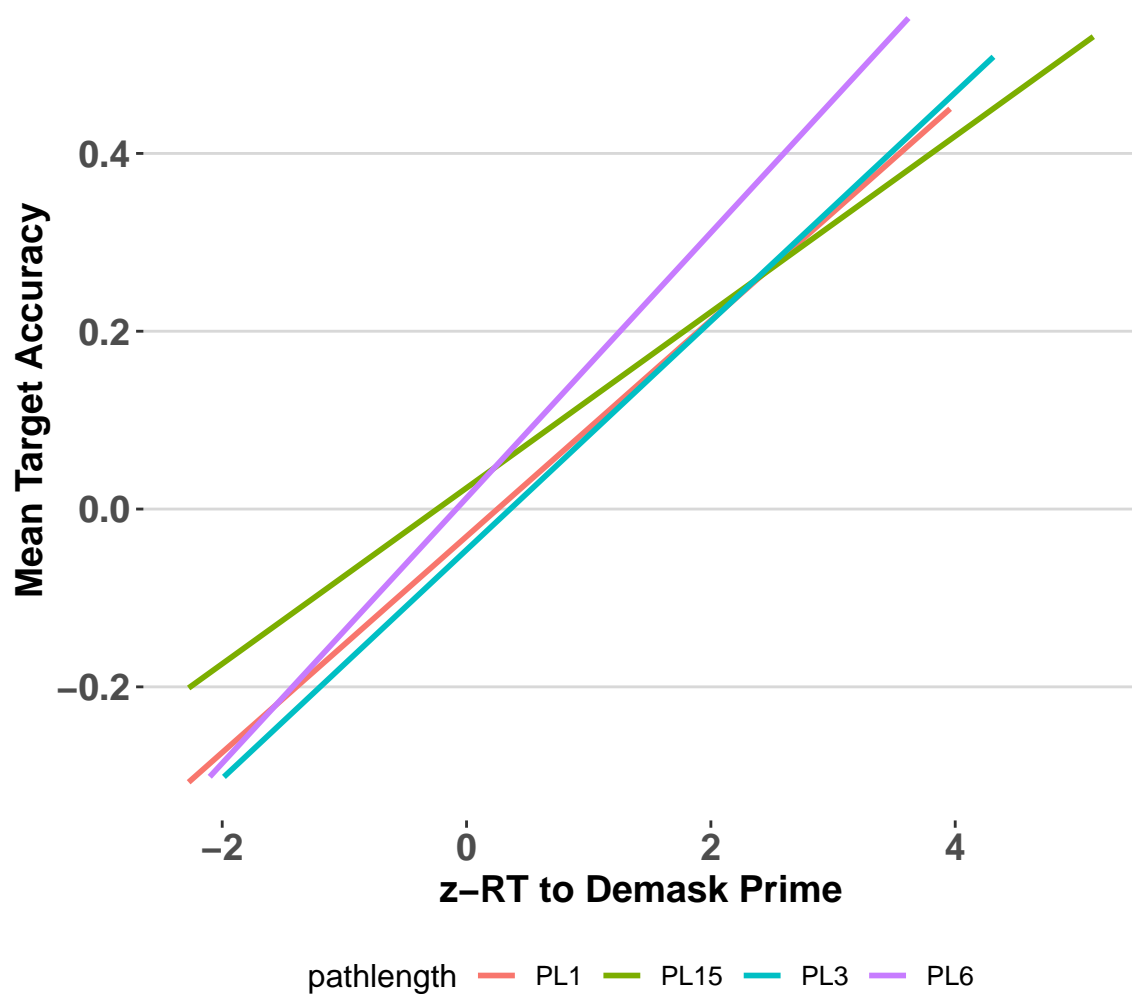


8.2 RT Figure

```
> net_final_z %>%
+   ggplot(aes(x = zPrimeRecogRT_trim, y = zTargetRecogRT_trim,
+             group = pathlength, color = pathlength)) +
+   geom_smooth(method = "lm", se = FALSE) +
+   xlab("z-RT to Demask Prime") + ylab ("Mean Target Accuracy") +
+   ggtitle("Target Accuracy as a Function of \n RT to Demask Prime & Path Length") +
+   theme_hc() +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
```

```
+ axis.title = element_text(face = "bold", size = rel(1.2)),
+ strip.text.x = element_text(face = "bold", size = rel(1.4)),
+ plot.title = element_text(face = "bold", size = rel(1.2), hjust = .5))
```

Target Accuracy as a Function of RT to Demask Prime & Path Length



9 Undirected Network

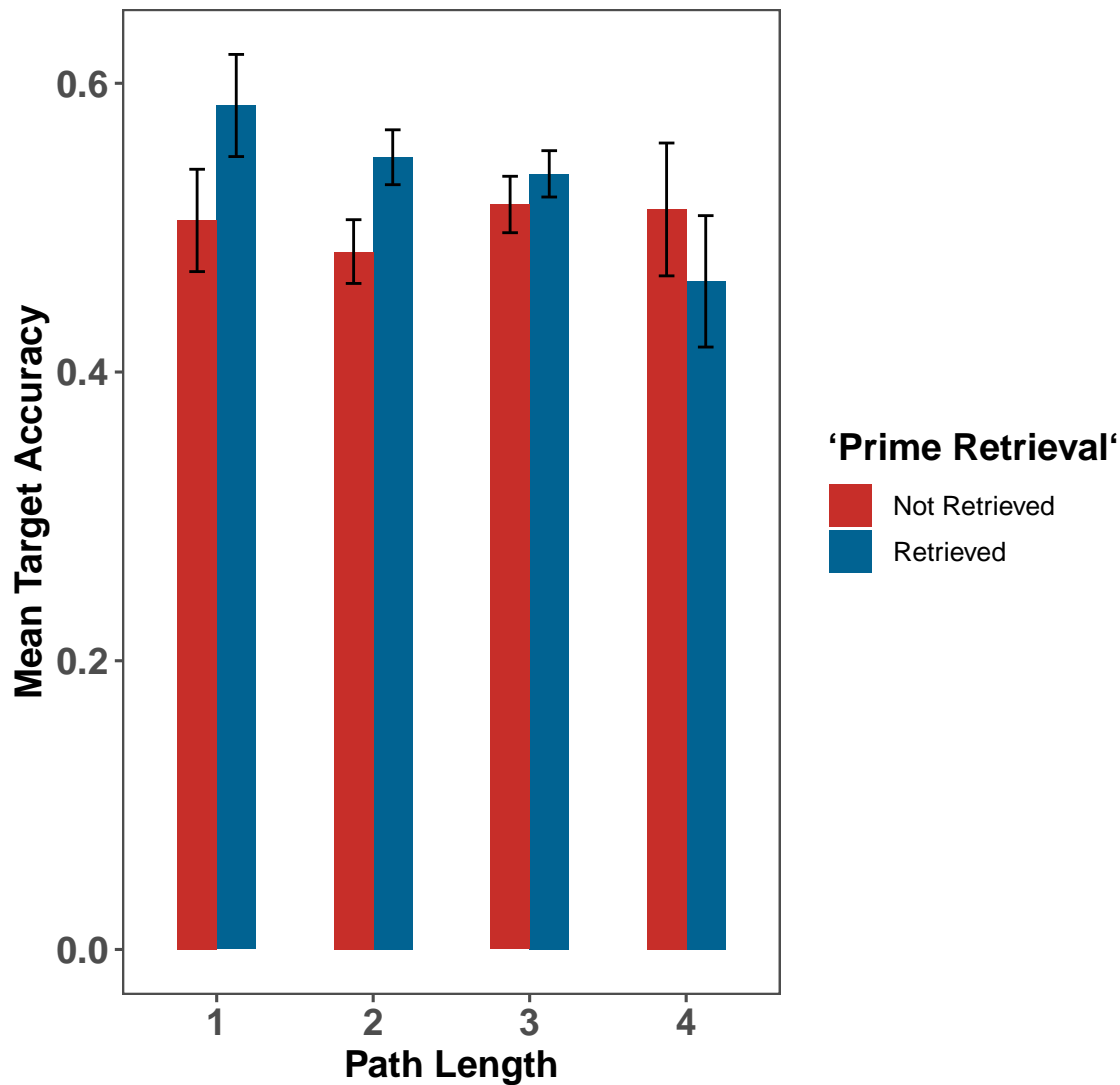
```
> undirected_subject = group_by(net, Subject,
+                               Undirected, PrimeFirstResp_ACC) %>%
+   summarize_at(vars(TargetAccuracy), mean)
> undirected_rmisc = Rmisc::summarySE(net,
```

```

+           measurevar = "TargetAccuracy",
+           groupvars = c("Undirected", "PrimeFirstResp_ACC"))
> undirected_rmisc$PrimeFirstResp_ACC = as.factor(undirected_rmisc$PrimeFirstResp_ACC)
> undirected_rmisc$Undirected = as.factor(undirected_rmisc$Undirected)
> undirected_rmisc = undirected_rmisc %>% filter(!is.na(undirected_rmisc$Undirected))
> library(ggplot2)
> library(ggthemes)
> undirected_rmisc %>% mutate(`Prime Retrieval` = factor(PrimeFirstResp_ACC,
+           levels = unique(PrimeFirstResp_ACC),
+           labels = c("Not Retrieved", "Retrieved")))%>%
+ ggplot(aes(x = Undirected,
+           y = TargetAccuracy,
+           fill = `Prime Retrieval`, group = `Prime Retrieval`))+
+   geom_bar(stat = "identity", position = "dodge",
+           width = 0.5)+
+   geom_errorbar(aes(ymin = TargetAccuracy - se,
+           ymax = TargetAccuracy + se),
+           width=.2, position=position_dodge(.5)) +
+   theme_few()+
+   scale_fill_wsj()+
+   xlab("Path Length") + ylab("Mean Target Accuracy") +
+   ggtitle("Target Accuracy by Path Length & Prime Accuracy") +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
+         axis.title = element_text(face = "bold", size = rel(1.2)),
+         legend.title = element_text(face = "bold", size = rel(1.2)),
+         plot.title = element_text( size = rel(1), hjust = .5))
>

```

Target Accuracy by Path Length & Prime Accuracy



Undirected Model

```
> net$undirectedfac = as.factor(net$Undirected)
> retrieval_model_undirected = glmer(data = net,
+                                     TargetAccuracy ~ undirectedfac*PrimeFirstResp_ACC +
+                                     (1|Subject) + (1|Stimuli1), family = "binomial",
+                                     control = glmerControl(optimizer = "optimx",
+                                                             calc.derivs = FALSE,
+                                                             optCtrl = list(method = "nlnmb", starttests = FALSE, kkt = FALSE)))
> summary(retrieval_model_undirected)
```

```

Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: TargetAccuracy ~ undirectedfac * PrimeFirstResp_ACC + (1 | Subject) +
(1 | Stimuli1)
Data: net
Control:
glmerControl(optimizer = "optimx", calc.derivs = FALSE, optCtrl = list(method = "nlminb",
starttests = FALSE, kkt = FALSE))

      AIC      BIC    logLik deviance df.resid
3825.8    3887.3   -1902.9    3805.8     3446

Scaled residuals:
      Min       1Q   Median       3Q      Max
-4.3630 -0.6478  0.2141  0.6531  3.8103

Random effects:
      Groups      Name      Variance Std.Dev.
Stimuli1 (Intercept) 2.3776     1.5420
Subject   (Intercept) 0.2283     0.4778
Number of obs: 3456, groups: Stimuli1, 72; Subject, 48

Fixed effects:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)      0.10537    0.20374   0.517   0.605
undirectedfac1      0.10444    0.11734   0.890   0.373
undirectedfac2      0.08142    0.08400   0.969   0.332
undirectedfac3      0.06187    0.07747   0.799   0.425
PrimeFirstResp_ACC1 -0.06549    0.05804  -1.128   0.259
undirectedfac1:PrimeFirstResp_ACC1 -0.07712    0.10887  -0.708   0.479
undirectedfac2:PrimeFirstResp_ACC1 -0.05489    0.07805  -0.703   0.482
undirectedfac3:PrimeFirstResp_ACC1  0.05127    0.07236   0.709   0.479

Correlation of Fixed Effects:
              (Intr) undrc1 undrc2 undrc3 PFR_AC u1:PFR u2:PFR
undirctdfc1  0.035
undirctdfc2 -0.134 -0.318
undirctdfc3 -0.167 -0.164  0.177
PrmFrR_ACC1  0.003 -0.051  0.032  0.039
u1:PFR_ACC1 -0.008 -0.066  0.002  0.002  0.135
u2:PFR_ACC1  0.017  0.016  0.043 -0.088 -0.438 -0.256
u3:PFR_ACC1  0.013  0.015 -0.066  0.053 -0.544 -0.224  0.163

```

```
> car::Anova(retrieval_model_undirected)
```

```
Analysis of Deviance Table (Type II Wald chisquare tests)
```

```
Response: TargetAccuracy
```

	Chisq	Df	Pr(>Chisq)
undirectedfac	3.0910	3	0.3778
PrimeFirstResp_ACC	2.0724	1	0.1500
undirectedfac:PrimeFirstResp_ACC	1.7892	3	0.6173

```
> options(contrasts = c("contr.sum","contr.poly"))
> anova(retrieval_model_undirected)
```

```
Analysis of Variance Table
```

	Df	Sum Sq	Mean Sq	F value
undirectedfac	3	3.0409	1.0136	1.0136
PrimeFirstResp_ACC	1	2.0724	2.0724	2.0724
undirectedfac:PrimeFirstResp_ACC	3	1.7892	0.5964	0.5964

```
> net_final_z$undirectedfac = as.factor(net_final_z$Undirected)
> RTprime_acc_model_undirected = glmer(data = net_final_z,
+ TargetAccuracy ~ zPrimeRecogRT_trim*undirectedfac +
+ (1|Subject) + (1|Stimuli1), family = binomial )
> summary(RTprime_acc_model_undirected)
```

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial ( logit )
Formula: TargetAccuracy ~ zPrimeRecogRT_trim * undirectedfac + (1 | Subject) +
(1 | Stimuli1)
Data: net_final_z
```

AIC	BIC	logLik	deviance	df.resid
3664.7	3725.8	-1822.4	3644.7	3296

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.5450	-0.6560	0.2220	0.6463	3.4222

Random effects:

Groups	Name	Variance	Std.Dev.
Stimuli1	(Intercept)	2.4219	1.5563
Subject	(Intercept)	0.2405	0.4904

Number of obs: 3306, groups: Stimuli1, 72; Subject, 48

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.150899	0.206562	0.731	0.465
zPrimeRecogRT_trim	0.082135	0.056686	1.449	0.147
undirectedfac1	0.038636	0.120382	0.321	0.748
undirectedfac2	0.111908	0.086930	1.287	0.198

```

undirectedfac3          0.043535    0.079461    0.548    0.584
zPrimeRecogRT_trim:undirectedfac1 -0.008329    0.103719   -0.080    0.936
zPrimeRecogRT_trim:undirectedfac2 -0.051908    0.077670   -0.668    0.504
zPrimeRecogRT_trim:undirectedfac3 -0.134096    0.072932   -1.839    0.066 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
      (Intr) zPrRRT_ undrc1 undrc2 undrc3 zPRRT_:1 zPRRT_:2
zPrmRcgRT_t -0.026
undirctdfc1  0.031 -0.026
undirctdfc2 -0.139  0.069 -0.303
undirctdfc3 -0.174  0.080 -0.149  0.194
zPrmRcRT_:1 -0.002  0.082 -0.104  0.001 -0.013
zPrmRcRT_:2  0.025 -0.406  0.011 -0.070 -0.067 -0.248
zPrmRcRT_:3  0.023 -0.536  0.032 -0.063 -0.050 -0.202  0.132

```

```
> car::Anova(RTprime_acc_model_undirected)
```

Analysis of Deviance Table (Type II Wald chisquare tests)

Response: TargetAccuracy

	Chisq	Df	Pr(>Chisq)
zPrimeRecogRT_trim	0.1131	1	0.7366
undirectedfac	1.8664	3	0.6006
zPrimeRecogRT_trim:undirectedfac	3.8941	3	0.2731

```

> options(contrasts = c("contr.sum","contr.poly"))
> anova(RTprime_acc_model_undirected)

```

Analysis of Variance Table

	Df	Sum Sq	Mean Sq	F value
zPrimeRecogRT_trim	1	0.1050	0.10497	0.1050
undirectedfac	3	1.8788	0.62626	0.6263
zPrimeRecogRT_trim:undirectedfac	3	3.9450	1.31501	1.3150

```

> RTprime_RT_model_undirected = lmer(data = net_final_z,
+   zTargetRecogRT_trim ~ zPrimeRecogRT_trim*undirectedfac +
+   (1|Subject) + (1|Stimuli1) )
> summary(RTprime_RT_model_undirected)

```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: zTargetRecogRT_trim ~ zPrimeRecogRT_trim * undirectedfac + (1 |
  Subject) + (1 | Stimuli1)
Data: net_final_z

```



```
REML criterion at convergence: 8881.5
```

```
Scaled residuals:
```

Min	1Q	Median	3Q	Max
-2.7538	-0.6337	-0.2260	0.4237	4.6717

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
Stimuli1	(Intercept)	0.1704	0.4127
Subject	(Intercept)	0.0000	0.0000
	Residual	0.8082	0.8990

```
Number of obs: 3306, groups: Stimuli1, 72; Subject, 48
```

```
Fixed effects:
```

	Estimate	Std. Error	df	t value
(Intercept)	2.606e-02	5.344e-02	8.271e+01	0.488
zPrimeRecogRT_trim	1.470e-01	2.092e-02	3.262e+03	7.027
undirectedfac1	1.478e-02	4.342e-02	3.294e+03	0.340
undirectedfac2	-5.001e-02	3.175e-02	3.291e+03	-1.575
undirectedfac3	-3.684e-02	2.939e-02	3.296e+03	-1.254
zPrimeRecogRT_trim:undirectedfac1	5.611e-02	3.742e-02	3.256e+03	1.499
zPrimeRecogRT_trim:undirectedfac2	-6.771e-02	2.876e-02	3.258e+03	-2.354
zPrimeRecogRT_trim:undirectedfac3	-2.021e-03	2.700e-02	3.261e+03	-0.075

```
Pr(>|t|)
```

(Intercept)	0.6271
zPrimeRecogRT_trim	2.57e-12 ***
undirectedfac1	0.7336
undirectedfac2	0.1154
undirectedfac3	0.2101
zPrimeRecogRT_trim:undirectedfac1	0.1339
zPrimeRecogRT_trim:undirectedfac2	0.0186 *
zPrimeRecogRT_trim:undirectedfac3	0.9403

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Correlation of Fixed Effects:
```

	(Intr)	zPrRRT_	undrc1	undrc2	undrc3	zPRRT_:1	zPRRT_:2
zPrmRcgRT_t	-0.034						
undirctdfc1	0.046	-0.046					
undirctdfc2	-0.196	0.062	-0.295				
undirctdfc3	-0.247	0.080	-0.162	0.190			
zPrmRcRT_:1	-0.013	0.061	-0.111	0.019	0.010		
zPrmRcRT_:2	0.032	-0.393	0.017	-0.041	-0.070	-0.240	
zPrmRcRT_:3	0.033	-0.523	0.045	-0.068	-0.039	-0.192	0.118

```
> car::Anova(RTprime_RT_model_undirected)
```

```
Analysis of Deviance Table (Type II Wald chisquare tests)
```

```
Response: zTargetRecogRT_trim
```

	Chisq	Df	Pr(>Chisq)
zPrimeRecogRT_trim	66.3415	1	3.792e-16 ***
undirectedfac	4.0258	3	0.25870
zPrimeRecogRT_trim:undirectedfac	6.6100	3	0.08543 .

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
> options(contrasts = c("contr.sum", "contr.poly"))
> anova(RTprime_RT_model_undirected)
```

```
Type III Analysis of Variance Table with Satterthwaite's method
```

	Sum Sq	Mean Sq	NumDF	DenDF	F value	Pr(>F)
zPrimeRecogRT_trim	39.904	39.904	1	3261.8	49.3724	2.566e-12
undirectedfac	2.816	0.939	3	3294.1	1.1614	0.32300
zPrimeRecogRT_trim:undirectedfac	5.342	1.781	3	3257.1	2.2033	0.08564

```
zPrimeRecogRT_trim      ***
undirectedfac
zPrimeRecogRT_trim:undirectedfac .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

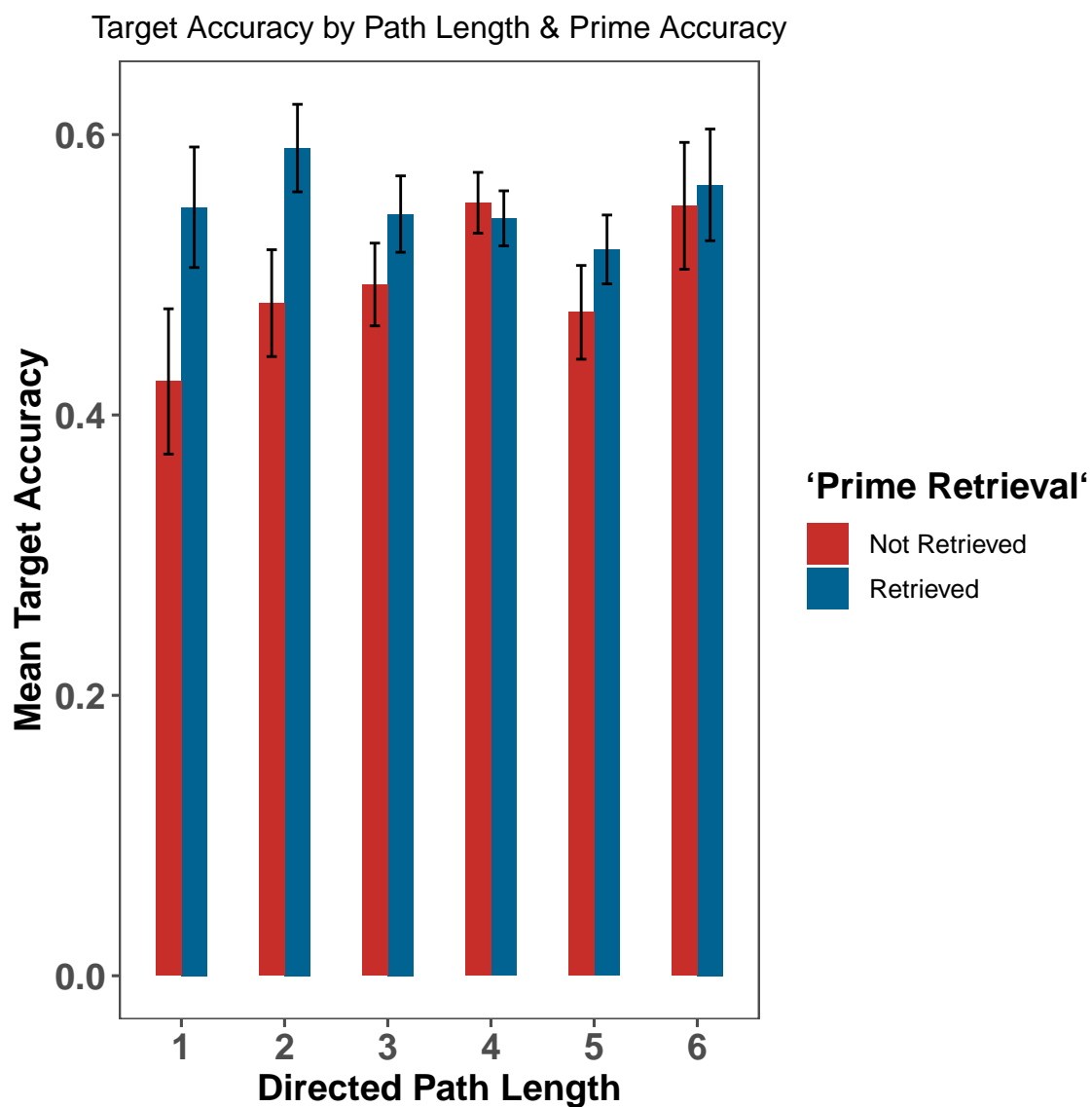
10 Directed Network

```
> net$newdirected = ifelse(net$Directed == "Inf" |
+                           net$Directed == "NA", NA,
+                           net$Directed)
> directed_rmisc = Rmisc::summarySE(net,
+                                   measurevar = "TargetAccuracy",
+                                   groupvars = c("newdirected", "PrimeFirstResp_ACC"))
> directed_rmisc = directed_rmisc %>% filter(!is.na(newdirected))
> directed_rmisc$PrimeFirstResp_ACC = as.factor(directed_rmisc$PrimeFirstResp_ACC)
> directed_rmisc$newdirected = as.factor(directed_rmisc$newdirected)
> library(ggplot2)
> library(ggthemes)
> directed_rmisc %>% mutate(`Prime Retrieval` = factor(PrimeFirstResp_ACC,
+                                                       levels = unique(PrimeFirstResp_ACC),
+                                                       labels = c("Not Retrieved", "Retrieved")))%>%
+ ggplot(aes(x = newdirected,
+            y = TargetAccuracy,
+            fill = `Prime Retrieval`, group = `Prime Retrieval`))+
+   geom_bar(stat = "identity", position = "dodge",
+            width = 0.5)+
+   geom_errorbar(aes(ymin = TargetAccuracy - se,
```

```

+           ymax = TargetAccuracy + se),
+           width=.2, position=position_dodge(.5)) +
+   theme_few()+
+   scale_fill_wsj()+
+   xlab("Directed Path Length") + ylab("Mean Target Accuracy") +
+   ggtitle("Target Accuracy by Path Length & Prime Accuracy") +
+   theme(axis.text = element_text(face = "bold", size = rel(1.2)),
+         axis.title = element_text(face = "bold", size = rel(1.2)),
+         legend.title = element_text(face = "bold", size = rel(1.2)),
+         plot.title = element_text( size = rel(1), hjust = .5))
>

```



Directed Model

```
> retrieval_model_directed = glmer(data = net,
+                               TargetAccuracy ~ newdirected*PrimeFirstResp_ACC +
+                               (1|Subject) + (1|Stimuli1), family = "binomial",
+                               control = glmerControl(optimizer = "optimx",
+                                                       calc.derivs = FALSE,
+                                                       optCtrl = list(method = "nlnmb", starttests = FALSE, kkt = FALSE)))
> summary(retrieval_model_directed)
```

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
Family: binomial (logit)
Formula: TargetAccuracy ~ newdirected * PrimeFirstResp_ACC + (1 | Subject) +
(1 | Stimuli1)
Data: net
Control:
glmerControl(optimizer = "optimx", calc.derivs = FALSE, optCtrl = list(method = "nlnmb",
starttests = FALSE, kkt = FALSE))

          AIC          BIC    logLik deviance df.resid
3697.8    3734.5   -1842.9    3685.8     3355

Scaled residuals:
    Min       1Q   Median       3Q      Max
-4.4648 -0.6425  0.2167  0.6523  3.6660

Random effects:
 Groups   Name      Variance Std.Dev.
Stimuli1 (Intercept) 2.4315   1.5593
Subject  (Intercept) 0.2365   0.4863
Number of obs: 3361, groups: Stimuli1, 72; Subject, 48

Fixed effects:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)      0.43993    0.24636   1.786  0.07414 .
newdirected     -0.07317    0.03793  -1.929  0.05371 .
PrimeFirstResp_ACC1 -0.38124    0.13502  -2.824  0.00475 **
newdirected:PrimeFirstResp_ACC1 0.08369    0.03395   2.465  0.01369 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
              (Intr) nwdrcr PFR_AC
newdirected  -0.572
PrmFrR_ACC1  0.075 -0.121
nw:PFR_ACC1 -0.070  0.128 -0.943
```

```
> car::Anova(retrieval_model_directed)
```

```
Analysis of Deviance Table (Type II Wald chisquare tests)
```

```
Response: TargetAccuracy
```

	Chisq	Df	Pr(>Chisq)
newdirected	5.1170	1	0.02369 *
PrimeFirstResp_ACC	2.2515	1	0.13348
newdirected:PrimeFirstResp_ACC	6.0781	1	0.01369 *

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
> options(contrasts = c("contr.sum","contr.poly"))
```

```
> anova(retrieval_model_directed)
```

```
Analysis of Variance Table
```

	Df	Sum Sq	Mean Sq	F value
newdirected	1	5.1342	5.1342	5.1342
PrimeFirstResp_ACC	1	2.2515	2.2515	2.2515
newdirected:PrimeFirstResp_ACC	1	6.0781	6.0781	6.0781

```
> net_final_z$newdirected = ifelse(net_final_z$Directed == "Inf" |
+                               net_final_z$Directed == "NA", NA,
+                               net_final_z$Directed)
> RTprime_acc_model_directed = glmer(data = net_final_z,
+ TargetAccuracy ~ zPrimeRecogRT_trim*newdirected +
+ (1|Subject) + (1|Stimuli1), family = binomial )
> summary(RTprime_acc_model_directed)
```

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) [glmerMod]
```

```
Family: binomial ( logit )
```

```
Formula: TargetAccuracy ~ zPrimeRecogRT_trim * newdirected + (1 | Subject) +
(1 | Stimuli1)
```

```
Data: net_final_z
```

AIC	BIC	logLik	deviance	df.resid
3555.2	3591.7	-1771.6	3543.2	3215

```
Scaled residuals:
```

Min	1Q	Median	3Q	Max
-4.6235	-0.6543	0.2277	0.6433	3.5036

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
Stimuli1	(Intercept)	2.4586	1.5680
Subject	(Intercept)	0.2515	0.5015

```
Number of obs: 3221, groups: Stimuli1, 72; Subject, 48
```

```
Fixed effects:
```

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.496830	0.249413	1.992	0.0464 *
zPrimeRecogRT_trim	0.048098	0.133417	0.361	0.7185
newdirected	-0.075770	0.038640	-1.961	0.0499 *
zPrimeRecogRT_trim:newdirected	-0.009696	0.034026	-0.285	0.7757

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Correlation of Fixed Effects:
```

	(Intr)	zPrRRT_ nwdrc
zPrmRcgRT_t	-0.004	
newdirected	-0.575	0.009
zPrmRcgRT_:	0.009	-0.942 -0.016

```
> car::Anova(RTprime_acc_model_directed)
```

```
Analysis of Deviance Table (Type II Wald chisquare tests)
```

```
Response: TargetAccuracy
```

	Chisq	Df	Pr(>Chisq)
zPrimeRecogRT_trim	0.0756	1	0.78341
newdirected	3.8647	1	0.04931 *
zPrimeRecogRT_trim:newdirected	0.0812	1	0.77567

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
> options(contrasts = c("contr.sum","contr.poly"))
```

```
> anova(RTprime_acc_model_directed)
```

```
Analysis of Variance Table
```

	Df	Sum Sq	Mean Sq	F value
zPrimeRecogRT_trim	1	0.0541	0.0541	0.0541
newdirected	1	3.9036	3.9036	3.9036
zPrimeRecogRT_trim:newdirected	1	0.0818	0.0818	0.0818

```
> RTprime_RT_model_directed = lmer(data = net_final_z,  
+   zTargetRecogRT_trim ~ zPrimeRecogRT_trim*newdirected +  
+   (1|Subject) + (1|Stimuli1) )  
> summary(RTprime_RT_model_directed)
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]
```

```
Formula: zTargetRecogRT_trim ~ zPrimeRecogRT_trim * newdirected + (1 |  
Subject) + (1 | Stimuli1)
```

```

Data: net_final_z

REML criterion at convergence: 8650.7

Scaled residuals:
    Min       1Q   Median       3Q      Max
-2.7558 -0.6295 -0.2313  0.4230  4.6752

Random effects:
 Groups   Name      Variance Std.Dev.
Stimuli1 (Intercept) 0.1735   0.4165
Subject  (Intercept) 0.0000   0.0000
Residual                0.8097   0.8998
Number of obs: 3221, groups: Stimuli1, 72; Subject, 48

Fixed effects:
              Estimate Std. Error      df t value
(Intercept)    -5.003e-02  7.254e-02  2.506e+02  -0.690
zPrimeRecogRT_trim    1.668e-01  4.784e-02  3.176e+03   3.487
newdirected      1.444e-02  1.375e-02  3.205e+03   1.050
zPrimeRecogRT_trim:newdirected -7.797e-03  1.222e-02  3.176e+03  -0.638
Pr(>|t|)
(Intercept)    0.491061
zPrimeRecogRT_trim    0.000496 ***
newdirected      0.293632
zPrimeRecogRT_trim:newdirected 0.523612
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
      (Intr) zPrRRT_ nwdrct
zPrmRcgRT_t -0.003
newdirected -0.703  0.005
zPrmRcgRT_  0.005 -0.938 -0.006

> car::Anova(RTprime_RT_model_directed)

Analysis of Deviance Table (Type II Wald chisquare tests)

Response: zTargetRecogRT_trim
              Chisq Df Pr(>Chisq)
zPrimeRecogRT_trim    69.1098  1    <2e-16 ***
newdirected           1.0949  1     0.2954
zPrimeRecogRT_trim:newdirected 0.4069  1     0.5236
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

> options(contrasts = c("contr.sum","contr.poly"))

```

```
> anova(RTprime_RT_model)
```

```
Type III Analysis of Variance Table with Satterthwaite's method
              Sum Sq Mean Sq NumDF  DenDF  F value Pr(>F)
zPrimeRecogRT_trim      56.480   56.480     1 3256.1  69.7916 <2e-16 ***
pathlength              4.255    1.418     3 3227.5   1.7528  0.1541
zPrimeRecogRT_trim:pathlength  1.674    0.558     3 3257.1   0.6893  0.5585
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```