

# Moral conventional: Study 1

Rose M. Schneider, Miguel Mejia

2025-07-16

## Study 1

### Participants

#### Overall age demographics

```
study1_data %>%
  distinct(subid, site, age)%>%
  group_by(site)%>%
  summarise_at('age',
               list(~mean(., na.rm=T),
                    ~sd(., na.rm=T),
                    ~median(., na.rm=T),
                    ~min(., na.rm=T),
                    ~max(., na.rm=T),
                    ~sum(!is.na(.))))%>%
  dplyr::rename("n" = "sum")%>%
  dplyr::select(site, n, mean, sd, median, min, max)%>%
  mutate(total.n = sum(n))%>%
  knitr::kable()
```

| site   | n  | mean     | sd       | median    | min      | max      | total.n |
|--------|----|----------|----------|-----------|----------|----------|---------|
| Canada | 80 | 7.812817 | 1.590593 | 7.927447  | 5.084189 | 10.80082 | 268     |
| India  | 73 | 9.516169 | 1.319499 | 10.198494 | 7.159480 | 10.99247 | 268     |
| Iran   | 84 | 7.657024 | 1.612185 | 7.945000  | 4.970000 | 10.35000 | 268     |
| Korea  | 31 | 8.980645 | 1.030993 | 8.400000  | 7.800000 | 10.60000 | 268     |

```
##total mean age, sd
mean(study1_data$age)
```

```
## [1] 8.363044
```

```
sd(study1_data$age)
```

```
## [1] 1.67056
```

```
length(unique(study1_data$subid))
```

```
## [1] 268
```

### Age bin and sex counts

```
study1_data %>%
  distinct(subid, site, age.bin, sex)%>%
  group_by(site, age.bin, sex)%>%
  summarise(n = n())%>%
  group_by(site)%>%
  mutate(total.site.n = sum(n))%>%
  knitr::kable()
```

```
## `summarise()` has grouped output by 'site', 'age.bin'. You can override using
## the '.groups' argument.
```

| site   | age.bin | sex | n  | total.site.n |
|--------|---------|-----|----|--------------|
| Canada | 5-6     | F   | 13 | 80           |
| Canada | 5-6     | M   | 17 | 80           |
| Canada | 7-8     | F   | 11 | 80           |
| Canada | 7-8     | M   | 17 | 80           |
| Canada | 9-10    | F   | 14 | 80           |
| Canada | 9-10    | M   | 8  | 80           |
| India  | 7-8     | F   | 7  | 73           |
| India  | 7-8     | M   | 21 | 73           |
| India  | 9-10    | F   | 14 | 73           |
| India  | 9-10    | M   | 19 | 73           |
| India  | 9-10    | NA  | 12 | 73           |
| Iran   | 5-6     | F   | 15 | 84           |
| Iran   | 5-6     | M   | 16 | 84           |
| Iran   | 7-8     | F   | 12 | 84           |
| Iran   | 7-8     | M   | 18 | 84           |
| Iran   | 9-10    | F   | 15 | 84           |
| Iran   | 9-10    | M   | 8  | 84           |
| Korea  | 7-8     | F   | 9  | 31           |
| Korea  | 7-8     | M   | 9  | 31           |
| Korea  | 9-10    | F   | 3  | 31           |
| Korea  | 9-10    | M   | 10 | 31           |

```
study1_data %>%
  distinct(subid, site, sex)%>%
  group_by(site, sex)%>%
  summarise(n = n())%>%
  group_by(site)%>%
  mutate(total.site.n = sum(n))%>%
  knitr::kable()
```

```
## `summarise()` has grouped output by 'site'. You can override using the
## `.` argument.
```

| site   | sex | n  | total.site.n |
|--------|-----|----|--------------|
| Canada | F   | 38 | 80           |
| Canada | M   | 42 | 80           |
| India  | F   | 21 | 73           |
| India  | M   | 40 | 73           |
| India  | NA  | 12 | 73           |
| Iran   | F   | 42 | 84           |
| Iran   | M   | 42 | 84           |
| Korea  | F   | 12 | 31           |
| Korea  | M   | 19 | 31           |

## Ratings for moral and conventional items by testing site

### Descriptives

```
x <- study1_data %>%
  filter(q_kind == 0) %>%
  group_by(site, task) %>%
  summarise_at('answer',
    list(~mean(., na.rm=T),
        ~sd(., na.rm=T),
        ~median(., na.rm=T),
        ~min(., na.rm=T),
        ~max(., na.rm=T),
        ~sum(!is.na(.)))) %>%
  dplyr::rename("n" = "sum") %>%
  dplyr::select(site, task, n, mean, sd, median, min, max) %>%
  knitr::kable()

#testing recoding
tmp <- study1_data %>%
  mutate(answer = case_when(answer == 1 ~ 6,
    answer == 2 ~ 5,
    answer == 3 ~ 4,
    answer == 4 ~ 3,
    answer == 5 ~ 2,
    answer == 6 ~ 1))

y <- tmp %>%
  filter(q_kind == 0) %>%
  group_by(site, task) %>%
  summarise_at('answer',
    list(~mean(., na.rm=T),
        ~sd(., na.rm=T),
        ~median(., na.rm=T),
        ~min(., na.rm=T),
        ~max(., na.rm=T),
```

```

~sum(!is.na(.)))%>%
dplyr::rename("n" = "sum")%>%
dplyr::select(site, task, n, mean, sd, median, min, max)%>%
knitr::kable()

```

Visualization of mean rating (all items collapsed) by site

```

library(ggthemes)

study1_data %>%
  filter(q_kind == 0)%>%
  mutate(task = factor(task, levels = c("moral", "conv"),
                       labels = c("Moral", "Conventional")))%>%
  ggplot(aes(x = task, y = answer, fill = task, color = task)) +
  stat_summary(fun = mean, position = position_dodge(width = .9),
               geom="bar", alpha = .5, colour = "black") +
  geom_point(position=position_jitter(width = .18, height = .1),
             size=1.5,
             alpha = .6,
             show.legend=FALSE,
             inherit.aes = TRUE) +
  geom_hline(yintercept = 3.5, color = "grey", linetype = "dashed") +
  facet_grid(~site) +
  coord_cartesian(ylim = c(1, 6)) +
  stat_summary(fun.data = "mean_cl_boot", geom="linerange",
               position = position_dodge(width=0.9), size = 1, color = "black") +
  theme(legend.position = "top",
        axis.text.x = element_blank(),
        axis.ticks.x = element_blank(),
        legend.key.size = unit(.5, 'cm'),
        legend.text = element_text(size = 10),
        legend.title = element_text(size = 11),
        legend.margin=margin(t = 0, unit='cm'),
        text = element_text()) +
  langcog::scale_color_solarized() +
  langcog::scale_fill_solarized() +
# scale_color_hc("darkunica") +
# scale_fill_hc("darkunica") +
  labs(y = "Mean acceptability rating",
       x = "",
       fill = "Transgression") +
  scale_y_continuous(breaks = seq(1,6, 1))

```

```

## Warning: Using 'size' aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use 'linewidth' instead.
## This warning is displayed once every 8 hours.
## Call 'lifecycle::last_lifecycle_warnings()' to see where this warning was
## generated.

```

```

## Warning: Removed 7 rows containing non-finite outside the scale range
## ('stat_summary()').

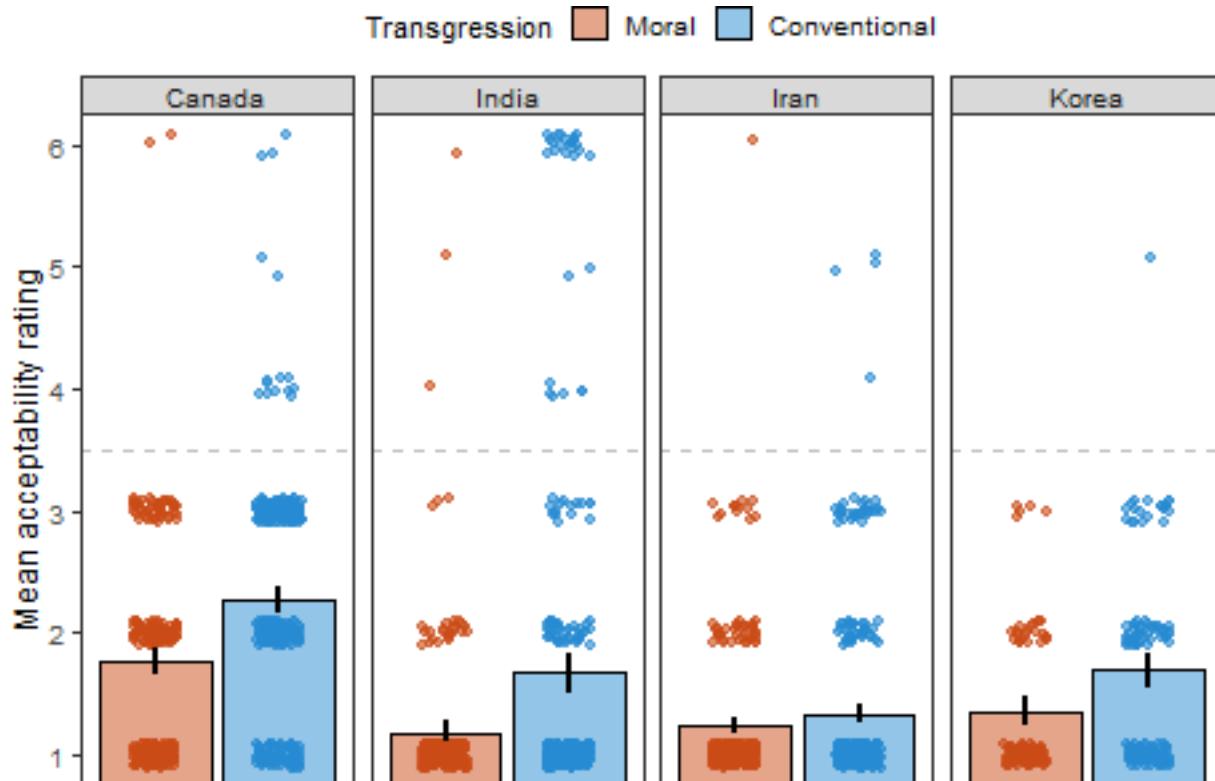
```

```

## Removed 7 rows containing non-finite outside the scale range
## ('stat_summary()').

## Warning: Removed 7 rows containing missing values or values outside the scale range
## ('geom_point()').

```



```
ggsave("mean_ratings_study1.png", height = 3)
```

```

## Saving 6.5 x 3 in image

## Warning: Removed 7 rows containing non-finite outside the scale range
## ('stat_summary()').

## Warning: Removed 7 rows containing non-finite outside the scale range
## ('stat_summary()').

## Warning: Removed 7 rows containing missing values or values outside the scale range
## ('geom_point()').

```

### Visualization of ratings by age by site

```

fig_1_v1 <- study1_data %>%
  filter(q_kind == 0) %>%
  dplyr::rename("Transgression" = "task") %>%

```

```

mutate(Transgression = factor(Transgression, levels = c("moral", "conv"),
                             labels = c("Moral", "Conventional")))%>%
ggplot(aes(x = age, y= answer, color = Transgression, fill = Transgression)) +
geom_point(position = position_jitter(width = .0, height = .0),
           alpha = .4) +
geom_smooth(method ="lm", fullrange = TRUE) +
langcog::scale_color_solarized() +
langcog::scale_fill_solarized() +
labs(x = "Age",
     y = "Acceptability Rating") +
scale_y_continuous(breaks = seq(1,6, 1)) +
facet_grid(~site, scale = "free_x") +
# theme_minimal() +
theme(strip.text.x = element_text(size = 16),
      strip.text.y = element_text(size = 16, ),
      axis.text.x = element_text(angle = 0, size = 16, ),
      axis.text.y = element_text(size = 16),
      legend.text = element_text(size = 16),
      legend.title = element_text(size = 16),
      axis.title.x= element_text(vjust = -1, size=16),
      axis.title.y= element_text(vjust = 2.5, size=16),
      legend.position = "top") +
theme(text=element_text(family = "serif")) +
theme(axis.text.y = element_text(margin = margin(0, 0, 0, 15))) +
theme(panel.spacing = unit(2, "lines")) +
scale_y_continuous(expand = c(0, 0)) +
scale_x_continuous(expand = c(0, 0)) +
scale_fill_manual(values = c(viridis::viridis(3), viridis::viridis(4))) +
scale_color_manual(values = c(viridis::viridis(3), viridis::viridis(4)))

```

```

## Scale for y is already present.
## Adding another scale for y, which will replace the existing scale.
## Scale for fill is already present.
## Adding another scale for fill, which will replace the existing scale.
## Scale for colour is already present.
## Adding another scale for colour, which will replace the existing scale.

```

```

fig_1_v2 <- study1_data %>%
  filter(q_kind == 0)%>%
  dplyr::rename("Transgression" = "task")%>%
  mutate(Transgression = factor(Transgression, levels = c("moral", "conv"),
                               labels = c("Moral", "Conventional")))%>%
ggplot(aes(x = age, y= answer, color = Transgression, fill = Transgression)) +
geom_point(position = position_jitter(width = .0, height = .03),
           alpha = .4) +
geom_smooth(method ="lm", fullrange = TRUE) +
langcog::scale_color_solarized() +
langcog::scale_fill_solarized() +
labs(x = "Age",
     y = "Acceptability Rating") +
scale_y_continuous(breaks = seq(1,6, 1)) +
facet_grid(~site, scales = "free") +
# scale_x_continuous(expand = c(0,0), ) +

```

```

# scale_x_continuous(breaks = seq(5, 11, 1), expand = c(0,0), limits = c(5, 11)) +
theme(strip.text.x = element_text(size = 16),
      strip.text.y = element_text(size = 16, ),
      axis.text.x = element_text(angle = 0, size = 16, ),
      axis.text.y = element_text(size = 16),
      legend.text = element_text(size = 16),
      legend.title = element_text(size = 16),
      axis.title.x= element_text(vjust = -1, size=16),
      axis.title.y= element_text(vjust = 2.5, size=16),
      legend.position = "top",
      plot.margin=unit(c(6,6,6,6),"mm")) +
theme(text=element_text(family = "serif")) +
theme(axis.text.y = element_text(margin = margin(0, 0, 0, 15))) +
theme(panel.spacing = unit(2, "lines")) +
scale_fill_manual(values = c(viridis::viridis(3), viridis::viridis(4))) +
scale_color_manual(values = c(viridis::viridis(3), viridis::viridis(4)))

```

```

## Scale for fill is already present.
## Adding another scale for fill, which will replace the existing scale.
## Scale for colour is already present.
## Adding another scale for colour, which will replace the existing scale.

```

fig\_1\_v1

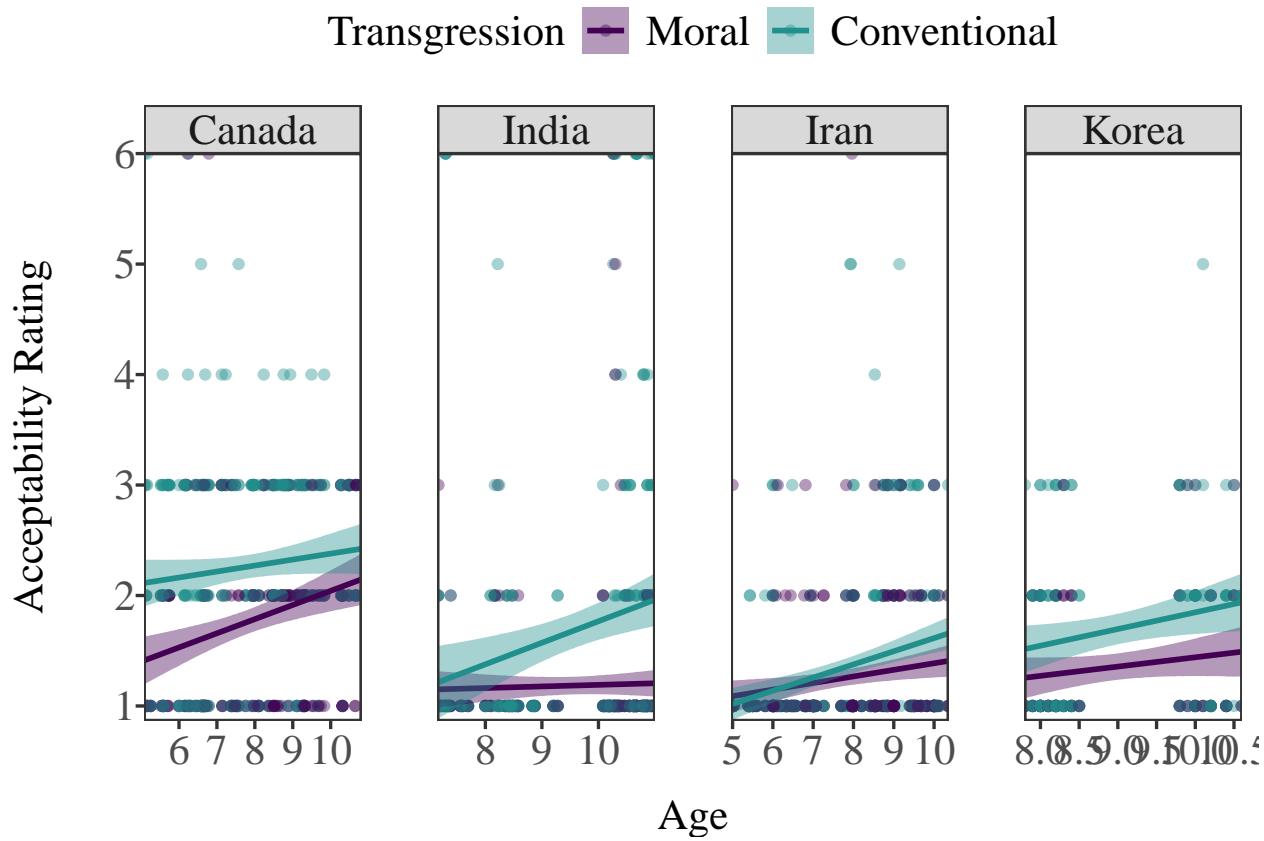
```

## `geom_smooth()` using formula = 'y ~ x'

## Warning: Removed 7 rows containing non-finite outside the scale range
## ('stat_smooth()').

## Warning: Removed 7 rows containing missing values or values outside the scale range
## ('geom_point()').

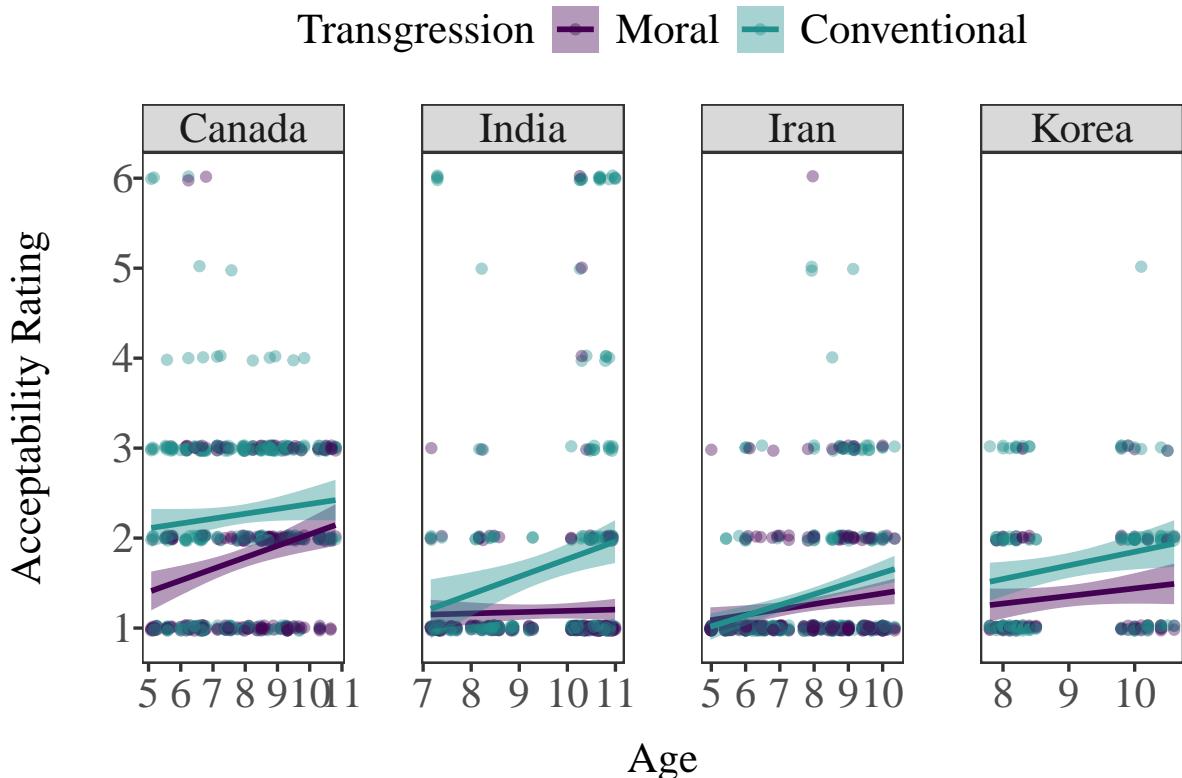
```



fig\_1\_v2

```
## `geom_smooth()` using formula = 'y ~ x'

## Warning: Removed 7 rows containing non-finite outside the scale range ('stat_smooth()').
## Removed 7 rows containing missing values or values outside the scale range
## ('geom_point()').
```



```
# ggsave("../Analyses/Figures/age_ratings.png", height = 3)
```

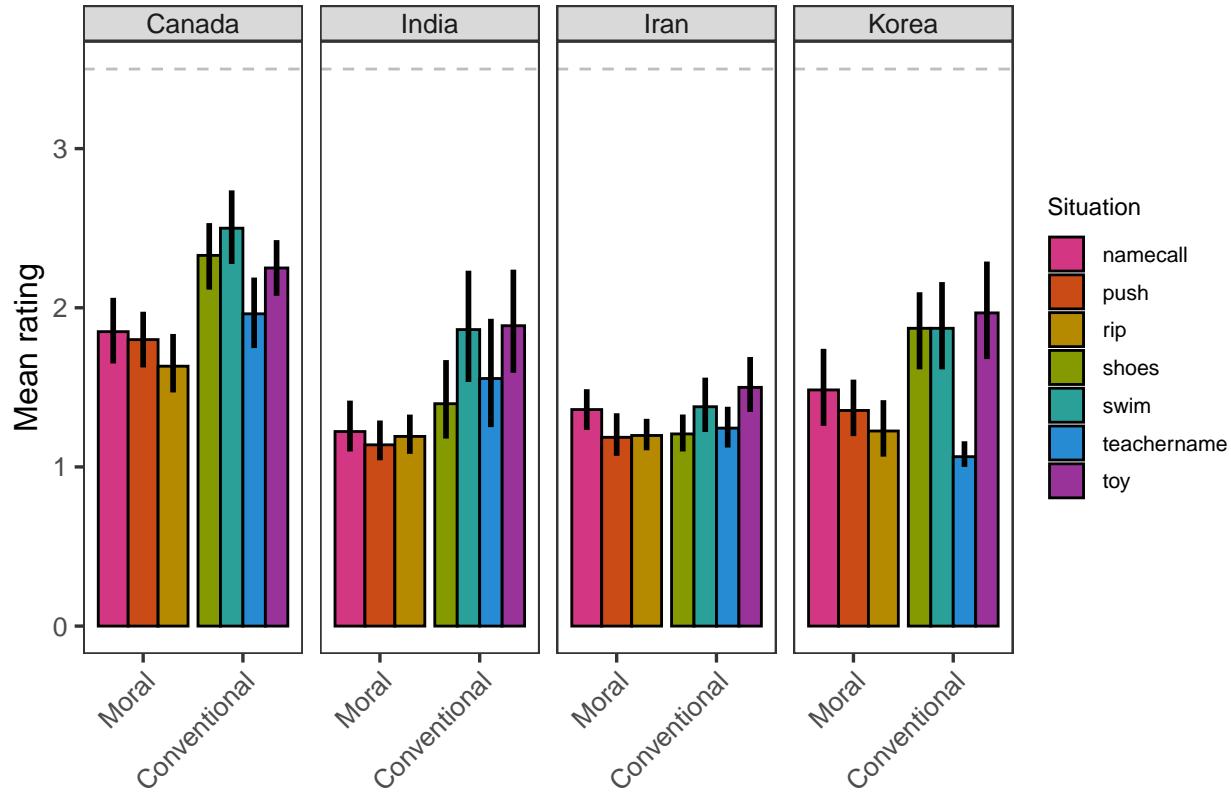
#### Visualization of mean rating (by item) by site

```
study1_data %>%
  filter(q_kind == 0)%>%
  mutate(task = factor(task, levels = c("moral", "conv"),
                       labels = c("Moral", "Conventional")))%>%
  ggplot(aes(x = task, y = answer, fill = item)) +
  stat_summary(fun = mean, position = position_dodge(width = .9),
               geom="bar", colour = "black") +
  stat_summary(fun.data = "mean_cl_boot", geom="linerange",
               position = position_dodge(width=0.9), size = 1, color = "black") +
  geom_hline(yintercept = 3.5, color = "grey", linetype = "dashed") +
  facet_grid(~site) +
  theme(legend.position = "right",
        legend.key.size = unit(.5, 'cm'),
        legend.text = element_text(size = 8),
        legend.title = element_text(size = 9),
        legend.margin=margin(t = 0, unit='cm'),
        axis.text.x = element_text(hjust = 1, angle = 45)) +
  langcog::scale_color_solarized() +
  langcog::scale_fill_solarized() +
  labs(y = "Mean rating",
       x = "",
       fill = "Situation")
```

```

## Warning: Removed 7 rows containing non-finite outside the scale range
## ('stat_summary()').
## Removed 7 rows containing non-finite outside the scale range
## ('stat_summary()').

```



### Analyses of differences in rating between moral and conventional transgressions: Within-country

Pre-registered mixed-effects model: Rating ~ Transgression type (moral; conventional)\*Age + (Transgression type|Subject) + (age|item).

We will iteratively remove item slopes, then subject slopes, then will remove item effects altogether if necessary.

**High-level summary of these models:** In general, we find a significant difference between moral and conventional items for every country except Iran, even when we include the item random intercept to the model, with the following qualifiers:

1. *The one exception* is Korea, where we *do not* find a significant difference when we include a random intercept of item to the model. This is because, while in general Korean children give higher ratings to conventional items, they give an extremely low rating to the “teachername” item. If you run the model without the item random intercept, there is a significant difference between moral and conventional items.
2. For India: In general, there is a significant interaction between age and task, and this holds true with or without item random intercept. If we remove the item random intercept, there is a significant difference between moral and conventional items.

## India

**Model:** Answer ~ Task + Age + Task:Age + (1|subid) + (1|item)

1. Interaction between task and age significantly improves the fit of the model ( $\chi^2 = 7.68, p = .006$ )
2. No significant difference between moral and conventional items ( $\beta = 0.28, p = .11$ )
3. No significant effect of age ( $\beta = 0.02, p = .85$ )
4. Significant interaction between transgression type and age: as children age, they are more likely to give higher ratings for conventional transgressions in comparison to moral transgressions ( $\beta = .30, p = .006$ )

```
#summary of item model
car::Anova(ratings.india, type = "III") ## for interaction
```

```
## Analysis of Deviance Table (Type III Wald chisquare tests)
##
## Response: answer
##          Chisq Df Pr(>Chisq)
## (Intercept) 60.4774  1 7.443e-15 ***
## task         3.1259  1  0.077057 .
## age.c        0.0357  1   0.850100
## task:age.c   7.7081  1  0.005497 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
knitr::kable(summary(ratings.india)$coef)
```

|                | Estimate  | Std. Error | df         | t value   | Pr(> t )  |
|----------------|-----------|------------|------------|-----------|-----------|
| (Intercept)    | 1.1695669 | 0.1503933  | 18.487775  | 7.7767207 | 0.0000003 |
| taskconv       | 0.2825694 | 0.1598221  | 8.210336   | 1.7680248 | 0.1140694 |
| age.c          | 0.0222982 | 0.1179853  | 129.880388 | 0.1889914 | 0.8503946 |
| taskconv:age.c | 0.2983360 | 0.1074563  | 426.931430 | 2.7763464 | 0.0057392 |

## Iran

**Model:** Answer ~ Task + Age + (task|subid) + (1|item)

1. Interaction between task and age does not significantly improve model fit ( $\chi^2 = 3.10, p = .08$ )
2. No significant difference between moral and conventional items ( $\beta = 0.09, p = .41$ )
3. Significant effect of age, with increases in ratings as children age ( $\beta = 0.14, p = .002$ )

```
## here are main effects from full model
knitr::kable(summary(ratings.iran.base)$coef)
```

|             | Estimate  | Std. Error | df       | t value    | Pr(> t )  |
|-------------|-----------|------------|----------|------------|-----------|
| (Intercept) | 1.3060139 | 0.0768252  | 7.468143 | 16.9998095 | 0.0000003 |
| taskconv    | 0.0857732 | 0.0969928  | 6.237079 | 0.8843259  | 0.4093127 |

|       | Estimate  | Std. Error | df        | t value   | Pr(> t )  |
|-------|-----------|------------|-----------|-----------|-----------|
| age.c | 0.1359640 | 0.0418156  | 81.959545 | 3.2515116 | 0.0016672 |

## Canada

**Model:** Answer ~ Task + Age + (1|subid) + (1|item)

1. Interaction between task and age does not significantly improve the fit of the model ( $\chi^2 = 2.87, p = .09$ )
2. Significant difference between moral and conventional items ( $\beta = 0.50, p = .02$ )
3. Significant effect of age ( $\beta = 0.14, p = .02$ )

```
## Summary of main effects
knitr::kable(summary(ratings.canada.base)$coef)
```

|             | Estimate  | Std. Error | df        | t value   | Pr(> t )  |
|-------------|-----------|------------|-----------|-----------|-----------|
| (Intercept) | 1.8085894 | 0.0726861  | 157.34714 | 24.882189 | 0.0000000 |
| taskconv    | 0.4978766 | 0.0704746  | 476.43610 | 7.064628  | 0.0000000 |
| age.c       | 0.1433067 | 0.0603768  | 77.92947  | 2.373539  | 0.0200817 |

**Korea** **NB** with Korea dataset: When we include the item random effect, we find that there is **no** difference between moral and conventional items. This means that the variance in the intercepts associated with these items that there is reason to call into question whether there is an overall difference between these moral and conventional items. I confirmed that this is driven by the abnormally low ratings for the “teachername” item. If you remove this item and run the model, you find that the difference between moral and conventional is significant.

**Model:** Answer ~ Task + Age + (1|subid) + (1|item)

1. The task x age interaction does not significantly improve the fit of the model ( $\chi^2 = 0.71, p = .40$ )
2. No significant difference between moral and conventional items ( $\beta = 0.34, p = .25$ )
3. Marginal effect of age, with increases in ratings as children age ( $\beta = 0.20, p = .06$ )

Summary of main effects with item random effect

```
#summary of main effects
knitr::kable(summary(ratings.korea.base)$coef)
```

|             | Estimate  | Std. Error | df        | t value  | Pr(> t )  |
|-------------|-----------|------------|-----------|----------|-----------|
| (Intercept) | 1.2792961 | 0.2037838  | 6.011542  | 6.277712 | 0.0007541 |
| taskconv    | 0.3387097 | 0.2572231  | 4.999999  | 1.316793 | 0.2450298 |
| age.c       | 0.2043363 | 0.1025683  | 28.999996 | 1.992196 | 0.0558387 |

Summary of main effects without item-level random effect

```
knitr::kable(summary(ratings.korea.noitem)$coef)
```

|             | Estimate  | Std. Error | df        | t value   | Pr(> t )  |
|-------------|-----------|------------|-----------|-----------|-----------|
| (Intercept) | 1.2792961 | 0.0892714  | 62.73404  | 14.330416 | 0.0000000 |
| taskconv    | 0.3387097 | 0.0901517  | 185.00000 | 3.757109  | 0.0002302 |
| age.c       | 0.2043363 | 0.1025683  | 29.00000  | 1.992196  | 0.0558387 |

=====

## Judgments of transgression acceptability under certain circumstances

### Descriptives

```
study1_data %>%
  mutate(task = factor(task, levels = c("moral", "conv")))%>%
  filter(q_kind != 0)%>%
  group_by(site, q_kind_label, task)%>%
  summarise_at('answer',
    list(~mean(., na.rm=T),
        ~sd(., na.rm=T),
        ~sum(!is.na(.))))%>%
  dplyr::rename("n" = "sum")%>%
  dplyr::select(site, task, q_kind_label, n, mean, sd)%>%
  knitr::kable()
```

| site   | task  | q_kind_label    | n   | mean      | sd        |
|--------|-------|-----------------|-----|-----------|-----------|
| Canada | moral | Everyone else   | 240 | 0.0958333 | 0.2949777 |
| Canada | conv  | Everyone else   | 320 | 0.1937500 | 0.3958543 |
| Canada | moral | Faraway country | 240 | 0.0958333 | 0.2949777 |
| Canada | conv  | Faraway country | 321 | 0.2242991 | 0.4177711 |
| Canada | moral | Rule at school  | 240 | 0.3375000 | 0.4738452 |
| Canada | conv  | Rule at school  | 320 | 0.4812500 | 0.5004308 |
| India  | moral | Everyone else   | 214 | 0.2476636 | 0.4326674 |
| India  | conv  | Everyone else   | 291 | 0.3402062 | 0.4745945 |
| India  | moral | Faraway country | 216 | 0.0925926 | 0.2905340 |
| India  | conv  | Faraway country | 291 | 0.0756014 | 0.2648146 |
| India  | moral | Rule at school  | 217 | 0.2165899 | 0.4128732 |
| India  | conv  | Rule at school  | 291 | 0.2542955 | 0.4362146 |
| Iran   | moral | Everyone else   | 258 | 0.0387597 | 0.1933969 |
| Iran   | conv  | Everyone else   | 331 | 0.0664653 | 0.2494707 |
| Iran   | moral | Faraway country | 258 | 0.0426357 | 0.2024270 |
| Iran   | conv  | Faraway country | 330 | 0.0909091 | 0.2879164 |
| Iran   | moral | Rule at school  | 258 | 0.1395349 | 0.3471773 |
| Iran   | conv  | Rule at school  | 329 | 0.1489362 | 0.3565679 |
| Korea  | moral | Everyone else   | 93  | 0.1397849 | 0.3486433 |
| Korea  | conv  | Everyone else   | 123 | 0.3333333 | 0.4733326 |
| Korea  | moral | Faraway country | 93  | 0.0107527 | 0.1036952 |
| Korea  | conv  | Faraway country | 123 | 0.0325203 | 0.1781029 |

| site  | task  | q_kind_label   | n   | mean      | sd        |
|-------|-------|----------------|-----|-----------|-----------|
| Korea | moral | Rule at school | 89  | 0.0674157 | 0.2521612 |
| Korea | conv  | Rule at school | 117 | 0.1538462 | 0.3623531 |

### Visualization of acceptability (all items collapsed) by site

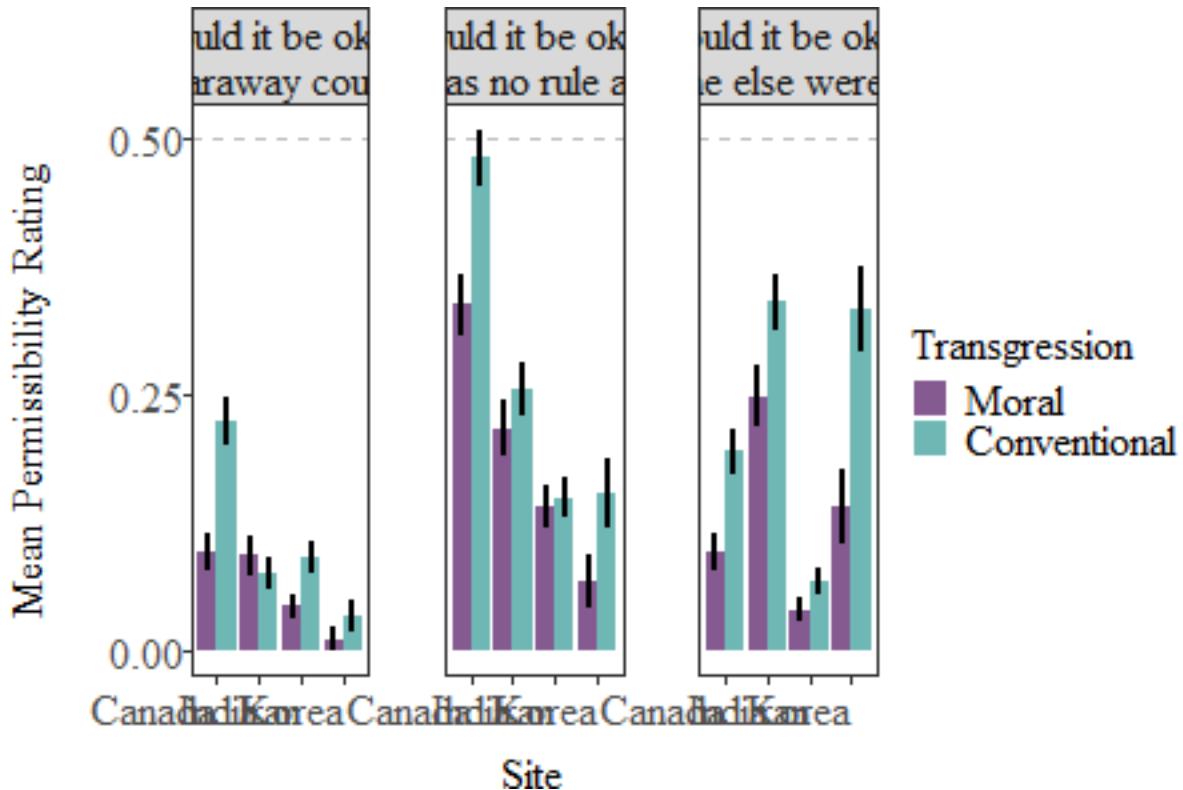
```

fig_2_v1 <- study1_data %>%
  filter(q_kind != 0) %>%
  mutate(task = factor(task, levels = c("moral", "conv"),
                       labels = c("Moral", "Conventional")),
         q_kind_label = factor(q_kind_label, levels = c("Faraway country",
                                                         "Rule at school",
                                                         "Everyone else"),
                               labels = c("Would it be okay \n\nin a faraway country?",
                                         "Would it be okay \nif there was no rule against it?",
                                         "Would it be okay \nif everyone else were doing it?")))%>%
  ggplot(aes(x = site, y = answer, fill = task)) +
  stat_summary(fun = mean, position = position_dodge(width = .9),
               geom="bar", alpha = .65) +
  geom_hline(yintercept = .5, color = "grey", linetype = "dashed") +
  facet_grid(~q_kind_label) +
  stat_summary(fun.data = "mean_se", geom="linerange",
               position = position_dodge(width=0.9), size = 1, color = "black") +
  # scale_fill_brewer(palette = "Dark2") +
  # langcog::scale_fill_solarized()+
  # scale_fill_hc("darkunica") +
  labs(y = "Mean Permissibility Rating",
       x = "Site",
       fill = "Transgression") +
  theme(axis.text.x = element_text(hjust = 1, angle = 45),
        legend.key.size = unit(.5, 'cm'),
        legend.text = element_text(size = 10),
        legend.title = element_text(size = 11),
        legend.margin=margin(t = 0, unit='cm'),
        plot.title = element_text(size = 12),
        text = element_text()) +
  guides(fill = guide_legend(title.position = "top" )) +
  scale_y_continuous(breaks = seq(0, 1,.25)) +
  theme(strip.text.x = element_text(size = 16),
        strip.text.y = element_text(size = 16, ),
        axis.text.x = element_text(angle = 0, size = 16, ),
        axis.text.y = element_text(size = 16),
        legend.text = element_text(size = 16),
        legend.title = element_text(size = 16),
        axis.title.x= element_text(vjust = -1, size=16),
        axis.title.y= element_text(vjust = 2.5, size=16),
        legend.position = "right",
        plot.margin=unit(c(6,6,6,6), "mm")) +
  theme(text=element_text(family = "serif")) +
  theme(axis.text.y = element_text(margin = margin(0, 0, 0, 15))) +
  theme(panel.spacing = unit(2, "lines")) +

```

```
scale_fill_manual(values = c(viridis::viridis(3), viridis::viridis(4)))  
  
fig_2_v1
```

```
## Warning: Removed 26 rows containing non-finite outside the scale range
## ('stat_summary()').
## Removed 26 rows containing non-finite outside the scale range
## ('stat_summary()').
```



```

# fig2_table <- study1_data %>%
#   filter(q_kind != 0) %>%
#   mutate(task = factor(task, levels = c("moral", "conv"),
#                         labels = c("Moral", "Conventional")),
#         q_kind_label = factor(q_kind_label, levels = c("Everyone else",
#                                                       "Faraway country",
#                                                       "Rule at school"),
#                               labels = c("Would it be okay \nif everyone else were doing it?",
#                                         "Would it be okay \nin a faraway country?",
#                                         "Would it be okay \nif there was no rule against it?")))
#   select()

#
# mutate(Part = as.numeric(Part)) %>%
# group_by(CONDITION) %>%
# summarise(participants = n()/12,
#           critical_trials = n(),
#           count_include = sum(Part, na.rm = T),

```

```

#           prop_include = mean(Part, na.rm = T),
#           sd_include = sd(Part, na.rm = T),
#           se_include = sd_include/sqrt(critical_trials))

```

### Analysis of acceptability ratings by transgression type: Within-country

Pre-registration: Response (yes/no) ~ Transgression type (moral; conventional) \*Age + (transgression type|subject) +(age|item). Once again we will begin with a maximal random effects structure, and iteratively remove coefficients until the model converges. We will begin first by removing the slope of the item effect, then of subject, and if necessary removing the item effect altogether.

**India High level summary** No significant difference between moral and conventional items for acceptability.

If everyone else were doing it: Answer ~ Task + Age + (1|subid) + (1|item)

1. Interaction between task and age not significant, so dropped from the model ( $\chi^2 = 0.19, p = 0.66$ )
2. No significant difference in acceptability between moral and conventional ( $\beta = 1.11, p = .09$ )
3. No significant effect of age ( $\beta = -0.15, p = 0.82$ )

```

everyone.india <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                           data = subset(acceptability.ms, q_kind == 3 & site == "India"),
                           family = 'binomial') # converges

## is the interaction between age and task significant?
everyone.india.base <- glmer(answer ~ task+age.c + (1|subid) + (1|item),
                               data = subset(acceptability.ms, q_kind == 3 & site == "India"),
                               family = 'binomial') # converges

summary(everyone.india)

```

```

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##   Family: binomial  ( logit )
## Formula: answer ~ task * age.c + (1 | subid) + (1 | item)
##   Data: subset(acceptability.ms, q_kind == 3 & site == "India")
##
##       AIC      BIC  logLik deviance df.resid
##     411.3    436.6   -199.6    399.3      499
##
## Scaled residuals:
##       Min     1Q Median     3Q    Max
## -1.7989 -0.2638 -0.0914  0.2339  3.5790
##
## Random effects:
##   Groups Name        Variance Std.Dev.
##   subid  (Intercept) 14.9942  3.8722
##   item   (Intercept)  0.5778  0.7601
##   Number of obs: 505, groups: subid, 73; item, 7
##
## Fixed effects:

```

```

##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.0068    1.0136  -2.966  0.00301 **
## taskconv     0.9662    0.7546   1.280  0.20038
## age.c       -0.2726    0.7544  -0.361  0.71777
## taskconv:age.c  0.1909    0.4368   0.437  0.66214
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) tskcnv age.c
## taskconv   -0.479
## age.c      -0.560  0.165
## taskcnv:g.c  0.219 -0.453 -0.367

summary(everyone.india.base)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: answer ~ task + age.c + (1 | subid) + (1 | item)
## Data: subset(acceptability.ms, q_kind == 3 & site == "India")
##
##      AIC      BIC  logLik deviance df.resid
## 409.5    430.6   -199.7    399.5      500
##
## Scaled residuals:
##    Min     1Q Median     3Q    Max
## -1.8307 -0.2673 -0.0896  0.2215  3.6370
##
## Random effects:
## Groups Name        Variance Std.Dev.
## subid  (Intercept) 15.0993  3.8858
## item   (Intercept)  0.5803  0.7618
## Number of obs: 505, groups: subid, 73; item, 7
##
## Fixed effects:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.1089    0.9930  -3.131  0.00174 **
## taskconv     1.1180    0.6741   1.659  0.09720 .
## age.c       -0.1516    0.7041  -0.215  0.82957
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) tskcnv
## taskconv   -0.438
## age.c      -0.529  0.000

anova(everyone.india.base, everyone.india, test = 'lrt') ## the interaction does not significantly improve the model
```

```

## Data: subset(acceptability.ms, q_kind == 3 & site == "India")
## Models:
## everyone.india.base: answer ~ task + age.c + (1 | subid) + (1 | item)
```

```

## everyone.india: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar      AIC      BIC  logLik deviance Chisq Df Pr(>Chisq)
## everyone.india.base    5 409.47 430.60 -199.74    399.47
## everyone.india       6 411.29 436.63 -199.64    399.29 0.1891   1     0.6636

##summary of main effects
knitr::kable(summary(everyone.india.base)$coef)

```

|             | Estimate   | Std. Error | z value    | Pr(> z )  |
|-------------|------------|------------|------------|-----------|
| (Intercept) | -3.1088772 | 0.9929649  | -3.1309034 | 0.0017427 |
| taskconv    | 1.1179786  | 0.6740584  | 1.6585783  | 0.0972008 |
| age.c       | -0.1515524 | 0.7040587  | -0.2152554 | 0.8295682 |

**Far-away country:** Answer ~ task + age + (1|subid) Note model with random item effect does not converge, so this is our only model

1. Interaction between task and age not significant ( $\chi^2 = 0.56, p = 0.46$ )
2. No significant difference between tasks ( $\beta = -.26, p = .45$ )
3. No significant effect of age ( $\beta = -0.60, p = .07$ )

```

### Far away country
faraway.india <- glmer(answer ~ task*age.c + (1|subid),
                         data = subset(acceptability.ms, q_kind == 1 & site == "India"),
                         family = 'binomial') # converges

## is the interaction significant?
faraway.india.base <- glmer(answer ~ task + age.c + (1|subid),
                             data = subset(acceptability.ms, q_kind == 1 & site == "India"),
                             family = 'binomial') # converges

summary(faraway.india)

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: answer ~ task * age.c + (1 | subid)
## Data: subset(acceptability.ms, q_kind == 1 & site == "India")
##
##          AIC      BIC  logLik deviance df.resid
##      275.0    296.1   -132.5    265.0      502
##
## Scaled residuals:
##      Min      1Q  Median      3Q     Max
## -0.8817 -0.2349 -0.1668 -0.1286  4.1533
##
## Random effects:
##   Groups Name        Variance Std.Dev.
##   subid  (Intercept) 2.133    1.461
##   Number of obs: 507, groups: subid, 73
##
## Fixed effects:
##             Estimate Std. Error z value Pr(>|z|)
## 
```

```

## (Intercept) -2.7894    0.4578  -6.094  1.1e-09 ***
## taskconv     -0.1223    0.4033  -0.303   0.762
## age.c        -0.4302    0.3951  -1.089   0.276
## taskconv:age.c -0.3071    0.4126  -0.744   0.457
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) tskcnv age.c
## taskconv   -0.487
## age.c      -0.404  0.310
## taskcnv:g.c  0.273 -0.475 -0.542

```

```
summary(faraway.india.base)
```

```

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: answer ~ task + age.c + (1 | subid)
## Data: subset(acceptability.ms, q_kind == 1 & site == "India")
##
##      AIC      BIC      logLik deviance df.resid
## 273.5    290.4    -132.8     265.5      503
##
## Scaled residuals:
##      Min      1Q      Median      3Q      Max
## -0.9298 -0.2542 -0.1594 -0.1365  3.8695
##
## Random effects:
## Groups Name      Variance Std.Dev.
## subid (Intercept) 2.118     1.455
## Number of obs: 507, groups: subid, 73
##
## Fixed effects:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -2.7039    0.4368  -6.190   6e-10 ***
## taskconv     -0.2646    0.3530  -0.749   0.4536
## age.c        -0.5908    0.3305  -1.787   0.0739 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) tskcnv
## taskconv   -0.412
## age.c      -0.296  0.016

```

```
anova(faraway.india.base, faraway.india, test = 'lrt') ##interaction does not improve the fit of the model
```

```

## Data: subset(acceptability.ms, q_kind == 1 & site == "India")
## Models:
## faraway.india.base: answer ~ task + age.c + (1 | subid)
## faraway.india: answer ~ task * age.c + (1 | subid)
##                  npar      AIC      BIC      logLik deviance Chisq Df Pr(>Chisq)

```

```
## faraway.india.base    4 273.52 290.44 -132.76   265.52
## faraway.india        5 274.96 296.11 -132.48   264.96 0.5568  1      0.4555
```

```
##Main effects
knitr::kable(summary(faraway.india.base)$coef)
```

|             | Estimate   | Std. Error | z value    | Pr(> z )  |
|-------------|------------|------------|------------|-----------|
| (Intercept) | -2.7038691 | 0.4367826  | -6.1904231 | 0.0000000 |
| taskconv    | -0.2645507 | 0.3530355  | -0.7493602 | 0.4536401 |
| age.c       | -0.5908460 | 0.3305487  | -1.7874702 | 0.0738615 |

Rule at school: Answer ~ Task + Age + (1|subid) + (1|item)

1. No significant interaction between task and age ( $\chi^2 = 0.02, p = 0.89$ )
2. No significant differences between tasks ( $\beta = 0.40, p = .21$ )
3. No significant effect of age ( $\beta = 0.15, p = .80$ )

```
rule.india <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                      data = subset(acceptability.ms, q_kind == 2 & site == "India"),
                      family = 'binomial') # converges
##does the interaction improve the model fit?
rule.india.base <- glmer(answer ~ task+ age.c + (1|subid) + (1|item),
                           data = subset(acceptability.ms, q_kind == 2 & site == "India"),
                           family = 'binomial') # converges

summary(rule.india)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: answer ~ task * age.c + (1 | subid) + (1 | item)
## Data: subset(acceptability.ms, q_kind == 2 & site == "India")
##
##      AIC      BIC  logLik deviance df.resid
##      436.7    462.1   -212.3     424.7      502
##
## Scaled residuals:
##      Min      1Q  Median      3Q     Max
## -2.0945 -0.3547 -0.1738 -0.1356  2.9759
##
## Random effects:
## Groups Name        Variance Std.Dev.
## subid  (Intercept) 6.71658  2.5916
## item   (Intercept) 0.02475  0.1573
## Number of obs: 508, groups: subid, 73; item, 7
##
## Fixed effects:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -2.69643   0.62786  -4.295 1.75e-05 ***
## taskconv     0.43704   0.42339   1.032   0.302
## age.c       0.17828   0.52714   0.338   0.735
```

```

## taskconv:age.c -0.05227    0.38223  -0.137    0.891
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) tskcnv age.c
## taskconv   -0.438
## age.c     -0.628  0.302
## taskcnv:g.c  0.285 -0.669 -0.443

```

```
summary(rule.india.base)
```

```

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: answer ~ task + age.c + (1 | subid) + (1 | item)
## Data: subset(acceptability.ms, q_kind == 2 & site == "India")
##
##      AIC      BIC  logLik deviance df.resid
## 434.7  455.9  -212.4    424.7     503
##
## Scaled residuals:
##    Min     1Q Median     3Q    Max
## -2.1032 -0.3522 -0.1739 -0.1382  2.9641
##
## Random effects:
## Groups Name        Variance Std.Dev.
## subid  (Intercept) 6.71271  2.5909
## item   (Intercept) 0.02475  0.1573
## Number of obs: 508, groups: subid, 73; item, 7
##
## Fixed effects:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -2.6723    0.6013  -4.444 8.83e-06 ***
## taskconv     0.3984    0.3148   1.266   0.206
## age.c       0.1464    0.4724   0.310   0.757
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) tskcnv
## taskconv   -0.347
## age.c     -0.584  0.006

```

```
anova(rule.india.base, rule.india, test = 'lrt') #does not improve model fit
```

```

## Data: subset(acceptability.ms, q_kind == 2 & site == "India")
## Models:
## rule.india.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## rule.india: answer ~ task * age.c + (1 | subid) + (1 | item)
##             npar    AIC      BIC  logLik deviance Chisq Df Pr(>Chisq)
## rule.india.base  5 434.71 455.86 -212.35    424.71
## rule.india       6 436.69 462.07 -212.34    424.69  0.0187  1     0.8912

```

```
#Main effects
knitr::kable(summary(rule.india.base)$coef)
```

|             | Estimate   | Std. Error | z value    | Pr(> z )  |
|-------------|------------|------------|------------|-----------|
| (Intercept) | -2.6722815 | 0.6013307  | -4.4439465 | 0.0000088 |
| taskconv    | 0.3984077  | 0.3147845  | 1.2656520  | 0.2056377 |
| age.c       | 0.1463927  | 0.4724081  | 0.3098861  | 0.7566476 |

**Iran High level summary** No significant effects of task - some marginal effect in “everyone else” and “rule at school”

**If everyone else were doing it: Answer ~ Task + Age + (1|subid)** **Note** The model with the item random effect does not converge, so this is our only model

1. Interaction between task and age not significant, so dropped from the model ( $\chi^2 = 0.08, p = 0.77$ )
2. No significant difference in acceptability between moral and conventional ( $\beta = 1.03, p = .06$ )
3. No significant effect of age ( $\beta = 0.61, p = 0.42$ )

```
everyone.iran <- glmer(answer ~ task*age.c + (1|subid),
                         data = subset(acceptability.ms, q_kind == 3 & site == "Iran"),
                         family = 'binomial') # converges

## is the interaction between age and task significant?
everyone.iran.base <- glmer(answer ~ task+age.c + (1|subid),
                             data = subset(acceptability.ms, q_kind == 3 & site == "Iran"),
                             family = 'binomial') # converges
anova(everyone.iran.base, everyone.iran, test = 'lrt') ## the interaction does not significantly improve the model

## Data: subset(acceptability.ms, q_kind == 3 & site == "Iran")
## Models:
## everyone.iran.base: answer ~ task + age.c + (1 | subid)
## everyone.iran: answer ~ task * age.c + (1 | subid)
##          npar      AIC      BIC logLik deviance Chisq Df Pr(>Chisq)
## everyone.iran.base     4 172.72 190.23 -82.360    164.72
## everyone.iran           5 174.63 196.53 -82.317    164.63 0.0849   1     0.7707

##summary of main effects
knitr::kable(summary(everyone.iran.base)$coef)
```

|             | Estimate   | Std. Error | z value   | Pr(> z )  |
|-------------|------------|------------|-----------|-----------|
| (Intercept) | -8.6110644 | 1.4518651  | -5.931036 | 0.0000000 |
| taskconv    | 1.0280234  | 0.5491974  | 1.871865  | 0.0612253 |
| age.c       | 0.6049413  | 0.7439287  | 0.813171  | 0.4161200 |

**Far-away country:**  $\text{Answer} \sim \text{task} + \text{age} + (1|\text{subid}) + (1|\text{item})$

1. Interaction between task and age not significant ( $\chi^2 = 0.0007, p = 0.98$ )
2. No significant difference between tasks ( $\beta = 2.74, p = .05$ )
3. No significant effect of age ( $\beta = 0.60, p = .49$ )

```
### Far away country
faraway.iran <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                        data = subset(acceptability.ms, q_kind == 1 & site == "Iran"),
                        family = 'binomial') # converges
## is the interaction significant?
faraway.iran.base <- glmer(answer ~ task + age.c + (1|subid) + (1|item),
                            data = subset(acceptability.ms, q_kind == 1 & site == "Iran"),
                            family = 'binomial') # converges
anova(faraway.iran.base, faraway.iran, test = 'lrt') ##interaction does not improve the fit of the model

## Data: subset(acceptability.ms, q_kind == 1 & site == "Iran")
## Models:
## faraway.iran.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## faraway.iran: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar    AIC    BIC  logLik deviance Chisq Df Pr(>Chisq)
## faraway.iran.base     5 169.17 191.05 -79.583   159.17
## faraway.iran         6 171.17 197.43 -79.583   159.17 7e-04  1      0.9785

##Main effects
knitr::kable(summary(faraway.iran.base)$coef)
```

|             | Estimate    | Std. Error | z value    | Pr(> z )  |
|-------------|-------------|------------|------------|-----------|
| (Intercept) | -12.6207763 | 1.9750797  | -6.3900087 | 0.0000000 |
| taskconv    | 2.7443718   | 1.4205557  | 1.9319001  | 0.0533718 |
| age.c       | 0.5994695   | 0.8770105  | 0.6835374  | 0.4942674 |

**Rule at school:**  $\text{Answer} \sim \text{Task} + \text{Age} + (1|\text{subid}) + (1|\text{item})$

1. No significant interaction between task and age ( $\chi^2 = 0.68, p = 0.41$ )
2. No significant differences between tasks ( $\beta = 0.56, p = .43$ )
3. No significant effect of age ( $\beta = -0.61, p = .43$ )
4. No significant interaction between age and task ( $\beta = -0.44, p = .42$ )

```
rule.iran <- glmer(answer ~ task*age.c + (1|subid),
                      data = subset(acceptability.ms, q_kind == 2 & site == "Iran"),
                      family = 'binomial') # converges
##does the interaction improve the model fit?
rule.iran.base <- glmer(answer ~ task+ age.c + (1|subid),
                         data = subset(acceptability.ms, q_kind == 2 & site == "Iran"),
                         family = 'binomial') # converges
anova(rule.iran.base, rule.iran, test = 'lrt') #does not improve model fit
```

```
## Data: subset(acceptability.ms, q_kind == 2 & site == "Iran")
## Models:
```

```

## rule.iran.base: answer ~ task + age.c + (1 | subid)
## rule.iran: answer ~ task * age.c + (1 | subid)
##          npar    AIC    BIC  logLik deviance   Chisq Df Pr(>Chisq)
## rule.iran.base    4 271.34 288.84 -131.67    263.34
## rule.iran        5 272.66 294.54 -131.33    262.66  0.6754  1     0.4112

#Main effects
knitr::kable(summary(rule.iran.base)$coef)

```

|             | Estimate   | Std. Error | z value    | Pr(> z )  |
|-------------|------------|------------|------------|-----------|
| (Intercept) | -8.2298522 | 1.2546832  | -6.5593071 | 0.0000000 |
| taskconv    | 0.6423313  | 0.4472391  | 1.4362144  | 0.1509413 |
| age.c       | 0.2996045  | 0.6480059  | 0.4623484  | 0.6438315 |

**Canada High level summary** There is a significant difference between moral and conventional items for every scenario, regardless of whether we include the item random effect or not.

If everyone else were doing it: Answer ~ Task + Age + (1|subid) + (1|item)

1. Interaction between task and age not significant, so dropped from the model ( $\chi^2 = 0.62, p = 0.43$ )
2. Significant difference in acceptability between moral and conventional ( $\beta = 1.42, p = .02$ )
3. No significant effect of age ( $\beta = 0.80, p = 0.07$ )

```

everyone.canada <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                           data = subset(acceptability.ms, q_kind == 3 & site == "Canada"),
                           family = 'binomial') # converges

## is the interaction between age and task significant?
everyone.canada.base <- glmer(answer ~ task+age.c + (1|subid) + (1|item),
                                 data = subset(acceptability.ms, q_kind == 3 & site == "Canada"),
                                 family = 'binomial') # converges
anova(everyone.canada.base, everyone.canada, test = 'lrt') ## the interaction does not significantly imp...

## Data: subset(acceptability.ms, q_kind == 3 & site == "Canada")
## Models:
## everyone.canada.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## everyone.canada: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar    AIC    BIC  logLik deviance   Chisq Df Pr(>Chisq)
## everyone.canada.base    5 363.96 385.60 -176.98    353.96
## everyone.canada        6 365.35 391.31 -176.67    353.35  0.6165  1     0.4323

##summary of main effects
knitr::kable(summary(everyone.canada.base)$coef)

```

|             | Estimate   | Std. Error | z value   | Pr(> z )  |
|-------------|------------|------------|-----------|-----------|
| (Intercept) | -4.2897440 | 0.7832951  | -5.476537 | 0.0000000 |
| taskconv    | 1.4235859  | 0.6039689  | 2.357052  | 0.0184207 |
| age.c       | 0.7969995  | 0.4370348  | 1.823652  | 0.0682046 |

Far-away country:  $\text{Answer} \sim \text{task} + \text{age} + (1|\text{subid}) + (1|\text{item})$

- Interaction between task and age not significant ( $\chi^2 = 1.20, p = .27$ )
- Significant difference between tasks ( $\beta = 1.50, p = .02$ )
- No significant effect of age ( $\beta = -0.24, p = .45$ )

```
## Far away country
faraway.canada <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                           data = subset(acceptability.ms, q_kind == 1 & site == "Canada"),
                           family = 'binomial') # singular fit
## is the interaction significant?
faraway.canada.base <- glmer(answer ~ task + age.c + (1|subid) + (1|item),
                               data = subset(acceptability.ms, q_kind == 1 & site == "Canada"),
                               family = 'binomial') # converges
anova(faraway.canada.base, faraway.canada, test = 'lrt') ##interaction does improve the fit of the model
```

```
## Data: subset(acceptability.ms, q_kind == 1 & site == "Canada")
## Models:
## faraway.canada.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## faraway.canada: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)
## faraway.canada.base     5 407.6 429.25 -198.8     397.6
## faraway.canada         6 408.4 434.38 -198.2     396.4 1.1961   1     0.2741
```

```
##summary of main effects
knitr::kable(summary(faraway.canada.base)$coef)
```

|             | Estimate   | Std. Error | z value   | Pr(> z )  |
|-------------|------------|------------|-----------|-----------|
| (Intercept) | -3.8498583 | 0.6535797  | -5.890419 | 0.0000000 |
| taskconv    | 1.5017141  | 0.6512281  | 2.305972  | 0.0211122 |
| age.c       | -0.2412393 | 0.3182165  | -0.758098 | 0.4483923 |

Rule at school:  $\text{Answer} \sim \text{Task} + \text{Age} + (1|\text{subid}) + (1|\text{item})$

- No significant interaction between task and age ( $\chi^2 = 2.77, p = 0.10$ )
- Significant differences between tasks ( $\beta = 1.53, p = .03$ )
- Significant effect of age ( $\beta = -0.01, p = .02$ )

```
rule.canada <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                       data = subset(acceptability.ms, q_kind == 2 & site == "Canada"),
                       family = 'binomial') # converges
##does the interaction improve the model fit?
rule.canada.base <- glmer(answer ~ task+ age.c + (1|subid) + (1|item),
                           data = subset(acceptability.ms, q_kind == 2 & site == "Canada"),
                           family = 'binomial') # converges
anova(rule.canada.base, rule.canada, test = 'lrt') #does not improve model fit
```

```

## Data: subset(acceptability.ms, q_kind == 2 & site == "Canada")
## Models:
## rule.canada.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## rule.canada: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)
## rule.canada.base    5 505.06 526.70 -247.53   495.06
## rule.canada         6 504.30 530.26 -246.15   492.30 2.7694  1   0.09608 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

#### #Main effects

```
knitr::kable(summary(rule.canada.base)$coef)
```

|             | Estimate  | Std. Error | z value   | Pr(> z )  |
|-------------|-----------|------------|-----------|-----------|
| (Intercept) | -1.975871 | 0.6823190  | -2.895816 | 0.0037817 |
| taskconv    | 1.533025  | 0.6908249  | 2.219123  | 0.0264784 |
| age.c       | -1.006612 | 0.4459201  | -2.257382 | 0.0239842 |

**Korea High level summary** Significant differences between tasks in the “everyone else is doing it” regardless of whether model includes item random effect

If everyone else were doing it: Answer ~ Task + Age + (1|subid) + (1|item)

1. Interaction between task and age not significant, so dropped from the model ( $\chi^2 = 0.83, p = 0.36$ )
2. Significant difference in acceptability between moral and conventional ( $\beta = 1.73, p = .006$ )
3. Significant effect of age ( $\beta = 1.77, p = 0.01$ )

```

everyone.korea <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                         data = subset(acceptability.ms, q_kind == 3 & site == "Korea"),
                         family = 'binomial') # converges

## is the interaction between age and task significant?
everyone.korea.base <- glmer(answer ~ task+age.c + (1|subid) + (1|item),
                               data = subset(acceptability.ms, q_kind == 3 & site == "Korea"),
                               family = 'binomial') # converges
anova(everyone.korea.base, everyone.korea, test = 'lrt') ## the interaction does not significantly improve the fit

## Data: subset(acceptability.ms, q_kind == 3 & site == "Korea")
## Models:
## everyone.korea.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## everyone.korea: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)
## everyone.korea.base    5 201.24 218.11 -95.619   191.24
## everyone.korea         6 202.41 222.66 -95.205   190.41 0.8272  1   0.3631

##summary of main effects
knitr::kable(summary(everyone.korea.base)$coef)

```

|             | Estimate  | Std. Error | z value   | Pr(> z )  |
|-------------|-----------|------------|-----------|-----------|
| (Intercept) | -3.667272 | 0.8159399  | -4.494537 | 0.0000070 |
| taskconv    | 1.730027  | 0.6301385  | 2.745471  | 0.0060424 |
| age.c       | 1.773927  | 0.7124752  | 2.489808  | 0.0127812 |

Far-away country:  $\text{Answer} \sim \text{task} + \text{age} + (1|\text{subid}) + (1|\text{item})$

- Interaction between task and age not significant ( $\chi^2 = 1.77, p = 0.20$ )
- No significant difference between tasks ( $\beta = -1.12, p = .39$ )
- No significant effect of age ( $\beta = -0.23, p = .77$ )

```
### Far away country
faraway.korea <- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                         data = subset(acceptability.ms, q_kind == 1 & site == "Korea"),
                         family = 'binomial') # fails to converge

faraway.korea.base <- glmer(answer ~ task + age.c + (1|subid) + (1|item),
                             data = subset(acceptability.ms, q_kind == 1 & site == "Korea"),
                             family = 'binomial') # converges
anova(faraway.korea.base, faraway.korea, test = 'lrt') ##interaction does not improve the fit of the model

## Data: subset(acceptability.ms, q_kind == 1 & site == "Korea")
## Models:
## faraway.korea.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## faraway.korea: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar   AIC   BIC logLik deviance Chisq Df Pr(>Chisq)
## faraway.korea.base     5 55.835 72.712 -22.918   45.835
## faraway.korea         6 56.070 76.322 -22.035   44.070 1.7655  1    0.1839

##Main effects
knitr::kable(summary(faraway.korea.base)$coef)
```

|             | Estimate   | Std. Error | z value    | Pr(> z )  |
|-------------|------------|------------|------------|-----------|
| (Intercept) | -4.6876380 | 1.2251435  | -3.8261951 | 0.0001301 |
| taskconv    | 1.1194218  | 1.2883020  | 0.8689126  | 0.3848950 |
| age.c       | -0.2293222 | 0.7745087  | -0.2960873 | 0.7671634 |

Rule at school:  $\text{Answer} \sim \text{Task} + \text{Age} + (1|\text{subid}) + (1|\text{item})$

- No significant interaction between task and age ( $\chi^2 = 2.69, p = 0.10$ )
- No significant differences between tasks ( $\beta = 1.50, p = .11$ )
- Marginal significant effect of age ( $\beta = 1.95, p = .049$ )

```
rule.korea<- glmer(answer ~ task*age.c + (1|subid) + (1|item),
                      data = subset(acceptability.ms, q_kind == 2 & site == "Korea"),
                      family = 'binomial') # converges
##does the interaction improve the model fit?
rule.korea.base <- glmer(answer ~ task+ age.c + (1|subid) + (1|item),
                           data = subset(acceptability.ms, q_kind == 2 & site == "Korea"),
                           family = 'binomial') # converges
anova(rule.korea.base, rule.korea, test = 'lrt') #does not improve model fit
```

```

## Data: subset(acceptability.ms, q_kind == 2 & site == "Korea")
## Models:
## rule.korea.base: answer ~ task + age.c + (1 | subid) + (1 | item)
## rule.korea: answer ~ task * age.c + (1 | subid) + (1 | item)
##          npar    AIC    BIC  logLik deviance Chisq Df Pr(>Chisq)
## rule.korea.base     5 123.04 139.68 -56.519   113.04
## rule.korea         6 122.34 142.31 -55.172   110.34 2.694   1    0.1007

##Main effects
knitr::kable(summary(rule.korea.base)$coef)

```

|             | Estimate  | Std. Error | z value   | Pr(> z )  |
|-------------|-----------|------------|-----------|-----------|
| (Intercept) | -5.543478 | 1.4510567  | -3.820304 | 0.0001333 |
| taskconv    | 1.499992  | 0.9335060  | 1.606837  | 0.1080901 |
| age.c       | 1.948940  | 0.9924811  | 1.963705  | 0.0495643 |

=====

### Differences in ratings across cultures: Answer ~ Site x Task x Age + (1|subid)

Tested for significance using likelihood ratio tests and nested model comparison.

1. Significant effect of site ( $\chi^2 = 92.13, p < .001$ )
2. Significant effect of transgression type ( $\chi^2 = 87.96, p < .001$ )
3. Significant effect of age ( $\chi^2 = 20.57, p < .001$ )
4. Two-way interaction between task and age ( $\chi^2 = 7.06, p = .008$ )
5. Two-way interaction between site and task ( $\chi^2 = 25.50, p < .001$ )
6. NO two-way interaction between site and age ( $\chi^2 = 0.35, p = .95$ )
7. Three-way interaction between site, task, and age ( $\chi^2 = 14.71, p = .002$ )

Pairwise comparisons for this omnibus model

```

library(lsmeans)

## Loading required package: emmeans

## Welcome to emmeans.
## Caution: You lose important information if you filter this package's results.
## See '? untidy'

## The 'lsmeans' package is now basically a front end for 'emmeans'.
## Users are encouraged to switch the rest of the way.
## See help('transition') for more information, including how to
## convert old 'lsmeans' objects and scripts to work with 'emmeans'.

emmeans(omnibus.full, pairwise~site*task, adjust = "none")

## NOTE: Results may be misleading due to involvement in interactions

```

```

## $emmeans
##   site  task emmean    SE df lower.CL upper.CL
##   Canada moral  1.83 0.0727 520    1.689    1.97
##   India  moral  1.17 0.0960 525    0.981    1.36
##   Korea  moral  1.30 0.1289 517    1.050    1.56
##   Iran   moral  1.29 0.0727 504    1.148    1.43
##   Canada conv   2.29 0.0677 399    2.156    2.42
##   India  conv   1.45 0.0896 406    1.274    1.63
##   Korea  conv   1.60 0.1200 397    1.364    1.84
##   Iran   conv   1.42 0.0686 406    1.283    1.55
##
## Degrees-of-freedom method: kenward-roger
## Confidence level used: 0.95
##
## $contrasts
##   contrast           estimate    SE   df t.ratio p.value
##   Canada moral - India moral  0.6625 0.1204 523   5.503 <.0001
##   Canada moral - Korea moral  0.5290 0.1480 518   3.575 0.0004
##   Canada moral - Iran moral  0.5414 0.1028 512   5.266 <.0001
##   Canada moral - Canada conv -0.4570 0.0701 1593  -6.522 <.0001
##   Canada moral - India conv   0.3824 0.1153 447   3.315 0.0010
##   Canada moral - Korea conv   0.2316 0.1403 426   1.651 0.0995
##   Canada moral - Iran conv   0.4139 0.0999 462   4.142 <.0001
##   India moral - Korea moral -0.1335 0.1607 520  -0.831 0.4065
##   India moral - Iran moral  -0.1211 0.1204 517  -1.006 0.3149
##   India moral - Canada conv  -1.1196 0.1174 478  -9.534 <.0001
##   India moral - India conv   -0.2801 0.0930 1595  -3.013 0.0026
##   India moral - Korea conv   -0.4309 0.1537 442  -2.804 0.0053
##   India moral - Iran conv   -0.2486 0.1179 480  -2.108 0.0356
##   Korea moral - Iran moral   0.0124 0.1480 514   0.084 0.9334
##   Korea moral - Canada conv -0.9861 0.1456 488  -6.774 <.0001
##   Korea moral - India conv   -0.1466 0.1569 477  -0.934 0.3506
##   Korea moral - Korea conv   -0.2974 0.1241 1592  -2.397 0.0167
##   Korea moral - Iran conv   -0.1151 0.1460 490  -0.788 0.4308
##   Iran moral - Canada conv  -0.9984 0.0993 451  -10.052 <.0001
##   Iran moral - India conv   -0.1590 0.1153 442  -1.378 0.1687
##   Iran moral - Korea conv   -0.3098 0.1403 423  -2.207 0.0278
##   Iran moral - Iran conv   -0.1275 0.0707 1615  -1.803 0.0715
##   Canada conv - India conv   0.8394 0.1123 404   7.478 <.0001
##   Canada conv - Korea conv   0.6887 0.1378 398   4.998 <.0001
##   Canada conv - Iran conv   0.8710 0.0963 403   9.040 <.0001
##   India conv - Korea conv   -0.1508 0.1498 401  -1.007 0.3147
##   India conv - Iran conv    0.0315 0.1128 406   0.280 0.7799
##   Korea conv - Iran conv    0.1823 0.1382 400   1.319 0.1880
##
## Degrees-of-freedom method: kenward-roger

```