

selective_play

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```
#Import packages
```

```
#Import packages  
setwd("~/Desktop/political play in WoT/")  
library(brms)
```

```
## Loading required package: Rcpp
```

```
## Loading 'brms' package (version 2.16.1). Useful instructions  
## can be found by typing help('brms'). A more detailed introduction  
## to the package is available through vignette('brms_overview').
```

```
##  
## Attaching package: 'brms'
```

```
## The following object is masked from 'package:stats':  
##  
## ar
```

```
library(broom.mixed)  
library(car)
```

```
## Loading required package: carData
```

```
library(corrplot)
```

```
## corrplot 0.90 loaded
```

```
library(dplyr)
```

```
##  
## Attaching package: 'dplyr'
```

```
## The following object is masked from 'package:car':  
##  
## recode
```

```
## The following objects are masked from 'package:stats':  
##  
##   filter, lag
```

```
## The following objects are masked from 'package:base':  
##  
##   intersect, setdiff, setequal, union
```

```
library(emmeans)  
library(ggplot2)  
library(glmmTMB)
```

```
## Warning in checkDepPackageVersion(dep_pkg = "TMB"): Package version inconsistency detected.  
## glmmTMB was built with TMB version 1.7.21  
## Current TMB version is 1.7.22  
## Please re-install glmmTMB from source or restore original 'TMB' package (see '?reinstalling' for more)
```

```
library(interactions)  
library(lme4)
```

```
## Loading required package: Matrix
```

```
##  
## Attaching package: 'lme4'
```

```
## The following object is masked from 'package:brms':  
##  
##   ngrps
```

```
library(lmerTest)
```

```
##  
## Attaching package: 'lmerTest'
```

```
## The following object is masked from 'package:lme4':  
##  
##   lmer
```

```
## The following object is masked from 'package:stats':  
##  
##   step
```

```
library(modelsummary)  
library(MuMIn)
```

```
##  
## Attaching package: 'MuMIn'
```

```
## The following object is masked from 'package:brms':  
##  
##   loo
```

```
library(optimx)
library(plyr)
```

```
## -----

## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)

## -----

##
## Attaching package: 'plyr'

## The following objects are masked from 'package:dplyr':
##
##   arrange, count, desc, failwith, id, mutate, rename, summarise,
##   summarize
```

```
library(psych)
```

```
##
## Attaching package: 'psych'

## The following object is masked from 'package:modelsummary':
##
##   SD

## The following objects are masked from 'package:ggplot2':
##
##   %+%, alpha

## The following object is masked from 'package:car':
##
##   logit

## The following object is masked from 'package:brms':
##
##   cs
```

```
library(r2mlm)
```

```
## Loading required package: nlme

##
## Attaching package: 'nlme'

## The following object is masked from 'package:optimx':
##
##   coef<-
```

```
## The following object is masked from 'package:lme4':
##
##   lmList
```

```
## The following object is masked from 'package:dplyr':
##
##   collapse
```

```
## Registered S3 methods overwritten by 'parameters':
##   method                                from
##   as.double.parameters_kurtosis         datawizard
##   as.double.parameters_skewness         datawizard
##   as.double.parameters_smoothness       datawizard
##   as.numeric.parameters_kurtosis        datawizard
##   as.numeric.parameters_skewness        datawizard
##   as.numeric.parameters_smoothness      datawizard
##   print.parameters_distribution          datawizard
##   print.parameters_kurtosis              datawizard
##   print.parameters_skewness              datawizard
##   summary.parameters_kurtosis            datawizard
##   summary.parameters_skewness            datawizard
```

```
library(readr)
library(reshape2)
library(sjPlot)
```

```
## Learn more about sjPlot with 'browseVignettes("sjPlot")'.
```

```
library(splines)
library(stringi)
library(tidyr)
```

```
##
## Attaching package: 'tidyr'
```

```
## The following object is masked from 'package:reshape2':
##
##   smiths
```

```
## The following objects are masked from 'package:Matrix':
##
##   expand, pack, unpack
```

```
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.1 --
```

```
## v tibble 3.1.4      v stringr 1.4.0
## v purrr  0.3.4      v forcats 0.5.1
```

```
## -- Conflicts ----- tidyverse_conflicts() --
## x psych::%+%( )      masks ggplot2::%+%( )
## x psych::alpha( )    masks ggplot2::alpha( )
## x plyr::arrange( )   masks dplyr::arrange( )
## x nlme::collapse( )  masks dplyr::collapse( )
## x purrr::compact( )  masks plyr::compact( )
## x plyr::count( )     masks dplyr::count( )
## x tidyr::expand( )   masks Matrix::expand( )
## x plyr::failwith( )  masks dplyr::failwith( )
## x dplyr::filter( )   masks stats::filter( )
## x plyr::id( )        masks dplyr::id( )
## x dplyr::lag( )       masks stats::lag( )
## x plyr::mutate( )     masks dplyr::mutate( )
## x tidyr::pack( )      masks Matrix::pack( )
## x dplyr::recode( )    masks car::recode( )
## x plyr::rename( )     masks dplyr::rename( )
## x purrr::some( )      masks car::some( )
## x plyr::summarise( )  masks dplyr::summarise( )
## x plyr::summarize( )  masks dplyr::summarize( )
## x tidyr::unpack( )   masks Matrix::unpack( )
```

```
theme_set(theme_bw())
```

```
#increase the max print, and turn off scientific notation
options(scipen=999)
options(max.print=99999999)
```

```
data <- read.csv("data_ica.csv")
data_long <- read.csv("data_long.csv")
```

```
m01 <- lmer(us_pct ~ military_y + liberal + conser + (1 | id), data = data_long)
```

```
m01.1 <- lmer(us_pct ~ age.z + inc.z + edu.z
              + rating_t1.z + unlock.z + battle.z + week
              + military_y + liberal + conser
              + (1 | id), data = data_long)
```

```
m02 <- lmer(cn_pct ~ military_y + liberal + conser + (1 | id), data = data_long)
```

```
m02.1 <- lmer(cn_pct ~ age.z + inc.z + edu.z
              + rating_t1.z + unlock.z + battle.z + week
              + military_y + liberal + conser
              + (1 | id), data = data_long)
```

```
m03 <- lmer(ussr_pct ~ military_y + liberal + conser + (1 | id), data = data_long)
```

```
m03.1 <- lmer(ussr_pct ~ age.z + inc.z + edu.z
              + rating_t1.z + unlock.z + battle.z + week
              + military_y + liberal + conser
              + (1 | id), data = data_long)
```

```
msummary(list(
  "U.S. vehicles (Baseline Model 1)" = m01,
  "U.S.S.R. vehicles (Baseline Model 2)" = m03,
```

Table 1: Multilevel Models Predicting Vehicle Selection

	U.S. vehicles (Baseline Model 1)	U.S.S.R. vehicles (Baseline Model 2)	Chinese vehicles (Baseline Model 3)
(Intercept)	0.254*** (0.009)	0.186*** (0.006)	0.030*** (0.002)
military_y	0.043*** (0.010)	-0.020** (0.007)	-0.006* (0.002)
liberal	-0.037** (0.014)	0.000 (0.010)	0.008* (0.003)
conser	-0.006 (0.011)	0.012 (0.008)	0.000 (0.003)
sd__(Intercept)	0.211	0.141	0.048
sd__Observation	0.158	0.143	0.065
age.z			
inc.z			
edu.z			
rating_t1.z			
unlock.z			
battle.z			
week			
AIC	-15 782.8	-22 376.4	-64 479.0
BIC	-15 733.7	-22 327.3	-64 429.9
Log.Lik.	7897.390	11 194.178	32 245.478
REMLcrit	-15 794.781	-22 388.357	-64 490.955

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

```

"Chinese vehicles (Baseline Model 3)" = m02,
"U.S. vehicles (Full Model 4)" = m01.1,
"U.S.S.R. vehicles (Full Model 5)" = m03.1,
"Chinese vehicles (Full Model 6)" = m02.1),
title = 'Multilevel Models Predicting Vehicle Selection',
stars = TRUE,
statistic = c('std.error')
)

```

Warning: In version 0.8.0 of the 'modelssummary' package, the default significance markers produced by
This warning is displayed once per session.

```

data_long$login_hr <- data_long$login_wk/60
data_long$login_hr.log <- log(data_long$login_hr+1) #Login time is very skewed

m_cs1 <- glmmTMB(login_hr.log ~ 0 + factor(week) + (1 | id), #compound symmetry model
  data = data_long)

```

```

m_gca1 <- glmmTMB(login_hr.log ~ week + (week | id), #general
                  data = data_long)

m_pw1 <- glmmTMB(login_hr.log ~ phase1 + phase2 + phase3 + (phase1 + phase2 + phase3 | id),
                  data = data_long)

anova(m_gca1, m_pw1)

```

```

## Data: data_long
## Models:
## m_gca1: login_hr.log ~ week + (week | id), zi=~0, disp=~1
## m_pw1: login_hr.log ~ phase1 + phase2 + phase3 + (phase1 + phase2 + , zi=~0, disp=~1
## m_pw1: phase3 | id), zi=~0, disp=~1
##      Df      AIC      BIC logLik deviance Chisq Chi Df      Pr(>Chisq)
## m_gca1  6 104616 104667 -52302   104604
## m_pw1  15  99708  99836 -49839   99678  4926      9 < 0.00000000000000022 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

msummary(list(
  "Growth Curve Model" = m_gca1,
  "Piecewise Growth Model" = m_pw1),
  title = 'Multilevel Growth Curve Models Predicting Gaming Behaviors',
  stars = TRUE,
  statistic = c('std.error')
)

```

#Model equations for models in RQ2

Level 1:

$$\text{Outcome}_{ti} = \beta_{0i} + \beta_{1i}\text{US_pmc}_{ti} + \beta_{2i}\text{USSR_pmc}_{ti} + \beta_{3i}\text{China_pmc}_{ti} + e_{ti}$$

Level 2:

$$\begin{aligned} \beta_{0i} = & \gamma_{00} + \gamma_{01}\text{US_pm}_i + \gamma_{02}\text{USSR_pm}_i + \gamma_{03}\text{China_pm}_i + \gamma_{04}\text{Ideology}_i + \gamma_{05}\text{Military}_i + \\ & \gamma_{06}\text{Phase1}_i + \gamma_{07}\text{Phase2}_i + \gamma_{08}\text{Phase3}_i + \\ & \gamma_{09}\text{Rating}_i + \gamma_{10}\text{Unlocked}_i + \gamma_{11}\text{Battle}_i + \\ & \gamma_{12}\text{Age}_i + \gamma_{13}\text{Edu}_i + \gamma_{14}\text{Income}_i + u_{0i} \end{aligned}$$

```

m06.d <- glmmTMB(login_hr.log ~ age.z + edu.z + inc.z
                  + rating_t1.z + unlock.z + battle.z
                  + phase1 + phase2 + phase3
                  + us_cmc + cn_cmc + ussr_cmc
                  + us_cm + cn_cm + ussr_cm
                  + liberal + conser + military_y
                  + (us_cmc + cn_cmc + ussr_cmc | id),
                  data = data_long, REML = TRUE)

data_long$battle_wk.log <- log(data_long$battle_wk+1) #battle_wk is very skewed

m07.d <- glmmTMB(battle_wk.log ~ age.z + edu.z + inc.z
                  + rating_t1.z + unlock.z + battle.z

```

Table 2: Multilevel Growth Curve Models Predicting Gaming Behaviors

	Growth Curve Model	Piecewise Growth Model
(Intercept)	1.795*** (0.031)	1.656*** (0.031)
week	0.037*** (0.002)	
sd__(Intercept)	1.458	1.435
sd__week	0.098	
cor__(Intercept).week	−0.623	
sd__Observation	0.824	0.709
phase1		0.071*** (0.004)
phase2		0.066*** (0.005)
phase3		−0.094*** (0.007)
sd__phase1		0.168
sd__phase2		0.209
sd__phase3		0.270
cor__(Intercept).phase1		−0.417
cor__(Intercept).phase2		−0.341
cor__(Intercept).phase3		−0.014
cor__phase1.phase2		−0.095
cor__phase1.phase3		−0.298
cor__phase2.phase3		−0.205
AIC	104 615.9	99 707.9
BIC	104 667.1	99 835.9
Log.Lik.	−52 301.951	−49 838.948

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001


```

+ phase1 + phase2 + phase3
+ us_cmc + cn_cmc + ussr_cmc
+ us_cm + cn_cm + ussr_cm
+ liberal + conser + military_y
+ (us_cmc + cn_cmc + ussr_cmc | id),
data = data_long, REML = TRUE)

m08.d <- glmmTMB(win_pct ~ age.z + edu.z + inc.z
+ rating_t1.z + unlock.z + battle.z
+ phase1 + phase2 + phase3
+ us_cmc + cn_cmc + ussr_cmc
+ us_cm + cn_cm + ussr_cm
+ liberal + conser + military_y
+ (us_cmc + cn_cmc + ussr_cmc | id),
data = data_long, REML = TRUE)

data_long$team_wk.log <- log(data_long$team_wk+1) #team_wk is very skewed

m09.d <- glmmTMB(team_wk.log ~ age.z + edu.z + inc.z
+ rating_t1.z + unlock.z + battle.z
+ phase1 + phase2 + phase3
+ us_cmc + cn_cmc + ussr_cmc
+ us_cm + cn_cm + ussr_cm
+ liberal + conser + military_y
+ (us_cmc + cn_cmc + ussr_cmc | id),
data = data_long, REML = TRUE)

msummary(list(
  "Gaming time (Model 7)" = m06.d,
  "Battle count (Model 8)" = m07.d,
  "Team battle (Model 9)" = m09.d,
  "Win rate (Model 10)" = m08.d,
  title = 'Multilevel Growth Curve Models Predicting Gaming Behaviors and Performance',
  stars = TRUE,
  statistic = c('std.error')
)

```

```

ran_int <- lmer(cn_pct ~ 1 + (1 | id), data = data_long)
variance_components <- as.data.frame(VarCorr(ran_int))
between_var <- variance_components$vcov[1]
within_var <- variance_components$vcov[2]
(icc <- between_var / (between_var + within_var))

```

```
## [1] 0.3505328
```

```
#For plot please refer to my prosepctus (or paper)
```

Table 3: Multilevel Growth Curve Models Predicting Gaming Behaviors and Performance

	Gaming time (Model 7)	Battle count (Model 8)	Team battle (Model 9)	Win rate (Model 10)
(Intercept)	2.342*** (0.066)	3.556*** (0.068)	0.038*** (0.006)	0.470*** (0.004)
age.z	0.001 (0.028)	-0.050+ (0.028)	-0.005* (0.002)	-0.006*** (0.002)
edu.z	-0.012 (0.024)	-0.007 (0.025)	0.000 (0.002)	0.002 (0.001)
inc.z	0.113*** (0.025)	0.053* (0.026)	-0.002 (0.002)	-0.001 (0.001)
rating_t1.z	-0.029 (0.026)	-0.025 (0.027)	0.002 (0.002)	0.027*** (0.002)
unlock.z	-0.044 (0.030)	-0.053+ (0.030)	0.006* (0.003)	-0.004* (0.002)
battle.z	0.365*** (0.031)	0.368*** (0.032)	0.011*** (0.003)	0.001 (0.002)
phase1	0.048*** (0.003)	0.055*** (0.003)	-0.003*** (0.000)	0.003*** (0.001)
phase2	0.024*** (0.004)	0.019*** (0.004)	0.001 (0.000)	0.002** (0.001)
phase3	-0.089*** (0.005)	-0.091*** (0.005)	-0.004*** (0.001)	-0.001+ (0.001)
us_cmc	-0.081 (0.051)	-0.059 (0.058)	-0.008 (0.005)	0.003 (0.009)
cn_cmc	0.498*** (0.127)	0.913*** (0.152)	0.002 (0.011)	0.022 (0.017)
ussr_cmc	0.234*** (0.056)	0.415*** (0.066)	0.025*** (0.006)	0.001 (0.009)
us_cm	-0.202+ (0.108)	-0.236* (0.112)	-0.023* (0.010)	-0.001 (0.006)
cn_cm	0.151 (0.393)	0.083 (0.412)	-0.017 (0.034)	-0.038+ (0.023)
ussr_cm	0.434** (0.147)	0.423** (0.154)	0.058*** (0.013)	-0.020* (0.009)
liberal	-0.007 (0.063)	0.032 (0.064)	0.002 (0.006)	0.008* (0.004)
conser	-0.048 (0.050)	-0.049 (0.051)	0.003 (0.004)	0.002 (0.003)
military_y	-0.080+ (0.045)	-0.084+ (0.046)	-0.002 (0.004)	0.000 (0.003)
sd__(Intercept)	0.839	0.863	0.074	0.036
sd__us_cmc	1.212	1.530	0.106	0.223
sd__cn_cmc	1.670	2.206	0.122	0.212
sd__ussr_cmc	1.298	1.701	0.163	0.195
cor__(Intercept).us_cmc	-0.072	-0.061	-0.176	0.024
cor__(Intercept).cn_cmc	-0.036	-0.044	-0.027	-0.114
cor__(Intercept).ussr_cmc	-0.006	-0.077	0.199	-0.083
cor__us_cmc.cn_cmc	0.255	0.189	0.621	0.553
cor__us_cmc.ussr_cmc	0.257	0.337	0.304	0.377
cor__cn_cmc.ussr_cmc	0.409	0.427	0.411	0.594
sd__Observation	0.664	0.686	0.074	0.112
AIC	51 994.4	54 058.2	-46 060.4	-30 719.3
BIC	52 234.5	54 298.3	-45 820.3	-30 479.3
Log.Lik.	-25 967.200	-26 999.117	23 060.213	15 389.67

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001