Appendix S1: A full list of experimental items

1. A mouse climbs up a table.

2. A mouse climbs down a tale.

3. A caterpillar crawls up a plant.

4. A caterpillar crawls down a plant.

5. A cat climbs up a telephone pole.

6. A cat climbs down a telephone pole.

7. A bear climbs up a tree.

8. A bear climbs down a tree.

9. A squirrel runs up a tree.

10. A squirrel runs down a tree.

11. A monkey climbs up a tree.

12. A monkey climbs down a tree.

13. A baby crawls across a street.

14. A man runs across the road.

15. A boy slides across a river.

16. A boy swims across a river.

17. A girl skates across a lake.

18. A woman cycles across the train tracks.

Appendix S2: A list of all planned contrasts

Contrasts for Age	
Contrast 1	4yr vs. 6yr
Contrast 2	6yr vs. 8yr
Contrast 3	8yr vs. 10yr
Contrast 4	10yr vs. adults
Contrast 5	4yr vs. adults
Contrast 6	6yr vs. adults
Contrast 7	8yr vs. adults

Appendix S3: All model outputs

INFORMATION IN THE VERB

Information in the verb in Uyghur:

```
> GLModel.UG.VERB.0 = glmer(Occurrence ~ Group + Packaging +
+                             (1 |Participant) + (1 | Item),
+                     data=data_UG_verb_overall, family=poisson, control=glmerControl())
> GLModel.UG.VERB.1 = glmer(Occurrence ~ Group * Packaging +
+                             (1 | Participant) + (1 | Item),
+                     data=data_UG_verb_overall, family=poisson, control=glmerControl())
> anova(GLModel.UG.VERB.0,GLModel.UG.VERB.1)
Data: data_UG_verb_overall
Models:
GLModel.UG.VERB.0: Occurrence ~ Group + Packaging + (1 | Participant) + (1 | Item)
GLModel.UG.VERB.1: Occurrence ~ Group * Packaging + (1 | Participant) + (1 | Item)
                  Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.VERB.0  8 2381.7 2418.3 -1182.8   2365.7
GLModel.UG.VERB.1 12 2320.7 2375.6 -1148.3   2296.7 68.998      4  3.695e-14 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0e+00    0e+00
 Item        (Intercept) 1e-14    1e-07
Number of obs: 720, groups:  Participant, 120; Item, 3

Fixed effects:
                     Estimate Std. Error z value Pr(>|z|)
(Intercept)          -0.87547    0.18257  -4.795 1.62e-06 ***
Group4yr              0.72594    0.22240   3.264 0.001098 **
Group6yr              1.18377    0.20865   5.673 1.40e-08 ***
Group8yr              0.20972    0.24568   0.854 0.393309
GroupUAD             -0.03390    0.26041  -0.130 0.896420
PackagingPO           2.57515    0.18939  13.597  < 2e-16 ***
Group4yr:PackagingPO -0.83017    0.23413  -3.546 0.000391 ***
Group6yr:PackagingPO -1.37322    0.22168  -6.195 5.84e-10 ***
Group8yr:PackagingPO -0.21226    0.25582  -0.830 0.406682
GroupUAD:PackagingPO -0.03982    0.27034  -0.147 0.882910
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:
            (Intr) Grp4yr Grp6yr Grp8yr GrpUAD PckgPO G4:PPO G6:PPO G8:PPO
Group4yr    -0.821
Group6yr    -0.875  0.718
Group8yr    -0.743  0.610  0.650
GroupUAD    -0.701  0.576  0.613  0.521
PackagingPO -0.964  0.791  0.843  0.716  0.676
Grp4yr:PcPO  0.780 -0.950 -0.682 -0.579 -0.547 -0.809
```

```
Grp6yr:PcPO  0.824 -0.676 -0.941 -0.612 -0.577 -0.854  0.691
Grp8yr:PcPO  0.714 -0.586 -0.624 -0.960 -0.500 -0.740  0.599  0.633
GrpUAD:PcPO  0.675 -0.554 -0.591 -0.502 -0.963 -0.701  0.567  0.599  0.519
```

Manner in the verb:

```
GLModel.UG.MO.0 = glmer(Occurrence ~ 1 +
+                           +(1 | Item)  + (1 | Participant),
+                            data = data_UG.verb_overall_MO, family = poisson, control=
glmerControl())
> GLModel.UG.MO.1 = glmer(Occurrence ~ Group +
+                           +(1 | Item)  + (1 | Participant),
+                   data=data_UG.verb_overall_MO, family=poisson, control=glmerControl())
> anova(GLModel.UG.MO.0,GLModel.UG.MO.1)
Data: data_UG.verb_overall_MO
Models:
GLModel.UG.MO.0: Occurrence ~ 1 + +(1 | Item) + (1 | Participant)
GLModel.UG.MO.1: Occurrence ~ Group + +(1 | Item) + (1 | Participant)
               Df    AIC    BIC  logLik deviance Chisq Chi Df Pr(>Chisq)
GLModel.UG.MO.0  3 800.19 811.84 -397.09   794.19
GLModel.UG.MO.1  7 779.05 806.25 -382.52   765.05 29.14      4  7.323e-06 ***
```

```
Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.4282   0.6543
 Item        (Intercept) 1.0574   1.0283
Number of obs: 360, groups:  Participant, 120; Item, 3
```

```
Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -1.49888    0.64265  -2.332  0.01968 *
Group4yr     0.75786    0.29403   2.578  0.00995 **
Group6yr     1.26430    0.28470   4.441 8.96e-06 ***
Group8yr     0.23649    0.31035   0.762  0.44606
GroupUAD    -0.03199    0.32196  -0.099  0.92086
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
Correlation of Fixed Effects:
         (Intr) Grp4yr Grp6yr Grp8yr
Group4yr -0.278
Group6yr -0.292  0.621
Group8yr -0.260  0.565  0.585
GroupUAD -0.248  0.542  0.560  0.514
```

Planned contrast:

4yr vs UAD

```
> GLModel.UG.VERB.MO.4andUAD.0 = glmer(Occurrence ~ 1 +
+                                        (1 |Participant) + (1 | Item),
```

```
+                            data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.VERB.MO.4andUAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                            data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.VERB.MO.4andUAD.0,GLModel.UG.VERB.MO.4andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.VERB.MO.4andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.VERB.MO.4andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.VERB.MO.4andUAD.0  3 314.26 323.17 -154.13   308.26
GLModel.UG.VERB.MO.4andUAD.1  4 310.31 322.19 -151.16   302.31 5.9509      1    0.01471
*

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.5868   0.766
 Item        (Intercept) 1.3943   1.181
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -0.8787     0.7302  -1.203   0.2288
GroupUAD     -0.8143     0.3217  -2.531   0.0114 *
```

6yrs vs. UAD

```
> GLModel.UG.VERB.MO.6andUAD.0 = glmer(Occurrence ~ 1 +
+                                        (1 |Participant) + (1 | Item),
+                                                  data=merged_data_UG,  family=poisson,
control=glmerControl())
> GLModel.UG.VERB.MO.6andUAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                                  data=merged_data_UG,  family=poisson,
control=glmerControl())
> anova(GLModel.UG.VERB.MO.6andUAD.0,GLModel.UG.VERB.MO.6andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.VERB.MO.6andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.VERB.MO.6andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.VERB.MO.6andUAD.0  3 347.07 355.98 -170.53   341.07
GLModel.UG.VERB.MO.6andUAD.1  4 329.43 341.31 -160.72   321.43 19.631      1  9.392e-06
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.3228   0.5681
 Item        (Intercept) 1.8808   1.3714
Number of obs: 144, groups:  Participant, 48; Item, 3
```

```
Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -0.4501     0.8232  -0.547    0.585
GroupUAD     -1.2690     0.2704  -4.694 2.68e-06 ***
```

Information in the verb in Chinese:

```
> View(data_CH_verb_overall)
> GLModel.CH.VERB.0 = glmer(Occurrence ~ Group + Packaging +
+                             (1 | Item) + (1 |Participant),
+                     data=data_CH_verb_overall, family=poisson, control=glmerControl())
> GLModel.CH.VERB.1 = glmer(Occurrence ~ Group * Packaging +
+                             (1 | Item) + (1 | Participant),
+                     data=data_CH_verb_overall, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.0,GLModel.CH.VERB.1)
Data: data_CH_verb_overall
Models:
GLModel.CH.VERB.0: Occurrence ~ Group + Packaging + (1 | Item) + (1 | Participant)
GLModel.CH.VERB.1: Occurrence ~ Group * Packaging + (1 | Item) + (1 | Participant)
                  Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.0  9 3829.1 3873.1 -1905.6   3811.1
GLModel.CH.VERB.1 17 3539.0 3622.0 -1752.5   3505.0 306.11      8  < 2.2e-16 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0        0
 Item        (Intercept) 0        0
Number of obs: 972, groups:  Participant, 108; Item, 3

Fixed effects:
                     Estimate Std. Error z value Pr(>|z|)
(Intercept)          -0.49248    0.15076  -3.267  0.00109 **
Group4yr              1.15745    0.17283   6.697 2.13e-11 ***
Group6yr              1.05209    0.17512   6.008 1.88e-09 ***
Group8yr              0.08701    0.20872   0.417  0.67676
GroupCAD             -0.38299    0.29899  -1.281  0.20021
PackagingPM           1.94266    0.16120  12.051  < 2e-16 ***
PackagingPO           0.50627    0.19086   2.653  0.00799 **
Group4yr:PackagingPM -2.23991    0.20675 -10.834  < 2e-16 ***
Group6yr:PackagingPM -1.74199    0.20104  -8.665  < 2e-16 ***
Group8yr:PackagingPM -0.43396    0.22678  -1.914  0.05567 .
GroupCAD:PackagingPM  0.27655    0.31607   0.875  0.38160
Group4yr:PackagingPO -0.26053    0.22171  -1.175  0.23997
Group6yr:PackagingPO -0.34534    0.22610  -1.527  0.12667
Group8yr:PackagingPO  0.67239    0.25234   2.665  0.00771 **
GroupCAD:PackagingPO  0.49925    0.35705   1.398  0.16203
```

Path in the verb

path only:

```
> GLModel.CH.PO.0 = glmer(Occurrence ~ 1 +
+                           +(1 | Item)  + (1 | Participant),
+                            data = data_CH.verb_overall_PO, family = poisson, control=
glmerControl())
> GLModel.CH.PO.1 = glmer(Occurrence ~ Group +
+                           +(1 | Item)  + (1 | Participant),
+                   data=data_CH.verb_overall_PO, family=poisson, control=glmerControl())
> anova(GLModel.CH.PO.0,GLModel.CH.PO.1)
Data: data_CH.verb_overall_PO
Models:
GLModel.CH.PO.0: Occurrence ~ 1 + +(1 | Item) + (1 | Participant)
GLModel.CH.PO.1: Occurrence ~ Group + +(1 | Item) + (1 | Participant)
                Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.PO.0  3 1133.7 1145.0 -563.85   1127.7
GLModel.CH.PO.1  7 1105.8 1132.2 -545.89   1091.8 35.932      4  2.988e-07 ***
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1461   0.3822
 Item        (Intercept) 0.2277   0.4772
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -0.2084     0.3128  -0.666    0.505
Group4yr      0.9563     0.1799   5.314 1.07e-07 ***
Group6yr      0.7677     0.1831   4.193 2.75e-05 ***
Group8yr      0.8017     0.1817   4.412 1.03e-05 ***
GroupCAD      0.1712     0.2380   0.719    0.472
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:
         (Intr) Grp4yr Grp6yr Grp8yr
Group4yr -0.374
Group6yr -0.368  0.629
Group8yr -0.366  0.629  0.618
GroupCAD -0.281  0.481  0.473  0.474
```

4yrs vs. CAD

```
> GLModel.CH.VERB.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                                  data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.4andCAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                                  data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.4andCAD.0,GLModel.CH.VERB.4andCAD.1)
```

```
Data: merged_d
Models:
GLModel.CH.VERB.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                          Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.4andCAD.0  3 404.17 412.22 -199.09   398.17
GLModel.CH.VERB.4andCAD.1  4 388.74 399.47 -190.37   380.74 17.427      1  2.986e-05 ***
---
Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.01443  0.1201
 Item        (Intercept) 0.20636  0.4543
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.7999     0.2762   2.896  0.00378 **
GroupCAD     -0.7808     0.1773  -4.403 1.07e-05 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

6 yr vs CAD:

```
> GLModel.CH.VERB.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.6andCAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.6andCAD.0,GLModel.CH.VERB.6andCAD.1)
Data: merged_d
Models:
GLModel.CH.VERB.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                          Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.6andCAD.0  3 363.62 371.67 -178.81   357.62
GLModel.CH.VERB.6andCAD.1  4 353.95 364.68 -172.98   345.95 11.665      1  0.0006369 ***
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.0000   0.00
 Item        (Intercept) 0.3249   0.57
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.5770     0.3420   1.687 0.091600 .
GroupCAD     -0.5905     0.1759  -3.358 0.000786 ***
---
```

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

Correlation of Fixed Effects:
         (Intr)
GroupCAD -0.112
```

8yr vs. CAD

```
> GLModel.CH.VERB.8andCAD.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.8andCAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.8andCAD.0,GLModel.CH.VERB.8andCAD.1)
Data: merged_d
Models:
GLModel.CH.VERB.8andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.8andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                          Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.8andCAD.0  3 377.74 385.79 -185.87   371.74
GLModel.CH.VERB.8andCAD.1  4 371.82 382.55 -181.91   363.82 7.9213      1   0.004886 **
---
Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1227   0.3503
 Item        (Intercept) 0.4542   0.6739
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.5270     0.4080   1.292  0.19649
GroupCAD     -0.6324     0.2136  -2.961  0.00307 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Manner only:

```
> GLModel.CH.MO.0 = glmer(Occurrence ~ 1 +
+                           +(1 | Item)  + (1 | Participant),
+                            data = data_CH.verb_overall_MO, family = poisson, control=
glmerControl())
> GLModel.CH.MO.1 = glmer(Occurrence ~ Group +
+                           +(1 | Item)  + (1 | Participant),
+                  data=data_CH.verb_overall_MO, family=poisson, control=glmerControl())
> anova(GLModel.CH.MO.0,GLModel.CH.MO.1)
Data: data_CH.verb_overall_MO
Models:
GLModel.CH.MO.0: Occurrence ~ 1 + +(1 | Item) + (1 | Participant)
GLModel.CH.MO.1: Occurrence ~ Group + +(1 | Item) + (1 | Participant)
                Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
```

```
GLModel.CH.MO.0  3 836.77 848.11 -415.38   830.77
GLModel.CH.MO.1  7 790.38 816.84 -388.19   776.38 54.389      4  4.361e-11 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1921   0.4383
 Item        (Intercept) 1.0524   1.0259
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.99388    0.62103  -1.600    0.110
Group4yr     1.15783    0.21307   5.434 5.51e-08 ***
Group6yr     1.06292    0.21477   4.949 7.46e-07 ***
Group8yr     0.07825    0.24177   0.324    0.746
GroupCAD    -0.40099    0.33290  -1.205    0.228
```

4yr vs CAD

```
> GLModel.CH.VERB.MO.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.MO.4andCAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.MO.4andCAD.0,GLModel.CH.VERB.MO.4andCAD.1)
Data: merged_d
Models:
GLModel.CH.VERB.MO.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.MO.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.MO.4andCAD.0  3 315.64 323.68 -154.82   309.64
GLModel.CH.VERB.MO.4andCAD.1  4 296.03 306.76 -144.01   288.03 21.609      1  3.343e-06
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.2712   0.5208
 Item        (Intercept) 1.0280   1.0139
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.1735     0.6097   0.285    0.776
GroupCAD     -1.5827     0.3302  -4.793 1.64e-06 ***
```

6yr vs. CAD

```
> GLModel.CH.VERB.MO.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
```

```
> GLModel.CH.VERB.MO.6andCAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.MO.6andCAD.0,GLModel.CH.VERB.MO.6andCAD.1)
Data: merged_d
Models:
GLModel.CH.VERB.MO.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.MO.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.MO.6andCAD.0  3 308.37 316.41 -151.18   302.37
GLModel.CH.VERB.MO.6andCAD.1  4 288.33 299.06 -140.17   280.33 22.035      1  2.677e-06
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1635   0.4044
 Item        (Intercept) 0.8829   0.9396
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.1167     0.5643   0.207    0.836
GroupCAD     -1.4571     0.3061  -4.760 1.94e-06 ***

Path+manner:

> GLModel.CH.PM.0 = glmer(Occurrence ~ 1 +
+                            +(1 | Item)  + (1 | Participant),
+                             data = data_CH.verb_overall_PM, family = poisson, control=
glmerControl())
> GLModel.CH.PM.1 = glmer(Occurrence ~ Group +
+                            +(1 | Item)  + (1 | Participant),
+                   data=data_CH.verb_overall_PM, family=poisson, control=glmerControl())
> anova(GLModel.CH.PM.0,GLModel.CH.PM.1)
Data: data_CH.verb_overall_PM
Models:
GLModel.CH.PM.0: Occurrence ~ 1 + +(1 | Item) + (1 | Participant)
GLModel.CH.PM.1: Occurrence ~ Group + +(1 | Item) + (1 | Participant)
                Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.PM.0  3 1286.4 1297.8 -640.21   1280.4
GLModel.CH.PM.1  7 1225.6 1252.1 -605.80   1211.6 68.828      4  4.012e-14 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.04319  0.2078
 Item        (Intercept) 0.10211  0.3196
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
```

```
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.3815     0.1981   6.972 3.12e-12 ***
Group4yr     -1.0878     0.1279  -8.503  < 2e-16 ***
Group6yr     -0.6929     0.1152  -6.016 1.79e-09 ***
Group8yr     -0.3517     0.1069  -3.290    0.001 **
GroupCAD     -0.1054     0.1258  -0.838    0.402
---
```

4yr vs CAD

```
> GLModel.CH.VERB.PM.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                        (1 |Participant) + (1 | Item),
+                                    data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.PM.4andCAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                    data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.PM.4andCAD.0,GLModel.CH.VERB.PM.4andCAD.1)
Data: merged_d
Models:
GLModel.CH.VERB.PM.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.PM.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.PM.4andCAD.0  3 403.57 411.62 -198.79   397.57
GLModel.CH.VERB.PM.4andCAD.1  4 380.61 391.33 -186.30   372.61 24.968      1  5.828e-07
***
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.06414  0.2533
 Item        (Intercept) 0.07317  0.2705
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.2951     0.1953   1.511    0.131
GroupCAD      0.9887     0.1584   6.243 4.28e-10 ***
```

6yr vs CAD

```
> GLModel.CH.VERB.PM.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                        (1 |Participant) + (1 | Item),
+                                    data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.PM.6andCAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                    data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.PM.6andCAD.0,GLModel.CH.VERB.PM.6andCAD.1)
Data: merged_d
Models:
GLModel.CH.VERB.PM.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
```

```
GLModel.CH.VERB.PM.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                             Df   AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.PM.6andCAD.0  3 423.3 431.35 -208.65    417.3
GLModel.CH.VERB.PM.6andCAD.1  4 408.2 418.93 -200.10    400.2 17.102       1  3.542e-05
***
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.005521 0.0743
 Item        (Intercept) 0.166076 0.4075
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.6755     0.2508   2.693  0.00708 **
GroupCAD      0.5836     0.1198   4.873  1.1e-06 ***


4yr vs. 6yr

> GLModel.CH.VERB.PM.4and6.0 = glmer(Occurrence ~ 1 +
+                                  (1 |Participant) + (1 | Item),
+                                data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.PM.4and6.1 = glmer(Occurrence ~ Group +
+                                  (1 | Participant) + (1 | Item),
+                                data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.PM.4and6.0,GLModel.CH.VERB.PM.4and6.1)
Data: merged_d
Models:
GLModel.CH.VERB.PM.4and6.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.PM.4and6.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.PM.4and6.0  3 503.97 512.88 -248.98   497.97
GLModel.CH.VERB.PM.4and6.1  4 500.22 512.09 -246.11   492.22 5.7535      1    0.01646 *

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1316   0.3627
 Item        (Intercept) 0.1387   0.3724
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.2261     0.2511   0.900   0.3679
Group6yr      0.4071     0.1648   2.471   0.0135 *
---

6yr vs. 8yr

> GLModel.CH.VERB.PM.6and8.0 = glmer(Occurrence ~ 1 +
```

```
+                                   (1 |Participant) + (1 | Item),
+                                 data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.PM.6and8.1 = glmer(Occurrence ~ Group +
+                                   (1 | Participant) + (1 | Item),
+                                 data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.PM.6and8.0,GLModel.CH.VERB.PM.6and8.1)
Data: merged_d
Models:
GLModel.CH.VERB.PM.6and8.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.PM.6and8.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.PM.6and8.0  3 564.68 573.59 -279.34   558.68
GLModel.CH.VERB.PM.6and8.1  4 560.79 572.67 -276.40   552.79 5.8846      1    0.01527 *
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.08382  0.2895
 Item        (Intercept) 0.14548  0.3814
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.6486     0.2432   2.667  0.00766 **
Group8yr      0.3403     0.1343   2.535  0.01126 *
```

8yr vs. 10yr

```
> GLModel.CH.VERB.PM.6and8.0 = glmer(Occurrence ~ 1 +
+                                   (1 |Participant) + (1 | Item),
+                                 data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.PM.6and8.1 = glmer(Occurrence ~ Group +
+                                   (1 | Participant) + (1 | Item),
+                                 data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.PM.6and8.0,GLModel.CH.VERB.PM.6and8.1)
Data: merged_d
Models:
GLModel.CH.VERB.PM.6and8.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.PM.6and8.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.PM.6and8.0  3 564.68 573.59 -279.34   558.68
GLModel.CH.VERB.PM.6and8.1  4 560.79 572.67 -276.40   552.79 5.8846      1    0.01527 *
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.08382  0.2895
 Item        (Intercept) 0.14548  0.3814
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
```

```
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.6486     0.2432   2.667  0.00766 **
Group8yr      0.3403     0.1343   2.535  0.01126 *
```

8yr vs 10yr

```
> GLModel.CH.VERB.PM.8and10.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> GLModel.CH.VERB.PM.8and10.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                                   data=merged_d, family=poisson, control=glmerControl())
> anova(GLModel.CH.VERB.PM.8and10.0,GLModel.CH.VERB.PM.8and10.1)
Data: merged_d
Models:
GLModel.CH.VERB.PM.8and10.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.VERB.PM.8and10.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                            Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.VERB.PM.8and10.0  3 599.80 608.70 -296.90   593.80
GLModel.CH.VERB.PM.8and10.1  4 591.71 603.59 -291.85   583.71 10.087      1   0.001493
**
---

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.03795  0.1948
 Item        (Intercept) 0.08697  0.2949
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.3924     0.1846   7.541 4.67e-14 ***
Group8yr     -0.3509     0.1048  -3.347 0.000818 ***
```

INFORMATION IN THE OTH LOCUS

Uyghur:

```
> GLModel.UG.other.0 = glmer(Occurrence ~ Group + Packaging +
+                                (1 | Participant),
+                                     data=data_UG_other_overall,  family=poisson,
control=glmerControl())
> GLModel.UG.other.1 = glmer(Occurrence ~ Group * Packaging +
+                                (1 | Participant),
+                                     data=data_UG_other_overall,  family=poisson,
control=glmerControl())
> anova(GLModel.UG.other.0,GLModel.UG.other.1)
Data: data_UG_other_overall
```

```
Models:
GLModel.UG.other.0: Occurrence ~ Group + Packaging + (1 | Participant)
GLModel.UG.other.1: Occurrence ~ Group * Packaging + (1 | Participant)
                   Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.other.0  9 4568.6 4616.0 -2275.3   4550.6
GLModel.UG.other.1 21 4393.7 4504.4 -2175.8   4351.7 198.91     12  < 2.2e-16
***
---

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 6.949e-16 2.636e-08
Number of obs: 1440, groups:  Participant, 120

Fixed effects:
                      Estimate Std. Error z value Pr(>|z|)
(Intercept)          -1.232144   0.218204  -5.647 1.64e-08 ***
Group4yr              0.251314   0.290935   0.864  0.38769
Group6yr             -0.048790   0.312440  -0.156  0.87591
Group8yr             -0.741937   0.384150  -1.931  0.05344 .
GroupUAD              0.619039   0.270662   2.287  0.02219 *
PackagingPM           1.952690   0.233173   8.374  < 2e-16 ***
PackagingPO           2.207751   0.229888   9.604  < 2e-16 ***
PackagingZO           1.114361   0.251466   4.431 9.36e-06 ***
Group4yr:PackagingPM -0.891818   0.322833  -2.762  0.00574 **
Group6yr:PackagingPM -0.363455   0.338494  -1.074  0.28294
Group8yr:PackagingPM  0.480924   0.403853   1.191  0.23372
GroupUAD:PackagingPM -0.278713   0.291242  -0.957  0.33858
Group4yr:PackagingPO -0.069866   0.306994  -0.228  0.81997
Group6yr:PackagingPO  0.217052   0.327535   0.663  0.50753
Group8yr:PackagingPO  1.015117   0.395968   2.564  0.01036 *
GroupUAD:PackagingPO -1.360453   0.299136  -4.548 5.42e-06 ***
Group4yr:PackagingZO  0.008643   0.335128   0.026  0.97942
Group6yr:PackagingZO  0.271934   0.354601   0.767  0.44316
Group8yr:PackagingZO  0.590387   0.425877   1.386  0.16566
GroupUAD:PackagingZO -0.734871   0.326229  -2.253  0.02428 *
---
```

Path only:

```
> GLModel.UG.other.PO.0 = glmer(Occurrence ~ 1 +
+                           (1 | Item)  + (1 | Participant),
+                          data = data_UG.other_overall_PO, family = poisson,
control= glmerControl())
> GLModel.UG.other.PO.1 = glmer(Occurrence ~ Group +
+                           (1 | Item)  + (1 | Participant),
```

```
+                               data=data_UG.other_overall_PO, family=poisson,
control=glmerControl())
> anova(GLModel.UG.other.PO.0,GLModel.UG.other.PO.1)
Data: data_UG.other_overall_PO
Models:
GLModel.UG.other.PO.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.UG.other.PO.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                      Df    AIC  BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.other.PO.0  3 1332.4 1344 -663.19   1326.4
GLModel.UG.other.PO.1  7 1262.8 1290 -624.42   1248.8 77.534      4  5.798e-16
***

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 3.222e-09 5.677e-05
 Item        (Intercept) 2.821e-01 5.311e-01
Number of obs: 360, groups:  Participant, 120; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  0.84844    0.31556   2.689  0.00717 **
Group4yr     0.18145    0.09792   1.853  0.06388 .
Group6yr     0.16827    0.09821   1.713  0.08666 .
Group8yr     0.27318    0.09595   2.847  0.00441 **
GroupUAD    -0.74142    0.12728  -5.825 5.71e-09 ***

4yr vs UAD:

> GLModel.UG.OTHER.4andUAD.0 = glmer(Occurrence ~ 1 +
+                                       (1 |Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.4andUAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> anova(GLModel.UG.OTHER.4andUAD.0,GLModel.UG.OTHER.4andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.4andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.4andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                           Df     AIC     BIC   logLik deviance   Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.4andUAD.0  3 520.17 529.08 -257.08   514.17
GLModel.UG.OTHER.4andUAD.1   4 477.46 489.34 -234.73    469.46 44.709        1
2.286e-11 ***
```

```
Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.0000   0.0000
 Item        (Intercept) 0.2802   0.5293
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.0306     0.3142   3.280  0.00104 **
GroupUAD     -0.9229     0.1237  -7.463 8.43e-14 ***
---
```

6yr vs UAD

```
> GLModel.UG.OTHER.6andUAD.0 = glmer(Occurrence ~ 1 +
+                                      (1 |Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.6andUAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> anova(GLModel.UG.OTHER.6andUAD.0,GLModel.UG.OTHER.6andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.6andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.6andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                           Df     AIC     BIC   logLik deviance   Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.6andUAD.0  3 521.46 530.37 -257.73   515.46
GLModel.UG.OTHER.6andUAD.1   4  487.64  499.52  -239.82    479.64  35.812        1
2.174e-09 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.01925  0.1388
 Item        (Intercept) 0.30831  0.5553
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.9948     0.3306   3.009  0.00262 **
GroupUAD     -0.9103     0.1298  -7.012 2.34e-12 ***
```

8yr vs UAD

```
> GLModel.UG.OTHER.8andUAD.0 = glmer(Occurrence ~ 1 +
+                                      (1 |Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.8andUAD.1 = glmer(Occurrence ~ Group +
+                                      (1 | Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
Warning message:
In checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv,  :
  Model failed to converge with max|grad| = 0.00132764 (tol = 0.001, component
1)
> anova(GLModel.UG.OTHER.8andUAD.0,GLModel.UG.OTHER.8andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.8andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.8andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                           Df     AIC     BIC   logLik deviance   Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.8andUAD.0  3 534.55 543.46 -264.28   528.55
GLModel.UG.OTHER.8andUAD.1   4  489.45  501.33 -240.72    481.45  47.104        1
6.733e-12 ***

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 9.153e-08 0.0003025
 Item        (Intercept) 2.542e-01 0.5041814
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.1344     0.2992   3.791  0.00015 ***
GroupUAD     -1.0146     0.1221  -8.308  < 2e-16 ***

10yr vs UAD:

> GLModel.UG.OTHER.10andUAD.0 = glmer(Occurrence ~ 1 +
+                                      (1 |Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.10andUAD.1 = glmer(Occurrence ~ Group +
+                                      (1 | Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
```

```
> anova(GLModel.UG.OTHER.10andUAD.0,GLModel.UG.OTHER.10andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.10andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.10andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                            Df     AIC     BIC  logLik deviance  Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.10andUAD.0  3 478.99 487.90 -236.49   472.99
GLModel.UG.OTHER.10andUAD.1  4 458.95 470.83 -225.48    450.95 22.036       1
2.676e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> summary(GLModel.UG.OTHER.10andUAD.1)
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation)
['glmerMod']
 Family: poisson  ( log )
Formula: Occurrence ~ Group + (1 | Participant) + (1 | Item)
   Data: merged_data_UG
Control: glmerControl()

     AIC      BIC   logLik deviance df.resid
   459.0    470.8   -225.5    451.0      140

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.8610 -0.6945 -0.1475  0.4056  3.7566

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.05028  0.2242
 Item        (Intercept) 0.53656  0.7325
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.7246     0.4345   1.668   0.0954 .
GroupUAD     -0.7434     0.1420  -5.235 1.65e-07 ***
```

Path+Manner

Path+manner:

```
> GLModel.UG.other.PM.0 = glmer(Occurrence ~ 1 +
+                                 (1 | Item)  + (1 | Participant),
```

```
+                          data = data_UG.other_overall_PM, family = poisson,
control= glmerControl())
> GLModel.UG.other.PM.1 = glmer(Occurrence ~ Group +
+                                 (1 | Item)  + (1 | Participant),
+                               data=data_UG.other_overall_PM, family=poisson,
control=glmerControl())
> anova(GLModel.UG.other.PM.0,GLModel.UG.other.PM.1)
Data: data_UG.other_overall_PM
Models:
GLModel.UG.other.PM.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.UG.other.PM.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                      Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.other.PM.0  3 1154.2 1165.9 -574.12   1148.2
GLModel.UG.other.PM.1  7 1115.3 1142.5 -550.67   1101.3 46.901      4  1.599e-
09 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.06541  0.2558
 Item        (Intercept) 0.45027  0.6710
Number of obs: 360, groups:  Participant, 120; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.4598     0.4008   1.147  0.25124
Group4yr     -0.6378     0.1572  -4.057 4.97e-05 ***
Group6yr     -0.4138     0.1490  -2.778  0.00547 **
Group8yr     -0.2597     0.1441  -1.802  0.07154 .
GroupUAD      0.3516     0.1302   2.702  0.00690 **


4yr vs UAD:

> GLModel.UG.OTHER.PM.4andUAD.0 = glmer(Occurrence ~ 1 +
+                                         (1 |Participant) + (1 | Item),
+                                       data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.PM.4andUAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                       data=merged_data_UG, family=poisson,
control=glmerControl())
> anova(GLModel.UG.OTHER.PM.4andUAD.0,GLModel.UG.OTHER.PM.4andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.PM.4andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
```

```
GLModel.UG.OTHER.PM.4andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 |
Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.PM.4andUAD.0  3 489.03 497.94 -241.51   483.03
GLModel.UG.OTHER.PM.4andUAD.1  4 443.24 455.12 -217.62   435.24 47.786      1
4.754e-12 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.000    0.0000
 Item        (Intercept) 0.569    0.7543
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -0.1699     0.4526  -0.375    0.707
GroupUAD      0.9808     0.1324   7.406 1.31e-13 ***
```

6yr vs UAD:

```
> GLModel.UG.OTHER.PM.6andUAD.0 = glmer(Occurrence ~ 1 +
+                                       (1 |Participant) + (1 | Item),
+                                       data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.PM.6andUAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                       data=merged_data_UG, family=poisson,
control=glmerControl())
> anova(GLModel.UG.OTHER.PM.6andUAD.0,GLModel.UG.OTHER.PM.6andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.PM.6andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.PM.6andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 |
Item)
                             Df    AIC    BIC  logLik deviance  Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.PM.6andUAD.0  3 516.10 525.01 -255.05   510.10
GLModel.UG.OTHER.PM.6andUAD.1  4 488.63 500.51 -240.31   480.63 29.477      1
5.658e-08 ***

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 2.408e-10 1.552e-05
 Item        (Intercept) 3.164e-01 5.625e-01
```

```
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.1569     0.3417   0.459    0.646
GroupUAD      0.7526     0.1222   6.156 7.45e-10 ***
```

8yr vs UAD:

```
> GLModel.UG.OTHER.PM.8andUAD.0 = glmer(Occurrence ~ 1 +
+                                         (1 |Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.PM.8andUAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                         data=merged_data_UG, family=poisson,
control=glmerControl())
> anova(GLModel.UG.OTHER.PM.8andUAD.0,GLModel.UG.OTHER.PM.8andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.PM.8andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.PM.8andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 |
Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.PM.8andUAD.0  3 496.01 504.92 -245.00   490.01
GLModel.UG.OTHER.PM.8andUAD.1  4 473.97 485.85 -232.99   465.97 24.037      1
9.449e-07 ***

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 6.752e-10 2.598e-05
 Item        (Intercept) 6.082e-01 7.799e-01
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.1943     0.4624   0.420    0.674
GroupUAD      0.6013     0.1163   5.172 2.32e-07 ***
```

10yr vs UAD

```
> GLModel.UG.OTHER.PM.10andUAD.0 = glmer(Occurrence ~ 1 +
+                                         (1 |Participant) + (1 | Item),
```

```
+                                          data=merged_data_UG, family=poisson,
control=glmerControl())
> GLModel.UG.OTHER.PM.10andUAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                          data=merged_data_UG, family=poisson,
control=glmerControl())
> anova(GLModel.UG.OTHER.PM.10andUAD.0,GLModel.UG.OTHER.PM.10andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.OTHER.PM.10andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.OTHER.PM.10andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 |
Item)
                                Df    AIC    BIC  logLik deviance  Chisq Chi Df
Pr(>Chisq)
GLModel.UG.OTHER.PM.10andUAD.0  3 522.67 531.58 -258.33   516.67
GLModel.UG.OTHER.PM.10andUAD.1  4 515.88 527.76 -253.94   507.88 8.7889      1
0.003031 **

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.008613 0.0928
 Item        (Intercept) 0.384850 0.6204
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.5347     0.3700   1.445  0.14837
GroupUAD      0.3407     0.1105   3.084  0.00204 **
```

CHINESE

```
> GLModel.CH.other.0 = glmer(Occurrence ~ Group + Packaging +
+                                (1 | Participant)+ (1 | Item),
+                                    data=data_CH_other_overall, family=poisson,
control=glmerControl())
> GLModel.CH.other.1 = glmer(Occurrence ~ Group * Packaging +
+                                (1 | Participant)+ (1 | Item),
+                                    data=data_CH_other_overall, family=poisson,
control=glmerControl())
> anova(GLModel.CH.other.0,GLModel.CH.other.1)
Data: data_CH_other_overall
Models:
GLModel.CH.other.0: Occurrence ~ Group + Packaging + (1 | Participant) + (1 |
Item)
```

```
GLModel.CH.other.1: Occurrence ~ Group * Packaging + (1 | Participant) + (1 |
Item)
                   Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.other.0 10 2908.9 2960.6 -1444.5   2888.9
GLModel.CH.other.1 22 2833.4 2947.0 -1394.7   2789.4 99.566     12  6.771e-16
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0        0
 Item        (Intercept) 0        0
Number of obs: 1296, groups:  Participant, 108; Item, 3

Fixed effects:
                     Estimate Std. Error z value Pr(>|z|)
(Intercept)          -0.78016    0.17408  -4.482 7.41e-06 ***
Group4yr             -0.72392    0.30465  -2.376 0.017489 *
Group6yr             -1.19392    0.36100  -3.307 0.000942 ***
Group8yr             -0.06252    0.25012  -0.250 0.802616
GroupCAD              0.49248    0.25950   1.898 0.057721 .
PackagingPM          -0.93156    0.32747  -2.845 0.004445 **
PackagingPO           0.79395    0.20977   3.785 0.000154 ***
PackagingZO           2.23683    0.18314  12.214  < 2e-16 ***
Group4yr:PackagingPM -1.84103    1.08189  -1.702 0.088815 .
Group6yr:PackagingPM -0.27241    0.73528  -0.370 0.711015
Group8yr:PackagingPM -0.19984    0.48937  -0.408 0.683000
GroupCAD:PackagingPM -0.16705    0.50534  -0.331 0.740964
Group4yr:PackagingPO -0.16534    0.37395  -0.442 0.658378
Group6yr:PackagingPO  0.89245    0.40316   2.214 0.026855 *
Group8yr:PackagingPO  0.07613    0.29962   0.254 0.799436
GroupCAD:PackagingPO -0.59328    0.33368  -1.778 0.075402 .
Group4yr:PackagingZO  0.93075    0.31413   2.963 0.003047 **
Group6yr:PackagingZO  1.35223    0.36922   3.662 0.000250 ***
Group8yr:PackagingZO  0.06897    0.26270   0.263 0.792897
GroupCAD:PackagingZO -0.70436    0.28031  -2.513 0.011979 *
```

Manner only:

```
> GLModel.CH.other.MO.0 = glmer(Occurrence ~ 1 +
+                                 (1 | Item)  + (1 | Participant),
+                          data = data_CH.other_overall_MO, family = poisson,
control= glmerControl())
> GLModel.CH.other.MO.1 = glmer(Occurrence ~ Group +
+                                 (1 | Item)  + (1 | Participant),
```

```
+                                data=data_CH.other_overall_MO,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.other.MO.0,GLModel.CH.other.MO.1)
Data: data_CH.other_overall_MO
Models:
GLModel.CH.other.MO.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.CH.other.MO.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                      Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.other.MO.0  3 471.44 482.78 -232.72   465.44
GLModel.CH.other.MO.1  7 455.47 481.94 -220.74   441.47 23.968      4  8.107e-
05 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1417   0.3764
 Item        (Intercept) 0.6021   0.7760
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -1.13393    0.49483  -2.292  0.02193 *
Group4yr    -0.72405    0.31541  -2.296  0.02170 *
Group6yr    -1.19467    0.36690  -3.256  0.00113 **
Group8yr    -0.06394    0.26682  -0.240  0.81061
GroupCAD     0.49107    0.28634   1.715  0.08635 .


4yr vs CAD

GLModel.CH.OTHER.MO.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                      (1 |Participant) + (1 | Item),
+                                               data=merged_data_CH,  family=poisson,
control=glmerControl())
Warning message:
In checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv,  :
  Model failed to converge with max|grad| = 0.0361602 (tol = 0.001, component 1)
> GLModel.CH.OTHER.MO.4andCAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                               data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.MO.4andCAD.0,GLModel.CH.OTHER.MO.4andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.MO.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.MO.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.MO.4andCAD.0  3 170.50 178.55 -82.252   164.50
```

```
GLModel.CH.OTHER.MO.4andCAD.1  4 162.03 172.76 -77.018   154.03 10.469      1   0.001214
**

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1620   0.4025
 Item        (Intercept) 0.6089   0.7803
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -1.8764     0.5419  -3.463 0.000534 ***
GroupCAD      1.2170     0.3375   3.606 0.000311 ***
```

6yr vs CAD

```
> GLModel.CH.OTHER.MO.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                         (1 |Participant) + (1 | Item),
+                             data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.OTHER.MO.6andCAD.1 = glmer(Occurrence ~ Group +
+                                         (1 | Participant) + (1 | Item),
+                             data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.OTHER.MO.6andCAD.0,GLModel.CH.OTHER.MO.6andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.MO.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.MO.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.MO.6andCAD.0  3 159.10 167.15 -76.552   153.10
GLModel.CH.OTHER.MO.6andCAD.1  4 145.92 156.65 -68.961   137.92 15.182      1  9.763e-05
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1980   0.4449
 Item        (Intercept) 0.5592   0.7478
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   -2.324      0.564  -4.121 3.77e-05 ***
GroupCAD       1.690      0.391   4.322 1.55e-05 ***
```

Path+manner:

```
> GLModel.CH.other.PM.0 = glmer(Occurrence ~ 1 +
+                                  (1 | Item)  + (1 | Participant),
+                           data = data_CH.other_overall_PM, family = poisson,
control= glmerControl())
```

```
Warning message:
In checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv,  :
  Model failed to converge with max|grad| = 0.038009 (tol = 0.001, component 1)
> GLModel.CH.other.PM.1 = glmer(Occurrence ~ Group +
+                                 (1 | Item)  + (1 | Participant),
+                               data=data_CH.other_overall_PM,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.other.PM.0,GLModel.CH.other.PM.1)
Data: data_CH.other_overall_PM
Models:
GLModel.CH.other.PM.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.CH.other.PM.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                      Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.other.PM.0  3 201.41 212.75 -97.704   195.41
GLModel.CH.other.PM.1  7 189.61 216.07 -87.805   175.61 19.799      4   0.000547
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1012   0.318
 Item        (Intercept) 2.0471   1.431
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -2.6691     0.9291  -2.873  0.00407 **
Group4yr     -2.5666     1.0043  -2.556  0.01060 *
Group6yr     -1.4678     0.6243  -2.351  0.01872 *
Group8yr     -0.2632     0.4161  -0.633  0.52699
GroupCAD      0.3232     0.4337   0.745  0.45620

4yr vs CAD

> GLModel.CH.OTHER.PM.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                       (1 |Participant) + (1 | Item),
+                                               data=merged_data_CH,  family=poisson,
control=glmerControl())
> GLModel.CH.OTHER.PM.4andCAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                               data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.PM.4andCAD.0,GLModel.CH.OTHER.PM.4andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.PM.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.PM.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
```

```
GLModel.CH.OTHER.PM.4andCAD.0  3 63.836 71.882 -28.918   57.836
GLModel.CH.OTHER.PM.4andCAD.1  4 55.961 66.690 -23.981   47.961 9.8748      1   0.001676
**

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   -5.573      1.578  -3.533 0.000411 ***
GroupCAD       2.917      1.113   2.619 0.008807 **
```

6yr vs CAD

```
> GLModel.CH.OTHER.PM.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                         (1 |Participant) + (1 | Item),
+                                                  data=merged_data_CH,  family=poisson,
control=glmerControl())
> GLModel.CH.OTHER.PM.6andCAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                                  data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.PM.6andCAD.0,GLModel.CH.OTHER.PM.6andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.PM.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.PM.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.PM.6andCAD.0  3 71.520 79.567 -32.760   65.520
GLModel.CH.OTHER.PM.6andCAD.1  4 67.284 78.013 -29.642   59.284 6.2362      1    0.01252
*

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.5812   0.7624
 Item        (Intercept) 2.7236   1.6503
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -4.5561     1.3955  -3.265   0.0011 **
GroupCAD      1.8011     0.7362   2.446   0.0144 *
```

Zero:

```
> GLModel.CH.other.ZO.0 = glmer(Occurrence ~ 1 +
+                                    (1 | Item)  + (1 | Participant),
+                             data = data_CH.other_overall_ZO, family = poisson,
control= glmerControl())
> GLModel.CH.other.ZO.1 = glmer(Occurrence ~ Group +
+                                    (1 | Item)  + (1 | Participant),
+                                 data=data_CH.other_overall_ZO,  family=poisson,
control=glmerControl())
```

```
> anova(GLModel.CH.other.ZO.0,GLModel.CH.other.ZO.1)
Data: data_CH.other_overall_ZO
Models:
GLModel.CH.other.ZO.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.CH.other.ZO.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                      Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.other.ZO.0  3 1255.9 1267.2 -624.94   1249.9
GLModel.CH.other.ZO.1  7 1240.6 1267.0 -613.29   1226.6 23.298      4  0.0001104
***

Fixed effects:
             Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.448386   0.093555  15.482  < 2e-16 ***
Group4yr     0.206829   0.076571   2.701  0.00691 **
Group6yr     0.158306   0.077420   2.045  0.04088 *
Group8yr     0.006455   0.080290   0.080  0.93592
GroupCAD    -0.211879   0.105959  -2.000  0.04554 *
4yr vs CAD

> GLModel.CH.OTHER.ZO.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                         (1 |Participant) + (1 | Item),
+                                                 data=merged_data_CH,  family=poisson,
control=glmerControl())
> GLModel.CH.OTHER.ZO.4andCAD.1 = glmer(Occurrence ~ Group +
+                                         (1 | Participant) + (1 | Item),
+                                                 data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.ZO.4andCAD.0,GLModel.CH.OTHER.ZO.4andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.ZO.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.ZO.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.ZO.4andCAD.0  3 429.79 437.84 -211.90   423.79
GLModel.CH.OTHER.ZO.4andCAD.1  4 414.18 424.91 -203.09   406.18 17.611      1   2.71e-05
***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.000000 0.00000
 Item        (Intercept) 0.004861 0.06972
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.66107    0.06531  25.433  < 2e-16 ***
GroupCAD    -0.41871    0.10308  -4.062 4.86e-05 ***

6yr vs CAD
```

```
> GLModel.CH.OTHER.ZO.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                       (1 |Participant) + (1 | Item),
+                                                data=merged_data_CH,  family=poisson,
control=glmerControl())
> GLModel.CH.OTHER.ZO.6andCAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                                data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.ZO.6andCAD.0,GLModel.CH.OTHER.ZO.6andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.ZO.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.ZO.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.ZO.6andCAD.0  3 434.19 442.24 -214.10   428.19
GLModel.CH.OTHER.ZO.6andCAD.1  4 422.73 433.45 -207.36   414.73 13.469      1  0.0002425
***


Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.61085    0.07427   21.69  < 2e-16 ***
GroupCAD    -0.37019    0.10369   -3.57 0.000357 ***

8yr vs CAD

> GLModel.CH.OTHER.ZO.8andCAD.0 = glmer(Occurrence ~ 1 +
+                                       (1 |Participant) + (1 | Item),
+                                                data=merged_data_CH,  family=poisson,
control=glmerControl())
> GLModel.CH.OTHER.ZO.8andCAD.1 = glmer(Occurrence ~ Group +
+                                       (1 | Participant) + (1 | Item),
+                                                data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.ZO.8andCAD.0,GLModel.CH.OTHER.ZO.8andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.ZO.8andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.ZO.8andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                              Df    AIC    BIC  logLik deviance Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.ZO.8andCAD.0  3 422.14 430.18 -208.07   416.14
GLModel.CH.OTHER.ZO.8andCAD.1  4 419.76 430.49 -205.88   411.76 4.378      1    0.03641
*

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.0000   0.000
 Item        (Intercept) 0.0635   0.252
Number of obs: 108, groups:  Participant, 36; Item, 3
```

```
Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.4329     0.1566   9.148   <2e-16 ***
GroupCAD     -0.2183     0.1058  -2.064    0.039 *
```

10yr vs CAD

```
> GLModel.CH.OTHER.ZO.10andCAD.0 = glmer(Occurrence ~ 1 +
+                                        (1 |Participant) + (1 | Item),
+                                                  data=merged_data_CH,  family=poisson,
control=glmerControl())
> GLModel.CH.OTHER.ZO.10andCAD.1 = glmer(Occurrence ~ Group +
+                                        (1 | Participant) + (1 | Item),
+                                                  data=merged_data_CH,  family=poisson,
control=glmerControl())
> anova(GLModel.CH.OTHER.ZO.10andCAD.0,GLModel.CH.OTHER.ZO.10andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.OTHER.ZO.10andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.OTHER.ZO.10andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                               Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.OTHER.ZO.10andCAD.0  3 419.26 427.31 -206.63   413.26
GLModel.CH.OTHER.ZO.10andCAD.1  4 417.15 427.88 -204.57   409.15 4.1112      1     0.0426
*

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.00000  0.0000
 Item        (Intercept) 0.04023  0.2006
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.4371     0.1294  11.107   <2e-16 ***
GroupCAD     -0.2119     0.1059  -2.001   0.0454 *
```

UTTERANCE DENSITY

Uyghur:

UYGHUR

```
> GLModel.UG.UD.0 = glmer(Occurrence ~ Group + Density +
+                           (1 | Participant) + (1 | Item),
+                         data=data_Density_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD.1 = glmer(Occurrence ~ Group * Density +
+                         (1 | Participant) + (1 | Item),
+                         data=data_Density_UG, family=poisson, control=glmerControl())
```

```
> anova(GLModel.UG.UD.0,GLModel.UG.UD.1)
Data: data_Density_UG
Models:
GLModel.UG.UD.0: Occurrence ~ Group + Density + (1 | Participant) + (1 | Item)
GLModel.UG.UD.1: Occurrence ~ Group * Density + (1 | Participant) + (1 | Item)
                Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD.0  8 3220.2 3256.8 -1602.1   3204.2
GLModel.UG.UD.1 12 3095.2 3150.2 -1535.6   3071.2 132.93      4  < 2.2e-16 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0        0
 Item        (Intercept) 0        0
Number of obs: 720, groups:  Participant, 120; Item, 3

Fixed effects:
                     Estimate Std. Error z value Pr(>|z|)
(Intercept)           1.36524    0.05955  22.926  < 2e-16 ***
Group06yr            -0.17808    0.08822  -2.018 0.043543 *
Group08yr            -0.01789    0.08459  -0.211 0.832517
Group10yr            -0.19087    0.08853  -2.156 0.031089 *
GroupUAD             -0.82163    0.10775  -7.625 2.44e-14 ***
DensityUD2           -0.73663    0.10466  -7.038 1.94e-12 ***
Group06yr:DensityUD2  0.50924    0.14321   3.556 0.000377 ***
Group08yr:DensityUD2  0.14305    0.14526   0.985 0.324709
Group10yr:DensityUD2  0.53787    0.14311   3.758 0.000171 ***
GroupUAD:DensityUD2   1.51847    0.15069  10.077  < 2e-16 ***
```

UD1:

```
> GLModel.UG.UD1.0 = glmer(Occurrence ~ 1 +
+                            (1 | Item)  + (1 | Participant),
+                               data = data_Density.UG.UD1, family = poisson, control=
glmerControl())
> GLModel.UG.UD1.1 = glmer(Occurrence ~ Group +
+                            (1 | Item)  + (1 | Participant),
+                      data=data_Density.UG.UD1, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD1.0,GLModel.UG.UD1.1)
Data: data_Density.UG.UD1
Models:
GLModel.UG.UD1.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.UG.UD1.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                 Df    AIC  BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD1.0  3 1401.3 1413 -697.66   1395.3
GLModel.UG.UD1.1  7 1354.8 1382 -670.40   1340.8 54.533      4   4.07e-11 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.02264  0.1505
 Item        (Intercept) 0.17980  0.4240
Number of obs: 360, groups:  Participant, 120; Item, 3
```

```
Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.27297    0.25418   5.008 5.49e-07 ***
Group06yr   -0.17959    0.09805  -1.832   0.0670 .
Group08yr   -0.01937    0.09483  -0.204   0.8381
Group10yr   -0.19197    0.09832  -1.953   0.0509 .
GroupUAD    -0.82324    0.11578  -7.111 1.16e-12 ***
```

4yr vs UAD

```
> GLModel.UG.UD.4andUAD.0 = glmer(Occurrence ~ 1 +
+                                   (1 |Participant) + (1 | Item),
+                             data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD.4andUAD.1 = glmer(Occurrence ~ Group +
+                                   (1 | Participant) + (1 | Item),
+                             data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD.4andUAD.0,GLModel.UG.UD.4andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD.4andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD.4andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD.4andUAD.0  3 550.69 559.60 -272.34   544.69
GLModel.UG.UD.4andUAD.1  4 511.61 523.49 -251.80   503.61 41.078      1  1.462e-10 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.0000   0.0000
 Item        (Intercept) 0.2544   0.5044
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.2498     0.2984   4.188 2.81e-05 ***
GroupUAD     -0.8216     0.1076  -7.638 2.20e-14 ***
```

6yr vs UAD

```
> GLModel.UG.UD.6andUAD.0 = glmer(Occurrence ~ 1 +
+                                   (1 |Participant) + (1 | Item),
+                             data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD.6andUAD.1 = glmer(Occurrence ~ Group +
+                                    (1 | Participant) + (1 | Item),
+                             data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD.6andUAD.0,GLModel.UG.UD.6andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD.6andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD.6andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
```

```
GLModel.UG.UD.6andUAD.0  3 539.55 548.46 -266.77   533.55
GLModel.UG.UD.6andUAD.1  4 522.58 534.46 -257.29   514.58 18.966      1  1.331e-05 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.06744  0.2597
 Item        (Intercept) 0.21544  0.4642
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.0505     0.2824   3.719    2e-04 ***
GroupUAD     -0.6465     0.1334  -4.845 1.27e-06 ***
```

8yr vs UAD

```
> GLModel.UG.UD.8andUAD.0 = glmer(Occurrence ~ 1 +
+                                   (1 |Participant) + (1 | Item),
+                               data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD.8andUAD.1 = glmer(Occurrence ~ Group +
+                                    (1 | Participant) + (1 | Item),
+                               data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD.8andUAD.0,GLModel.UG.UD.8andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD.8andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD.8andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD.8andUAD.0  3 550.66 559.57 -272.33   544.66
GLModel.UG.UD.8andUAD.1  4 524.07 535.95 -258.04   516.07 28.592      1  8.936e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> summary(GLModel.UG.UD.8andUAD.1)
Generalized  linear  mixed  model  fit  by  maximum  likelihood  (Laplace  Approximation)
['glmerMod']
 Family: poisson  ( log )
Formula: Occurrence ~ Group + (1 | Participant) + (1 | Item)
   Data: merged_data_UG
Control: glmerControl()

     AIC      BIC   logLik deviance df.resid
   524.1    536.0   -258.0    516.1      140

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.6495 -0.7553 -0.2042  0.5986  2.4800

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.06073  0.2464
 Item        (Intercept) 0.24605  0.4960
```

```
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.2060     0.2984   4.042 5.31e-05 ***
GroupUAD     -0.8068     0.1290  -6.256 3.96e-10 ***
```

10yr vs UAD

```
> GLModel.UG.UD.10andUAD.0 = glmer(Occurrence ~ 1 +
+                                  (1 |Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD.10andUAD.1 = glmer(Occurrence ~ Group +
+                                  (1 | Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD.10andUAD.0,GLModel.UG.UD.10andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD.10andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD.10andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD.10andUAD.0  3 518.03 526.94 -256.02   512.03
GLModel.UG.UD.10andUAD.1  4 499.79 511.66 -245.89   491.79 20.247      1  6.807e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> summary(GLModel.UG.UD.10andUAD.1)
Generalized  linear  mixed  model  fit  by  maximum  likelihood  (Laplace  Approximation)
['glmerMod']
 Family: poisson  ( log )
Formula: Occurrence ~ Group + (1 | Participant) + (1 | Item)
   Data: merged_data_UG
Control: glmerControl()

     AIC      BIC   logLik deviance df.resid
   499.8    511.7   -245.9    491.8      140

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.7561 -0.7274 -0.1317  0.5591  2.8204

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.04504  0.2122
 Item        (Intercept) 0.43053  0.6561
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.9730     0.3890   2.502   0.0124 *
GroupUAD     -0.6331     0.1263  -5.011 5.42e-07 ***
```

UD2:

```
> GLModel.UG.UD2.0 = glmer(Occurrence ~ 1 +
+                            (1 | Item)  + (1 | Participant),
+                               data = data_Density.UG.UD2, family = poisson, control=
glmerControl())
> GLModel.UG.UD2.1 = glmer(Occurrence ~ Group +
+                            (1 | Item)  + (1 | Participant),
+                      data=data_Density.UG.UD2, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD2.0,GLModel.UG.UD2.1)
Data: data_Density.UG.UD2
Models:
GLModel.UG.UD2.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.UG.UD2.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                 Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD2.0  3 1352.7 1364.4 -673.36   1346.7
GLModel.UG.UD2.1  7 1329.3 1356.5 -657.66   1315.3 31.388      4  2.551e-06 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.07564  0.2750
 Item        (Intercept) 0.33687  0.5804
Number of obs: 360, groups:  Participant, 120; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.4362     0.3512   1.242   0.2142
Group06yr     0.3282     0.1376   2.385   0.0171 *
Group08yr     0.1170     0.1420   0.824   0.4099
Group10yr     0.3484     0.1373   2.538   0.0111 *
GroupUAD      0.7083     0.1317   5.380 7.45e-08 ***
```

4yr vs UAD

```
> GLModel.UG.UD2.4andUAD.0 = glmer(Occurrence ~ 1 +
+                                    (1 |Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD2.4andUAD.1 = glmer(Occurrence ~ Group +
+                                    (1 | Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD2.4andUAD.0,GLModel.UG.UD2.4andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD2.4andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD2.4andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD2.4andUAD.0  3 547.90 556.81 -270.95   541.90
GLModel.UG.UD2.4andUAD.1  4 516.15 528.02 -254.07   508.15 33.759      1  6.238e-09 ***

Random effects:
```

```
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.0000   0.0000
 Item        (Intercept) 0.4846   0.6962
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.4212     0.4127   1.020    0.308
GroupUAD      0.6968     0.1052   6.627 3.44e-11 ***
```

6yr vs UAD

```
> GLModel.UG.UD2.6andUAD.0 = glmer(Occurrence ~ 1 +
+                                    (1 |Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD2.6andUAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD2.6andUAD.0,GLModel.UG.UD2.6andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD2.6andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD2.6andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD2.6andUAD.0  3 570.79 579.70 -282.40   564.79
GLModel.UG.UD2.6andUAD.1  4 561.76 573.64 -276.88   553.76 11.037      1  0.0008931 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.02688  0.1640
 Item        (Intercept) 0.31479  0.5611
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.8096     0.3352   2.415 0.015728 *
GroupUAD      0.3688     0.1058   3.486 0.000491 ***
```

8yr vs UAD

```
> GLModel.UG.UD2.8andUAD.0 = glmer(Occurrence ~ 1 +
+                                     (1 |Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD2.8andUAD.1 = glmer(Occurrence ~ Group +
+                                     (1 | Participant) + (1 | Item),
+                              data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD2.8andUAD.0,GLModel.UG.UD2.8andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD2.8andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD2.8andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
```

```
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD2.8andUAD.0  3 558.18 567.09 -276.09   552.18
GLModel.UG.UD2.8andUAD.1  4 540.66 552.54 -266.33   532.66 19.516      1  9.976e-06 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.05625  0.2372
 Item        (Intercept) 0.40292  0.6348
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.5463     0.3806   1.436    0.151
GroupUAD      0.5846     0.1225   4.772 1.82e-06 ***
```

10yr vs UAD

```
> GLModel.UG.UD2.10andUAD.0 = glmer(Occurrence ~ 1 +
+                                   (1 |Participant) + (1 | Item),
+                               data=merged_data_UG, family=poisson, control=glmerControl())
> GLModel.UG.UD2.10andUAD.1 = glmer(Occurrence ~ Group +
+                                   (1 | Participant) + (1 | Item),
+                               data=merged_data_UG, family=poisson, control=glmerControl())
> anova(GLModel.UG.UD2.10andUAD.0,GLModel.UG.UD2.10andUAD.1)
Data: merged_data_UG
Models:
GLModel.UG.UD2.10andUAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.UG.UD2.10andUAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                          Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.UG.UD2.10andUAD.0  3 570.07 578.98 -282.04   564.07
GLModel.UG.UD2.10andUAD.1  4 560.04 571.92 -276.02   552.04 12.032      1  0.0005229 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.001962 0.0443
 Item        (Intercept) 0.279868 0.5290
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  0.84473    0.31526   2.679 0.007375 **
GroupUAD     0.34987    0.09516   3.677 0.000236 ***
```

UTTERANCE DENSITY IN CHINESE

CHINESE

```
> GLModel.CH.UD.0 = glmer(Occurrence ~ Group + Density +
+                           (1 | Participant) + (1 | Item),
+                         data=data_Density_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD.1 = glmer(Occurrence ~ Group * Density +
+                           (1 | Participant) + (1 | Item),
+                         data=data_Density_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD.0,GLModel.CH.UD.1)
Data: data_Density_CH
Models:
GLModel.CH.UD.0: Occurrence ~ Group + Density + (1 | Participant) + (1 | Item)
GLModel.CH.UD.1: Occurrence ~ Group * Density + (1 | Participant) + (1 | Item)
               Df    AIC    BIC  logLik deviance Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD.0  8 2847.9 2883.7 -1416.0   2831.9
GLModel.CH.UD.1 12 2493.4 2547.1 -1234.7   2469.4 362.5      4  < 2.2e-16 ***

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 3.484e-18 1.867e-09
 Item        (Intercept) 0.000e+00 0.000e+00
Number of obs: 648, groups:  Participant, 108; Item, 3

Fixed effects:
                     Estimate Std. Error z value Pr(>|z|)
(Intercept)           1.47273    0.05643  26.097  < 2e-16 ***
Group06yr            -0.17724    0.08359  -2.120 0.033974 *
Group08yr            -0.55090    0.09332  -5.903 3.57e-09 ***
Group10yr            -1.13427    0.11439  -9.916  < 2e-16 ***
GroupCAD             -1.79815    0.20407  -8.811  < 2e-16 ***
DensityUD2           -1.02201    0.10970  -9.316  < 2e-16 ***
Group06yr:DensityUD2  0.56184    0.14785   3.800 0.000145 ***
Group08yr:DensityUD2  1.32477    0.14711   9.005  < 2e-16 ***
Group10yr:DensityUD2  2.19684    0.15809  13.896  < 2e-16 ***
GroupCAD:DensityUD2   2.88787    0.23759  12.155  < 2e-16 ***

UD1:

> GLModel.CH.UD1.0 = glmer(Occurrence ~ 1 +
+                           (1 | Item)  + (1 | Participant),
+                              data = data_Density.CH.UD1, family = poisson, control=
glmerControl())
> GLModel.CH.UD1.1 = glmer(Occurrence ~ Group +
+                           (1 | Item)  + (1 | Participant),
+                       data=data_Density.CH.UD1, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.0,GLModel.CH.UD1.1)
Data: data_Density.CH.UD1
Models:
GLModel.CH.UD1.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.CH.UD1.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.0  3 1277.5 1288.8 -635.73   1271.5
GLModel.CH.UD1.1  7 1179.4 1205.9 -582.72   1165.4 106.02      4  < 2.2e-16 ***
```

```
Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.03694  0.1922
 Item        (Intercept) 0.05392  0.2322
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.4324     0.1510   9.487  < 2e-16 ***
Group06yr    -0.1790     0.1001  -1.789   0.0736 .
Group08yr    -0.5571     0.1085  -5.137 2.79e-07 ***
Group10yr    -1.1407     0.1268  -8.993  < 2e-16 ***
GroupCAD     -1.8010     0.2139  -8.419  < 2e-16 ***
```

4yrs VS 6yrs

```
> GLModel.CH.UD1.4and6.0 = glmer(Occurrence ~ 1 +
+                                (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.4and6.1 = glmer(Occurrence ~ Group +
+                                (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.4and6.0,GLModel.CH.UD1.4and6.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.4and6.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD1.4and6.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                       Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.4and6.0  3 581.77 590.68 -287.89   575.77
GLModel.CH.UD1.4and6.1  4 579.26 591.14 -285.63   571.26 4.5137      1    0.03362 *

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 1.026e-10 1.013e-05
 Item        (Intercept) 1.736e-02 1.317e-01
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.46426    0.09487  15.434   <2e-16 ***
Group06yr   -0.17724    0.08352  -2.122   0.0338 *
```

6yr vs 8yr

```
GLModel.CH.UD1.6and8.0 = glmer(Occurrence ~ 1 +
+                                (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.6and8.1 = glmer(Occurrence ~ Group +
+                                (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
```

```
> anova(GLModel.CH.UD1.6and8.0,GLModel.CH.UD1.6and8.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.6and8.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD1.6and8.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                       Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.6and8.0  3 584.73 593.64 -289.37   578.73
GLModel.CH.UD1.6and8.1  4 577.25 589.13 -284.63   569.25 9.4781      1   0.002079 **
Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.05941  0.2437
 Item        (Intercept) 0.07683  0.2772
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.2358     0.1794   6.889 5.64e-12 ***
Group08yr    -0.3831     0.1196  -3.204  0.00136 **
```

8yr vs 10yr

```
> GLModel.CH.UD1.8and10.0 = glmer(Occurrence ~ 1 +
+                                 (1 |Participant) + (1 | Item),
+                             data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.8and10.1 = glmer(Occurrence ~ Group +
+                                 (1 | Participant) + (1 | Item),
+                             data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.8and10.0,GLModel.CH.UD1.8and10.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.8and10.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD1.8and10.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.8and10.0  3 515.59 524.50 -254.79   509.59
GLModel.CH.UD1.8and10.1  4 508.36 520.24 -250.18   500.36 9.2287      1   0.002383 **

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.2392   0.4891
 Item        (Intercept) 0.1414   0.3760
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.7544     0.2531   2.981  0.00287 **
Group10yr    -0.6076     0.1904  -3.192  0.00141 **
```

4yr vs CAD

```
> GLModel.CH.UD1.4andCAD.0 = glmer(Occurrence ~ 1 +
+                                  (1 |Participant) + (1 | Item),
```

```
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.4andCAD.1 = glmer(Occurrence ~ Group +
+                                    (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.4andCAD.0,GLModel.CH.UD1.4andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.4andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD1.4andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.4andCAD.0  3 436.53 444.57 -215.26   430.53
GLModel.CH.UD1.4andCAD.1  4 362.93 373.65 -177.46   354.93 75.599      1  < 2.2e-16 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.000000 0.00000
 Item        (Intercept) 0.005457 0.07387
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.47000    0.07093  20.724   <2e-16 ***
GroupCAD    -1.79814    0.20401  -8.814   <2e-16 ***
```

6yr vs CAD

```
> GLModel.CH.UD1.6andCAD.0 = glmer(Occurrence ~ 1 +
+                                    (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.6andCAD.1 = glmer(Occurrence ~ Group +
+                                    (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.6andCAD.0,GLModel.CH.UD1.6andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.6andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD1.6andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.6andCAD.0  3 428.92 436.97 -211.46   422.92
GLModel.CH.UD1.6andCAD.1  4 373.57 384.30 -182.78   365.57 57.356      1  3.637e-14 ***

Random effects:
 Groups      Name        Variance  Std.Dev.
 Participant (Intercept) 6.884e-10 2.624e-05
 Item        (Intercept) 8.165e-02 2.858e-01
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.2569     0.1770   7.103 1.22e-12 ***
```

```
GroupCAD     -1.6209     0.2052  -7.900 2.78e-15 ***
```

8yr vs CAD

```
> GLModel.CH.UD1.8andCAD.0 = glmer(Occurrence ~ 1 +
+                                  (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.8andCAD.1 = glmer(Occurrence ~ Group +
+                                  (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.8andCAD.0,GLModel.CH.UD1.8andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.8andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD1.8andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.8andCAD.0  3 376.47 384.51 -185.23   370.47
GLModel.CH.UD1.8andCAD.1  4 357.30 368.03 -174.65   349.30 21.163      1  4.219e-06 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.1397   0.3737
 Item        (Intercept) 0.1449   0.3807
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.7868     0.2478   3.176  0.00149 **
GroupCAD     -1.2355     0.2462  -5.019 5.19e-07 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:
         (Intr)
GroupCAD -0.189
```

10yr vs CAD

```
> GLModel.CH.UD1.10andCAD.0 = glmer(Occurrence ~ 1 +
+                                  (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD1.10andCAD.1 = glmer(Occurrence ~ Group +
+                                  (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD1.10andCAD.0,GLModel.CH.UD1.10andCAD.1)
Data: merged_data_CH
Models:
GLModel.CH.UD1.10andCAD.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
```

```
GLModel.CH.UD1.10andCAD.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                          Df    AIC    BIC  logLik deviance Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD1.10andCAD.0  3 303.27 311.31 -148.63   297.27
GLModel.CH.UD1.10andCAD.1  4 300.25 310.97 -146.12   292.25 5.021      1    0.02504 *

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.2067   0.4546
 Item        (Intercept) 0.3406   0.5836
Number of obs: 108, groups:  Participant, 36; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  0.06246    0.37030   0.169   0.8660
GroupCAD    -0.63082    0.27056  -2.332   0.0197 *
```

UD2

```
> GLModel.CH.UD2.0 = glmer(Occurrence ~ 1 +
+                            (1 | Item)  + (1 | Participant),
+                               data = data_Density.CH.UD2, family = poisson, control=
glmerControl())
> GLModel.CH.UD2.1 = glmer(Occurrence ~ Group +
+                            (1 | Item)  + (1 | Participant),
+                       data=data_Density.CH.UD2, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD2.0,GLModel.CH.UD2.1)
Data: data_Density.CH.UD2
Models:
GLModel.CH.UD2.0: Occurrence ~ 1 + (1 | Item) + (1 | Participant)
GLModel.CH.UD2.1: Occurrence ~ Group + (1 | Item) + (1 | Participant)
                 Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD2.0  3 1326.0 1337.3 -660.00   1320.0
GLModel.CH.UD2.1  7 1248.8 1275.2 -617.39   1234.8 85.221      4  < 2.2e-16 ***

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.01690  0.1300
 Item        (Intercept) 0.03594  0.1896
Number of obs: 324, groups:  Participant, 108; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.4234     0.1470   2.880  0.00398 **
Group06yr     0.3849     0.1272   3.026  0.00248 **
Group08yr     0.7739     0.1194   6.482 9.04e-11 ***
Group10yr     1.0638     0.1151   9.244  < 2e-16 ***
GroupCAD      1.0913     0.1297   8.413  < 2e-16 ***
```

4yr vs 6yr

```
> GLModel.CH.UD2.4and6.0 = glmer(Occurrence ~ 1 +
```

```
+                                (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD2.4and6.1 = glmer(Occurrence ~ Group +
+                                 (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD2.4and6.0,GLModel.CH.UD2.4and6.1)
Data: merged_data_CH
Models:
GLModel.CH.UD2.4and6.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD2.4and6.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                       Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD2.4and6.0  3 523.10 532.01 -258.55   517.10
GLModel.CH.UD2.4and6.1  4 519.15 531.03 -255.58   511.15 5.9418      1    0.01479 *

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.11570  0.3402
 Item        (Intercept) 0.08295  0.2880
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.3472     0.2061   1.684   0.0921 .
Group06yr     0.3946     0.1567   2.519   0.0118 *
```

6yr vs 8yr

```
> GLModel.CH.UD2.6and8.0 = glmer(Occurrence ~ 1 +
+                                 (1 |Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD2.6and8.1 = glmer(Occurrence ~ Group +
+                                 (1 | Participant) + (1 | Item),
+                            data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD2.6and8.0,GLModel.CH.UD2.6and8.1)
Data: merged_data_CH
Models:
GLModel.CH.UD2.6and8.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD2.6and8.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                       Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD2.6and8.0  3 584.14 593.05 -289.07   578.14
GLModel.CH.UD2.6and8.1  4 577.44 589.32 -284.72   569.44 8.7002      1   0.003182 **

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.06669  0.2582
 Item        (Intercept) 0.06662  0.2581
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   0.7689     0.1772   4.338 1.44e-05 ***
```

```
Group08yr     0.3891     0.1249   3.114  0.00184 **
```

8yr vs 10yr

```
> GLModel.CH.UD2.8and10.0 = glmer(Occurrence ~ 1 +
+                                   (1 |Participant) + (1 | Item),
+                             data=merged_data_CH, family=poisson, control=glmerControl())
> GLModel.CH.UD2.8and10.1 = glmer(Occurrence ~ Group +
+                                  (1 | Participant) + (1 | Item),
+                             data=merged_data_CH, family=poisson, control=glmerControl())
> anova(GLModel.CH.UD2.8and10.0,GLModel.CH.UD2.8and10.1)
Data: merged_data_CH
Models:
GLModel.CH.UD2.8and10.0: Occurrence ~ 1 + (1 | Participant) + (1 | Item)
GLModel.CH.UD2.8and10.1: Occurrence ~ Group + (1 | Participant) + (1 | Item)
                        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
GLModel.CH.UD2.8and10.0  3 598.14 607.05 -296.07   592.14
GLModel.CH.UD2.8and10.1  4 590.74 602.62 -291.37   582.74 9.3936      1   0.002177 **

Random effects:
 Groups      Name        Variance Std.Dev.
 Participant (Intercept) 0.01219  0.1104
 Item        (Intercept) 0.02467  0.1571
Number of obs: 144, groups:  Participant, 48; Item, 3

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.20592    0.11386  10.591  < 2e-16 ***
Group10yr    0.28939    0.09013   3.211  0.00132 **
```

Appendix S4: Absolute and relative frequencies of various categories in the verb, OTH, and semantic density

Table 1. Counts and percentages of information expressed in the verb in Uyghur and Chinese

		Uyghur		Chinese		
		Path	Manner	Path	Manner	Path+Manner
4 years	Counts	352	65	183	140	104
	Total		417			427
	%	84.41	15.58	42.85	32.78	24.35
6 years	Counts	326	98	149	126	154
	Total		424			429
	%	76.88	23.11	34.73	29.37	35.89
8 years	Counts	393	37	161	48	217
	Total		430			426
	%	91.39	8.60	37.79	11.26	50.93
10 years	Counts	394	30	73	44	311
	Total		424			428
	%	92.92	7.07	17.05	10.28	72.66
Adults	Counts	366	29	41	15	138
	Total		395			194
	%	92.65	7.34	21.12	7.73	71.13

Table 2. Counts and percentages of information expressed in the OTH in Uyghur and Chinese

		Uyghur				Chinese			
		Path	Manner	Path+Manner	Zero	Path	Manner	Path+Manner	Zero
4 years	Counts	229	78	27	83	30	16	1	380
	Total				417				427
	%	54.91	18.70	6.47	19.09	7.02	3.74	–	88.99
6 years	Counts	226	98	20	80	54	10	3	362
	Total				424				429
	%	53.30	23.11	4.71	18.86	12.58	2.33	–	84.38
8 years	Counts	251	114	10	55	84	41	10	291
	Total				430				426
	%	58.37	26.51	2.32	12.79	19.71	9.62	2.34	68.30
10 years	Counts	191	148	21	64	73	33	13	309
	Total				424				428
	%	45.04	34.90	4.95	15.09	17.05	7.71	3.03	72.19
Adults	Counts	91	208	39	57	33	27	9	125
	Total				395				194

	%	23.03	52.65	9.87	14.43	2.64	13.91	4.63	64.43

Table 3. Counts and percentages of utterance density in Uyghur and Chinese

		Uyghur		Chinese	
		UD1	UD2	UD1	UD2
4 years	Counts	282	135	314	113
	Total		417		427
	%	67.62	32.37	73.53	26.46
6 years	Counts	236	188	263	166
	Total		424		429
	%	55.66	44.33	61.30	38.69
8 years	Counts	277	153	181	245
	Total		430		426
	%	64.61	35.58	42.48%	57.51
10 years	Counts	233	191	102	326
	Total		424		428
	%	54.95	45.05	23.83	76.16
Adults	Counts	124	271	26	168
	Total		395		194
	%	31.39	68.60	13.40	86.59