Hierarchical and Mixed Effects Model

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1 Random-effect syntax

- `(1|group)`: Random intercept with fixed mean
- `(1|group1/group2)`: Intercepts vary among `g1` and `g2` within `g2`
- `(1|group1) + (1|group2)`: Random intercepts for 2 variables
- `x + (x|group)`: Correlated random slope and intercept
- `x + (x||group)`: Uncorrelated random slope and intercept

```
require(ggplot2)
require(lme4)

# First, re-run the model to re-load it
outLmer <- lmer( response ~ x + (1|group), data = multIntDemo)

# Second, save the model predictions as a column to the original data.frame
multIntDemo$lmerPredict <- predict(outLmer)

# Third, plot the original data
ggmultIntgDemo2 <- ggplot( multIntDemo, aes(x = x, y = response) ) +
  geom_point(aes(color = group))+
  theme_minimal() +
  scale_color_manual(values = c("blue", "black", "red")) +
  geom_abline(data = multIntDemo,
              aes(intercept = intercept, slope = slope, color = group))

# Fourth, use the predicted values to plot the new outputs
ggmultIntgDemo2 +
  geom_line( data =  multIntDemo,
             aes(x = x, y = lmerPredict, color = group),
             linetype = 2)
```

```
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# Second, save the model predictions as a column to the original data.frame
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# Third, plot the original data
ggmultIntgDemo2 <- ggplot( multIntDemo, aes(x = x, y = response) ) +
        geom_point(aes(color = group))+
        theme_minimal() +
        scale_color_manual(values = c("blue", "black", "red")) +
        geom_abline(data = multIntDemo,
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```

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```r
# Fourth, use the residual to plot the new outputs
ggmultIntgDemo2 +
    geom_line( data =  multIntDemo,
               aes(x = x, y = lmerPredict, color = group),
               linetype = 2)
```