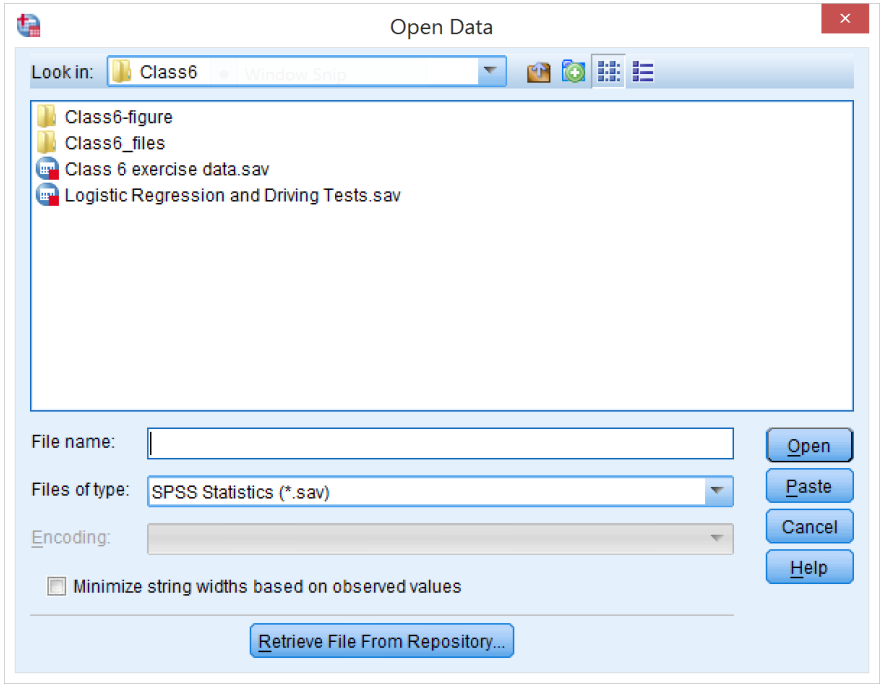
Doing the Class 6 exercise in SPSS

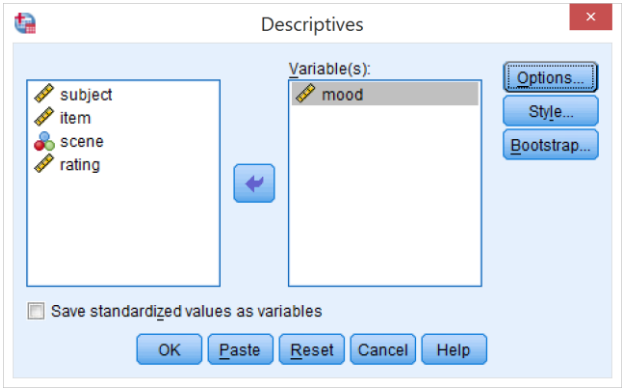
Open the data file

- If you want to open the csv file directly, the instructions for that are in the “Homework 4 in SPSS” presentation on myBU.



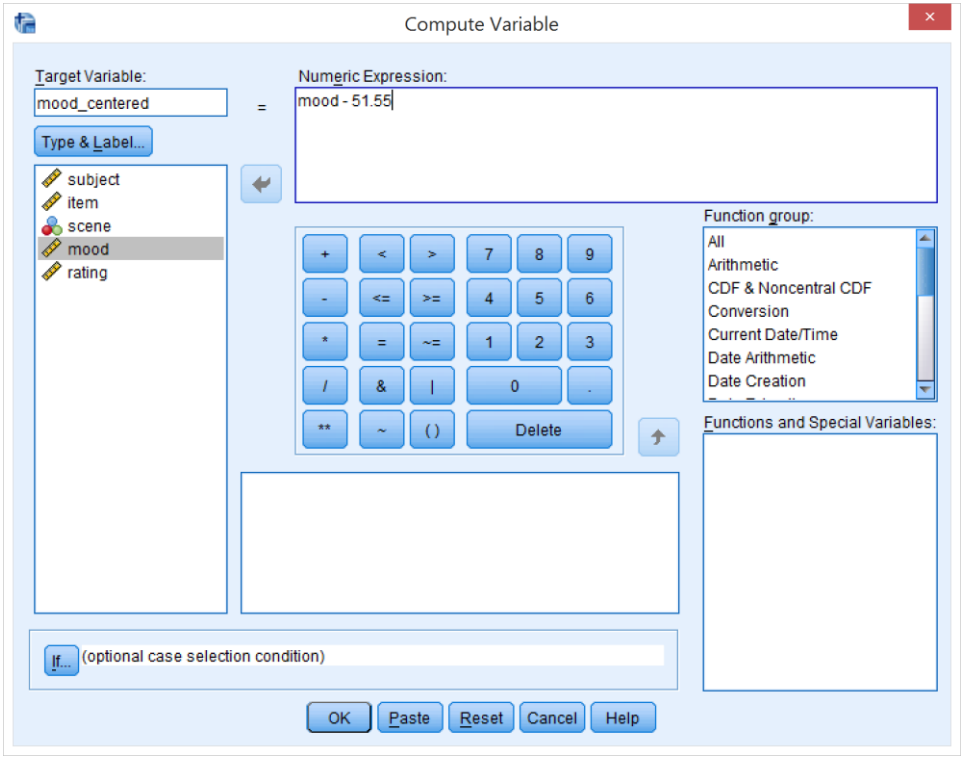
Perform the linear regression

- We want to have two main effects and one interaction
- First thing to do: center the mood variable
- Need to know the mean first:
- Analyze
  → Descriptive Statistics
    → Descriptives
- Select the mood variable
- Click OK



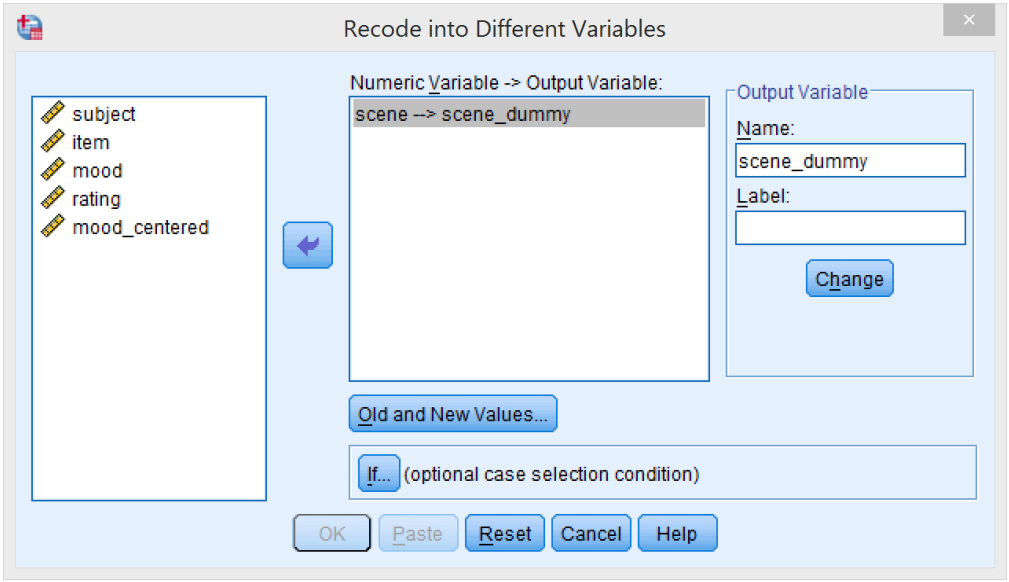
Center the mood variable

- From the output we learn that the mean of the mood variable is 51.55
- Now make a new variable mood_centered by subtracting the mean from each value
- Transform → Compute Variable
- Enter the new variable name, the formula "mood – 51.55"
- Click OK



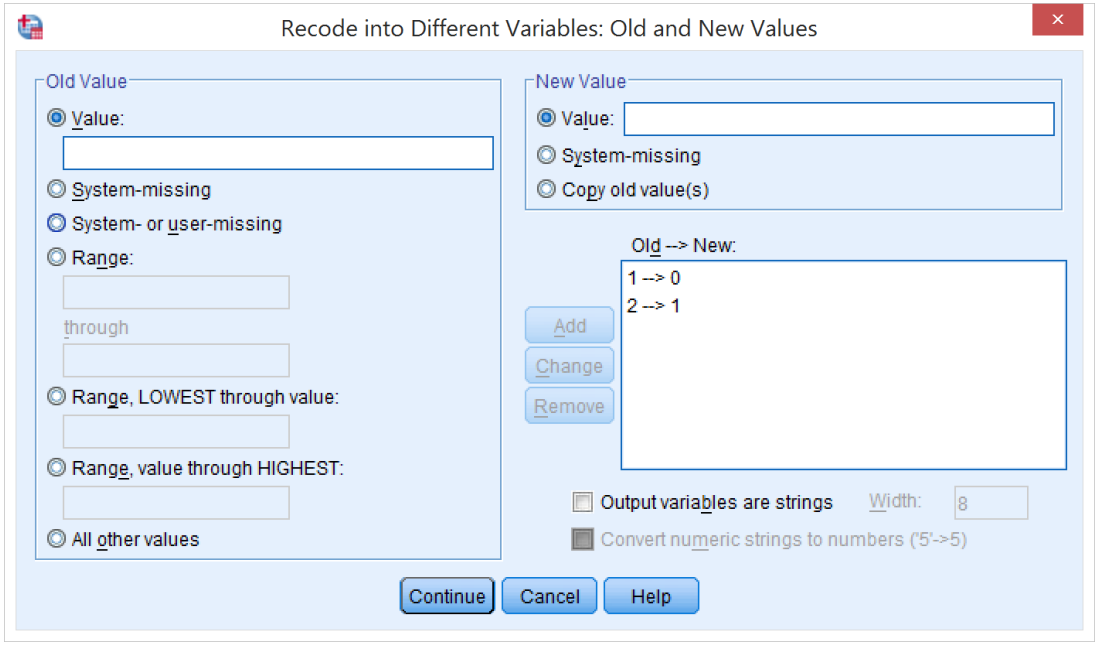
Adding the interaction term

- SPSS forces you to compute the interaction term by hand if you want to add it to a regression model
- To start, we need to dummy-code “scene” to make sure that the correct contrasts are used
- Transform → Recode into different variables
- Select “scene”
- Choose a name for the output variable (“scene_dummy”)
- Click Old and New Values



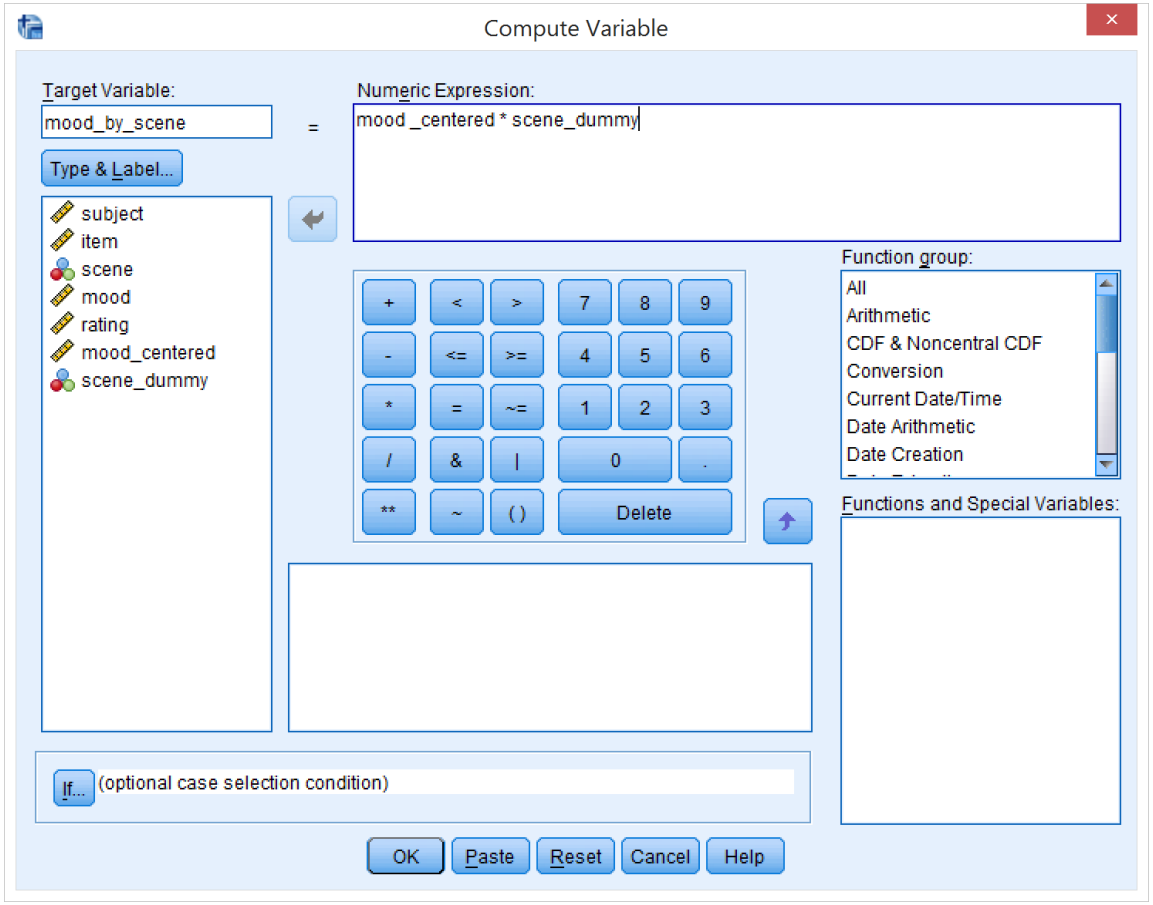
Recoding scene

- Old and New Values
- Replace 1 with 0 and 2 with 1 by entering each pair of numbers in “Old value” and “New value” and pressing “Add”
- Click Continue
- Click OK



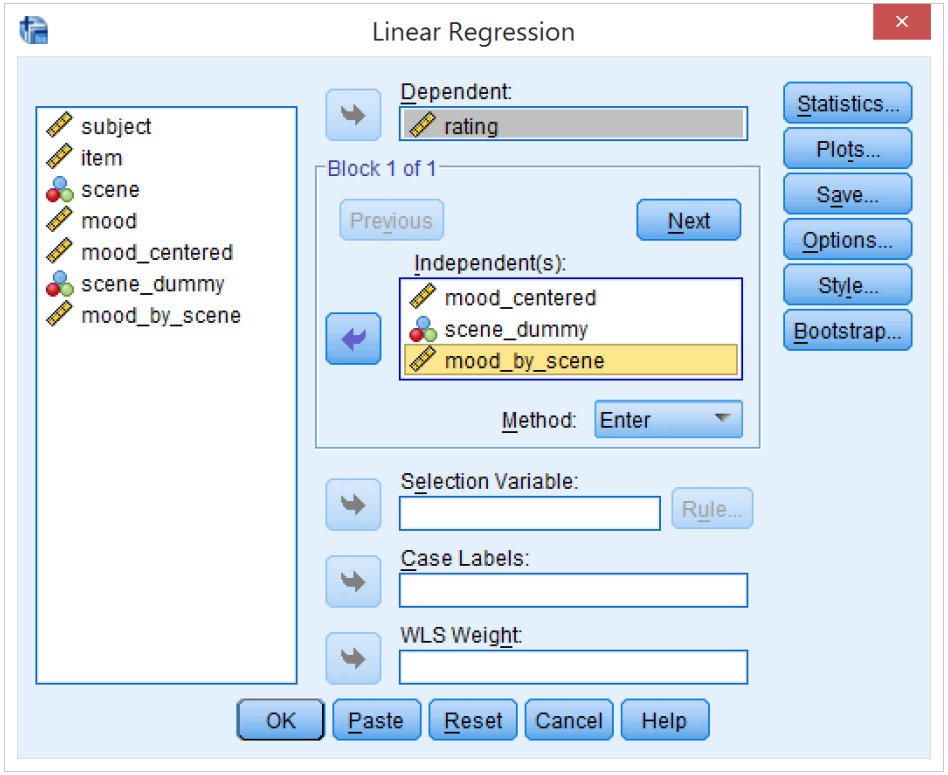
Computing the interaction term

- Transform → Compute Variable
- Give it a good name, e.g. mood_by_scene
- Enter the formula: mood_centered * scene_dummy
- Click OK



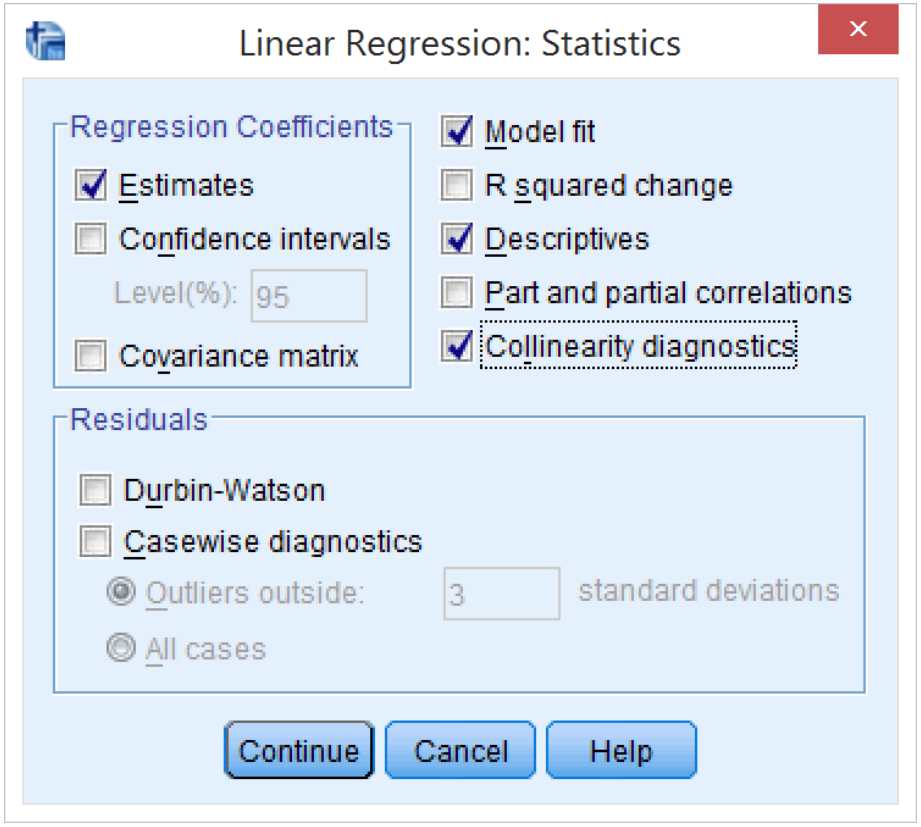
Running the regression

- Analyze → Regression → Linear
- Enter rating as the dependent variable
- Enter the centered mood variable, the recoded scene variable, and the interaction term as independent variables



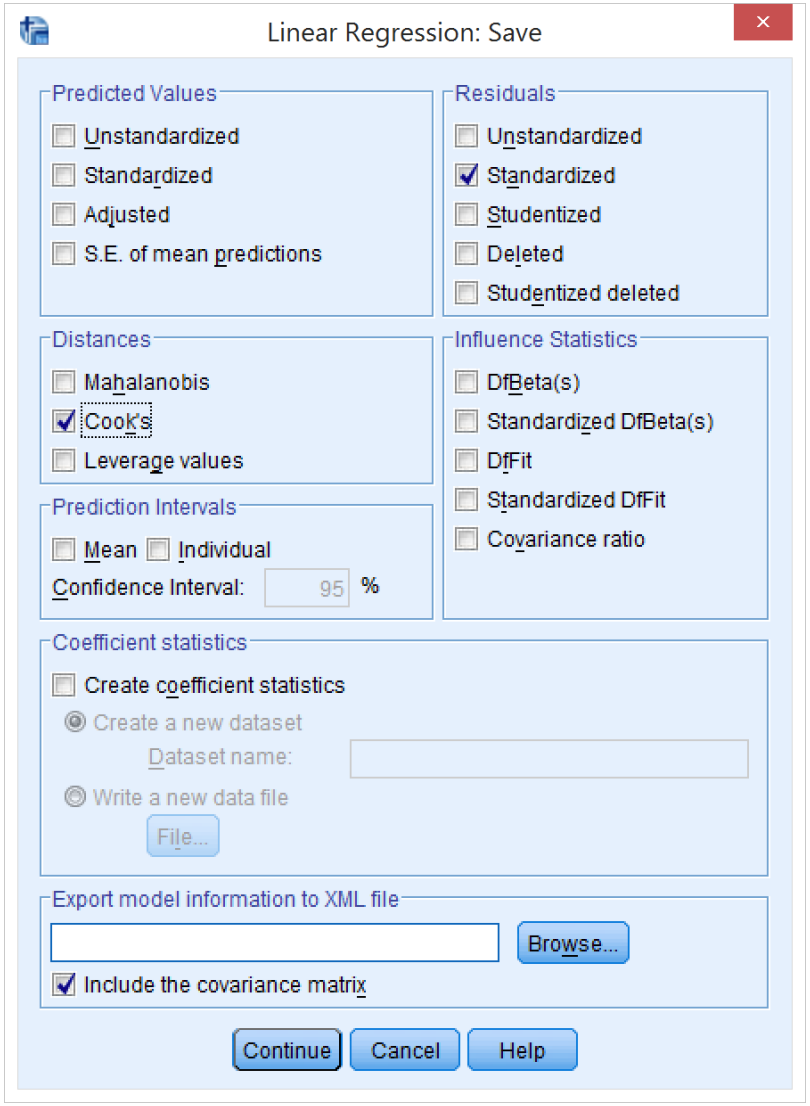
Running the regression (2)

- Click Statistics…
- Select Descriptives
- Select Collinearity diagnostics
- Click Continue



Running the regression (3)

- Click Save…
- Select Standardized Residuals
- Select Cook's distance
- Click Continue
- Click OK to run the regression



Regression results

- Look at the output: Nothing is significant
  - No multicollinearity issues (max VIF = 2)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.283	3	13.428	1.926	.123[b]
	Residual	11128.235	1596	6.973		
	Total	11168.518	1599			

a. Dependent Variable: rating

b. Predictors: (Constant), mood_by_scene, scene_dummy, mood_centered

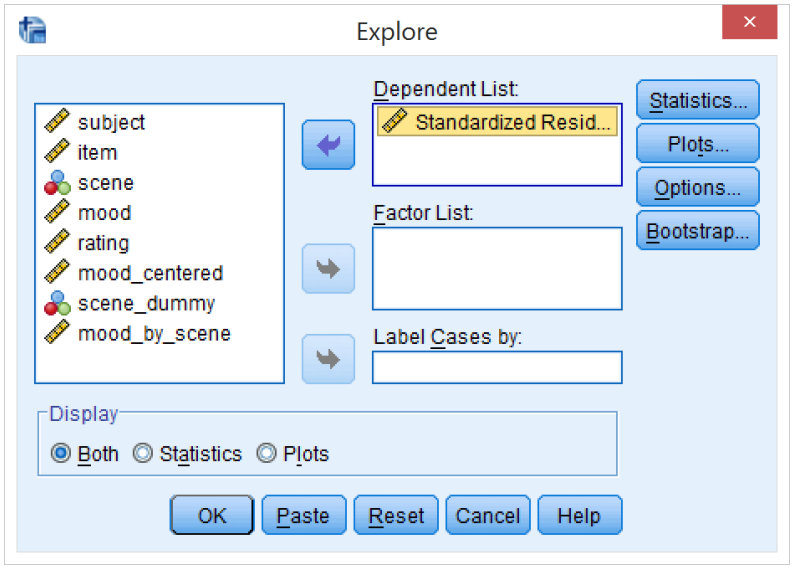
Coefficients[a]

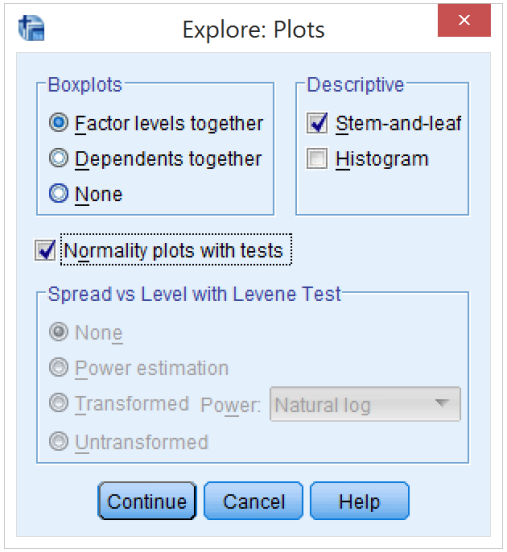
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	11.328	.093		121.342	.000		
	mood_centered	-.007	.004	-.058	-1.650	.099	.500	2.000
	scene_dummy	-.208	.132	-.039	-1.579	.114	1.000	1.000
	mood_by_scene	.011	.006	.060	1.696	.090	.500	2.000

a. Dependent Variable: rating

Regression results

- Check normality of residuals
  - Analyze→Descriptives →Explore
- Select the new standardized residuals variable
- Click “Plots…”
- Select Normality plots with tests
- Click Continue
- Click OK





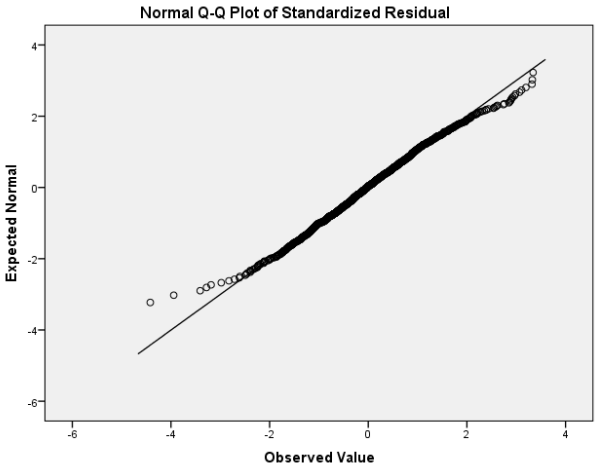
Testing normality of the residuals

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual	.020	1600	.129	.995	1600	.000

a. Lilliefors Significance Correction

- Shapiro-Wilk shows a significant deviation from normality (although K-F doesn't)
- Visual inspection of the normal Quantile-Quantile plot also shows deviations from normality

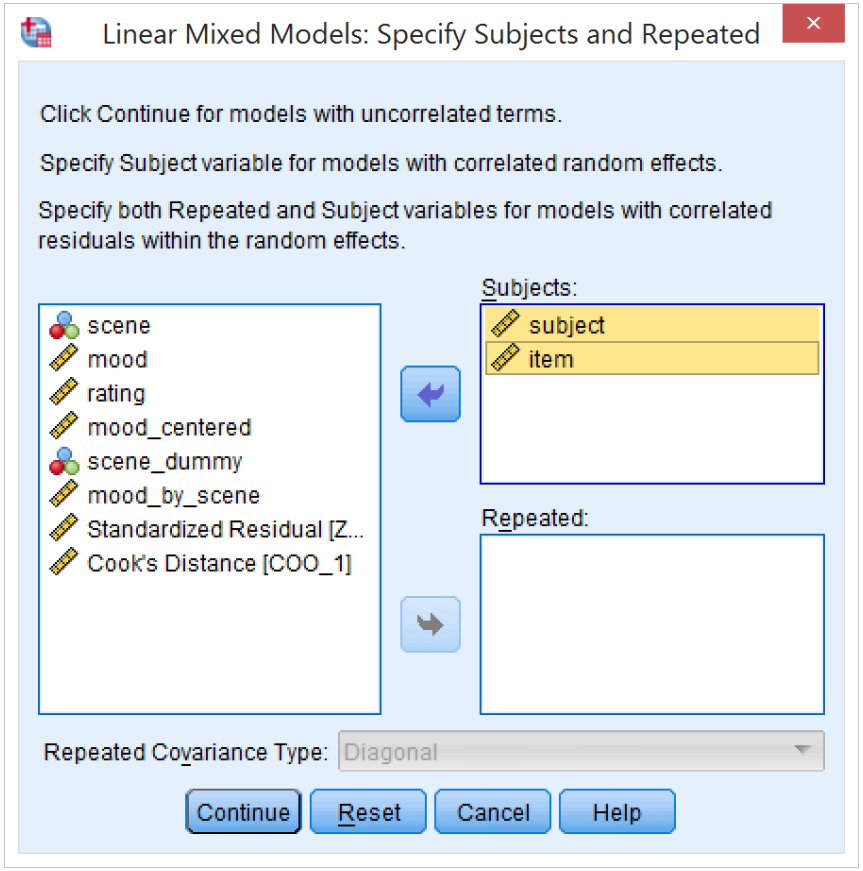


Regression results

- Outliers: in the new Cook's D column (COO_1), check if any values are > 1

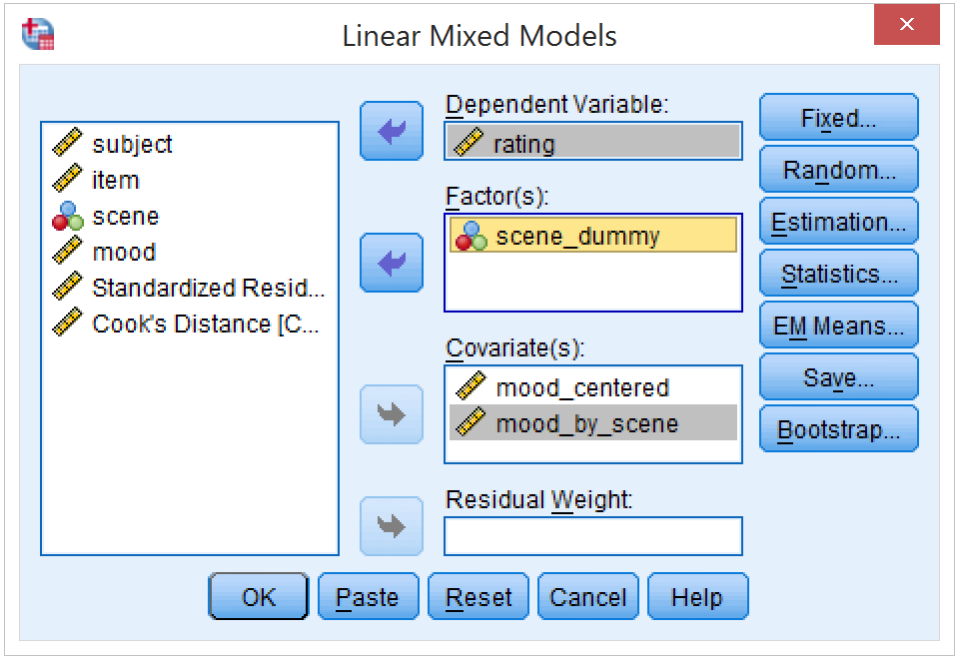
Linear mixed model

- Analyze → Mixed → Linear
- Enter “subject” and “item” as Subjects
- Click Continue



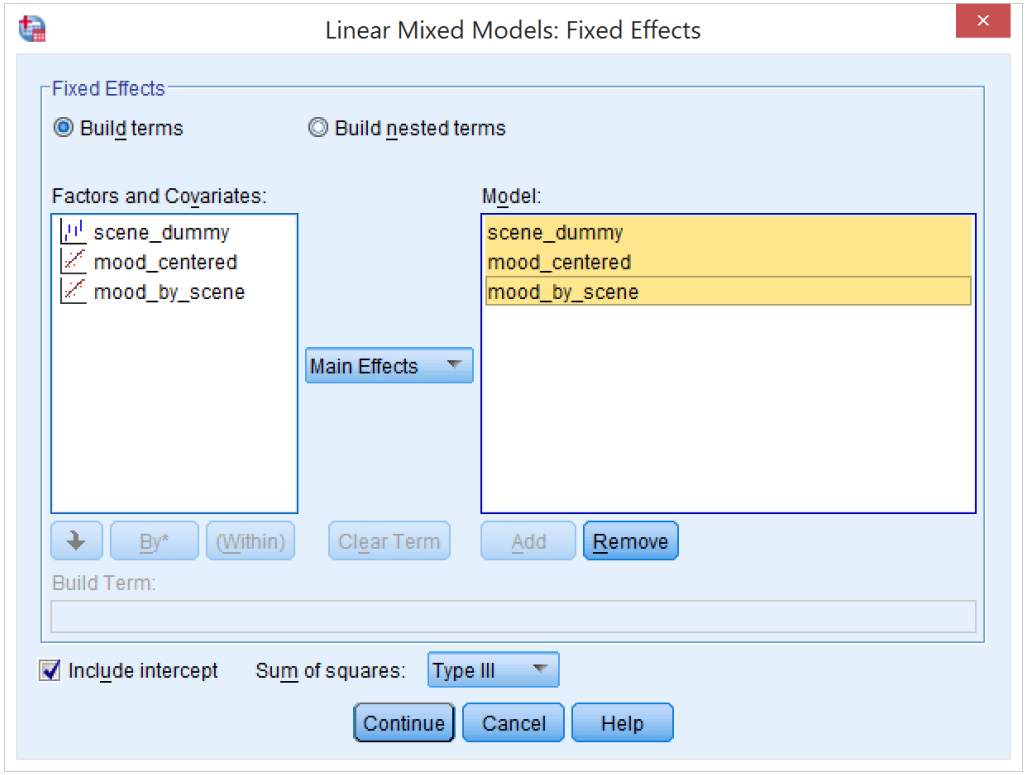
Linear mixed model

- Enter “rating” as the dependent variable
- Enter the recoded scene variable as a factor
- Enter the centered mood variable as a covariate
- Enter the interaction term as a covariate
- Click “Fixed”



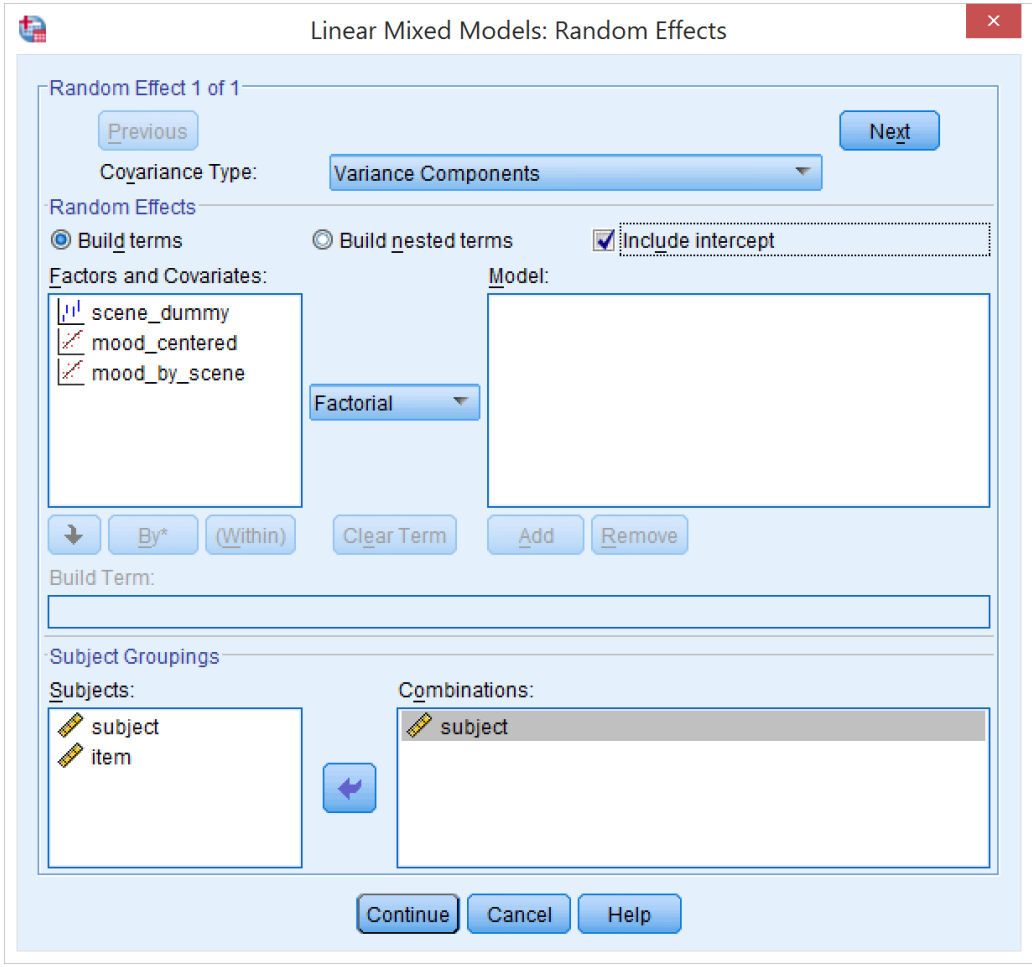
Linear mixed model

- Select all three factors/covariates
- In the drop-down menu, select “Main effects” (we coded the interaction term by hand, so to SPSS it looks like a main effect)
- Click Add
- Click Continue



Linear mixed model

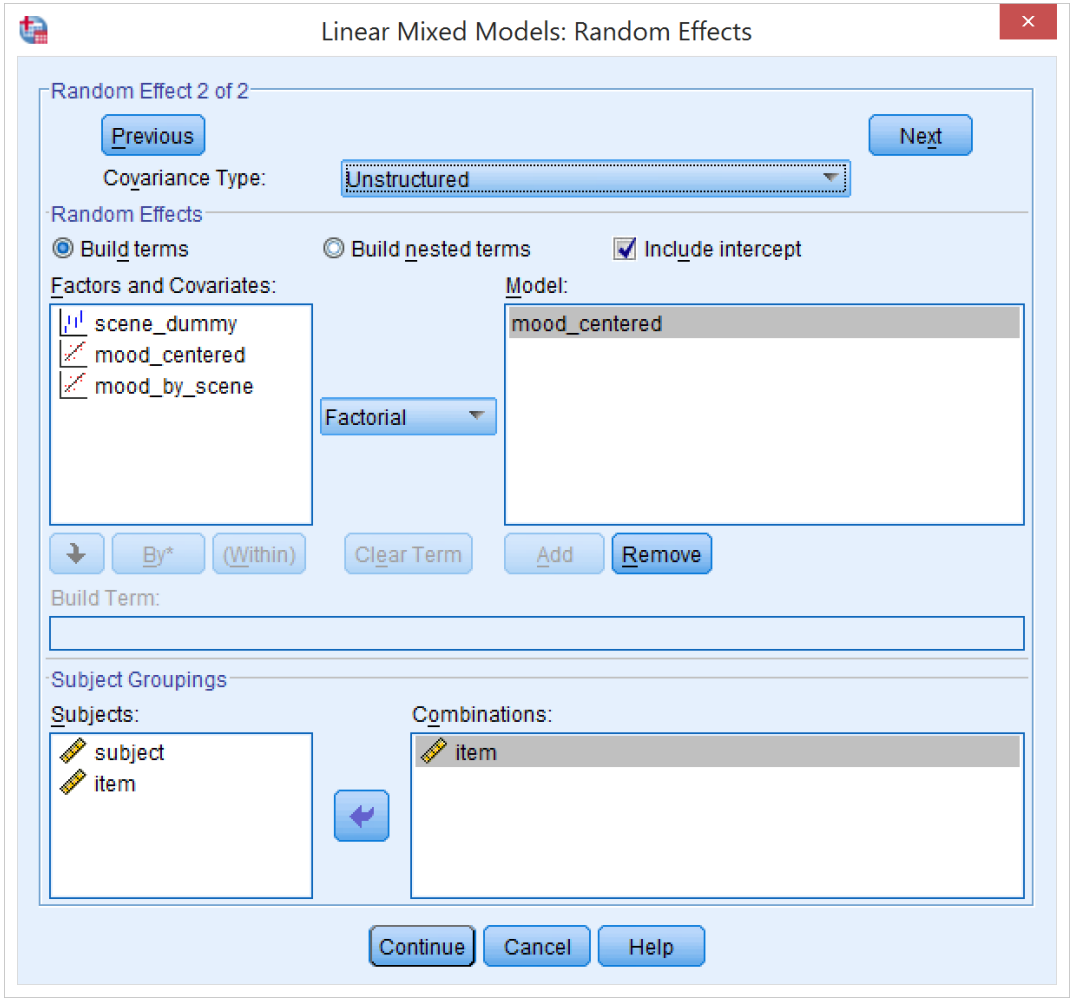
- Click Random…
- Define Subject random effects:
  - Enter “subject” into the “Combinations” filed
  - Select “Include intercept”
  - Click “Next”



Linear mixed model

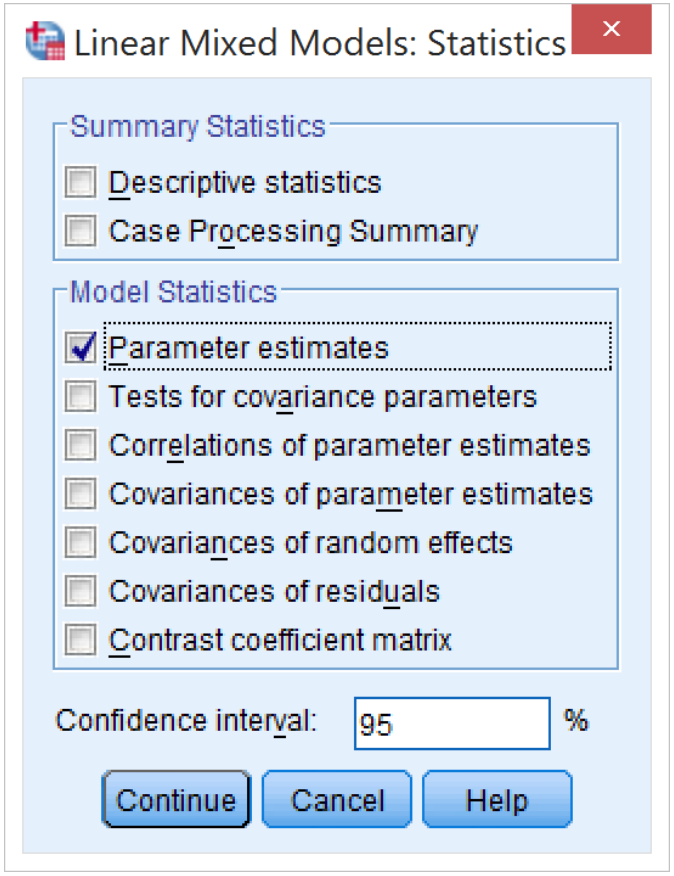
- Click Random…
- Define Item random effects:
  - Enter “item” into the “Combinations” filed
  - Select “Include intercept”
  - Select “mood_centered”
  - Click “Add”
  - In the Covariance Type dropdown menu, select “Unstructured”
  - Click “Next”

  Note: you don’t need any random slopes for covariates in the assignment – the intercept is sufficient



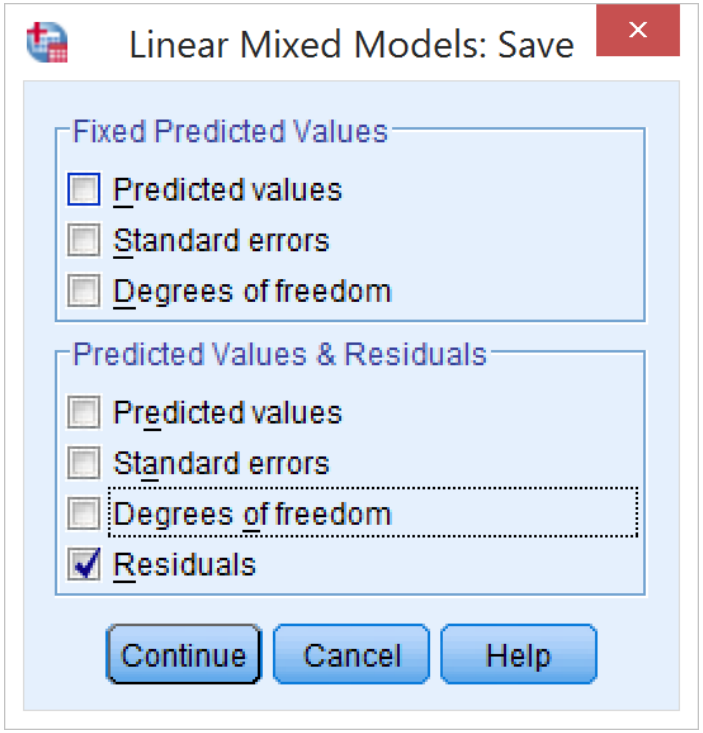
Linear mixed model

- Final touches
- Click “Statistics”
- Select “Parameter estimates”
- Click Continue



Linear mixed model

- Click Save
- Select Residuals
- Click continue
- Click OK to run the model



Linear mixed model results

- Both scene and mood by scene are significant
  - Report the coefficient, t, and p values of the significant predictors

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	11.092576	.118148	77.302	93.887	.000	10.857327	11.327825
[scene_dummy=.00]	.262848	.097945	1482.420	2.684	.007	.070723	.454973
[scene_dummy=1.00]	0[b]	0	.	.	.	.	.
mood_centered	-.007034	.013662	45.596	-.515	.609	-.034542	.020474
mood_by_scene	.010055	.004662	1501.837	2.157	.031	.000910	.019199

a. Dependent Variable: rating.

b. This parameter is set to zero because it is redundant.

Linear mixed model residuals

- Analyze → Descriptive Statistics → Explore
- Same procedure as with the linear regression, just choose RESID_1 this time
- Now the Shapiro-Wilk test is no longer significant

Tests of Normality

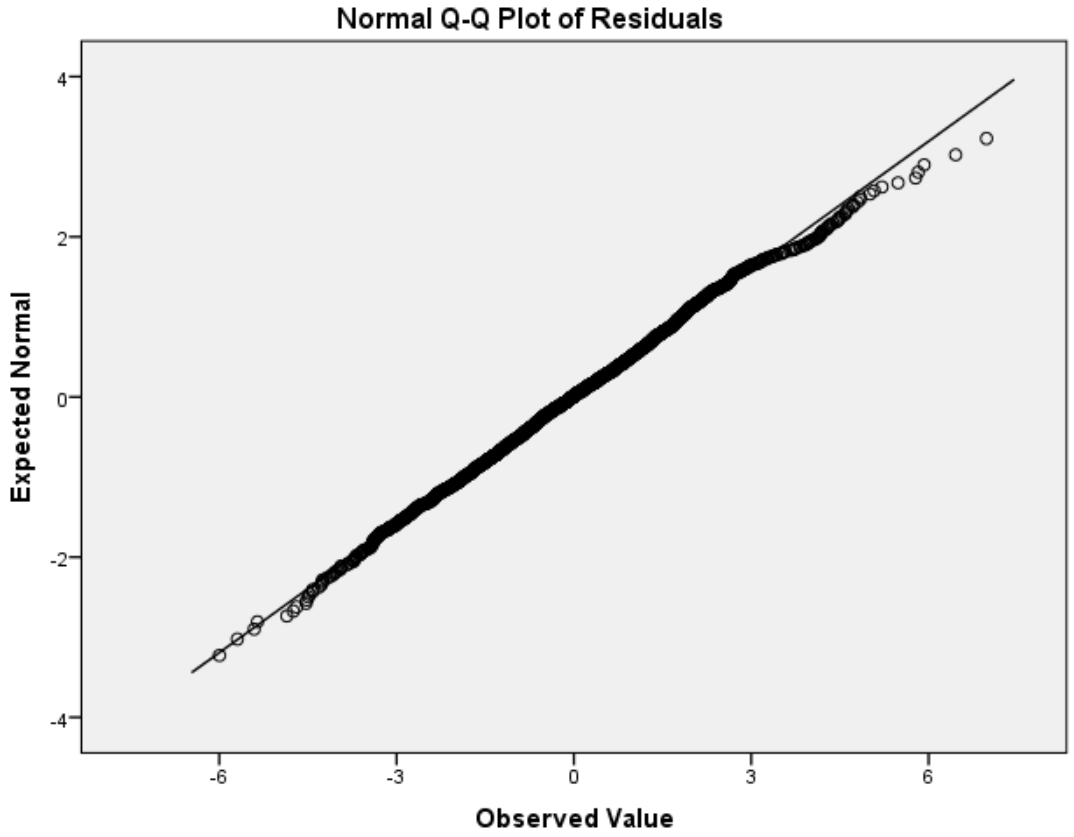
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Residuals	.016	1600	.200*	.998	1600	.075

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

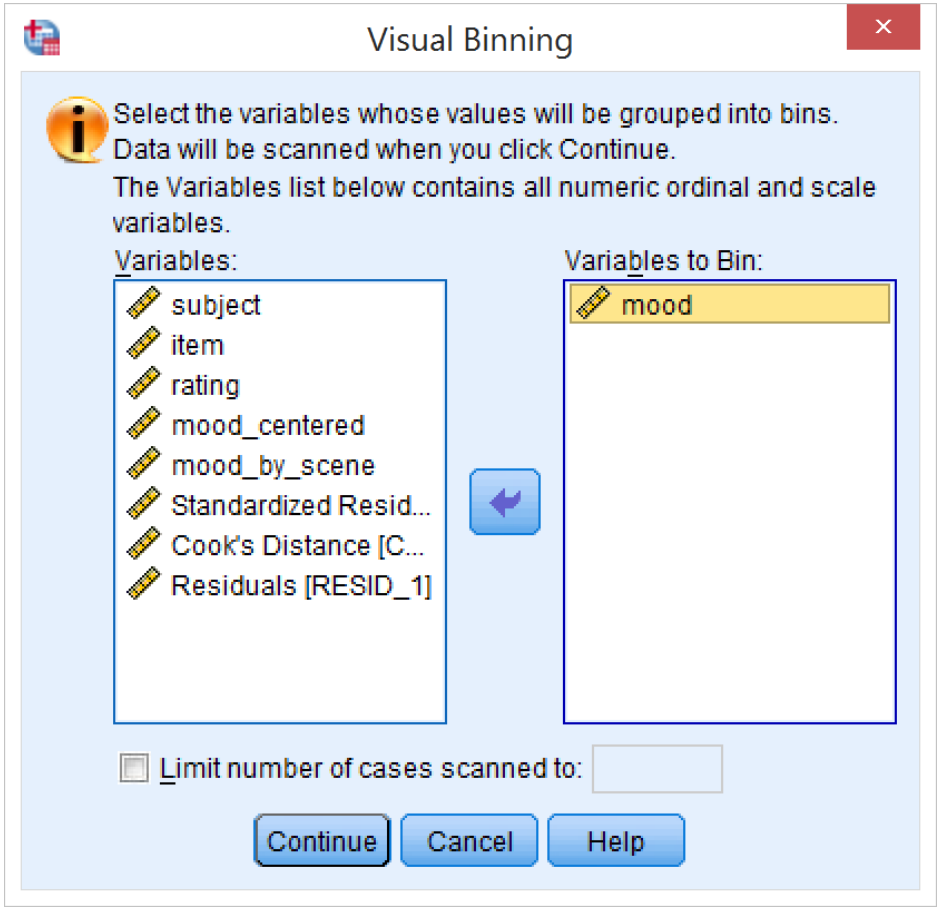
Linear mixed model residuals

- The Quantile-Quantile plot also looks much better



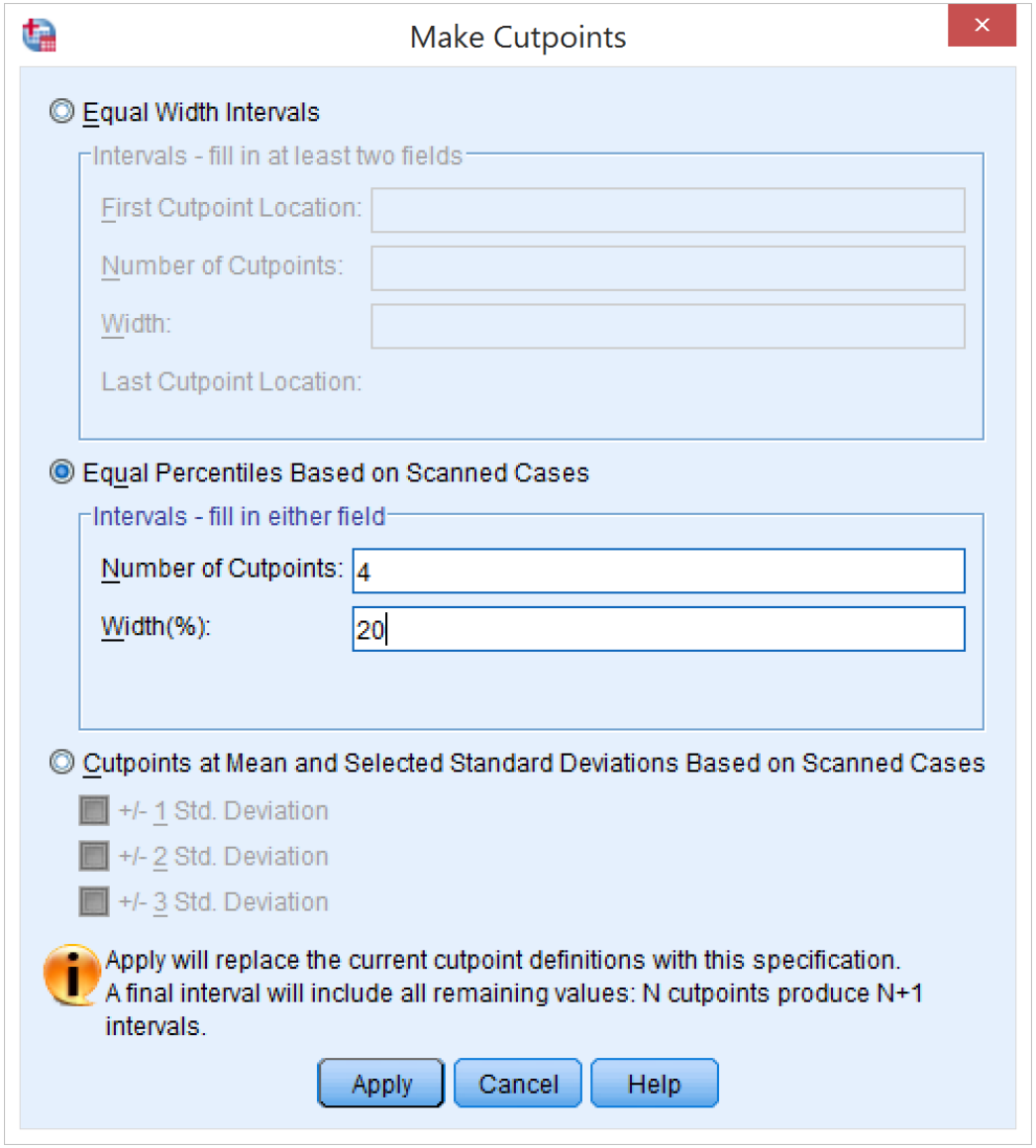
Plotting the mood by scene interaction

- Need to split the mood variable into bins
- Transform → Visual binning
- Select “mood”
- Click Continue



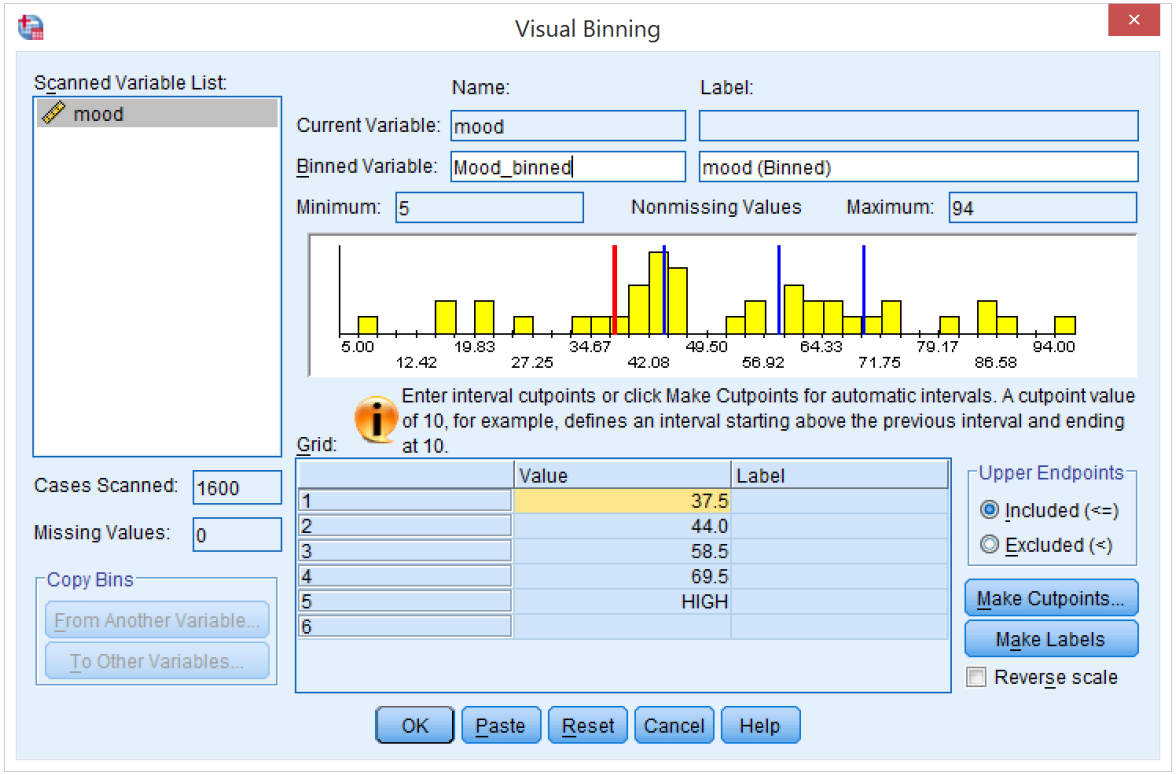
Plotting the mood by scene interaction

- Click Make Cutpoints
- Click “Equal Percentiles”
- Enter 20 in the Width(%) field for 5 equally sized bins
- Click Apply
- Click OK



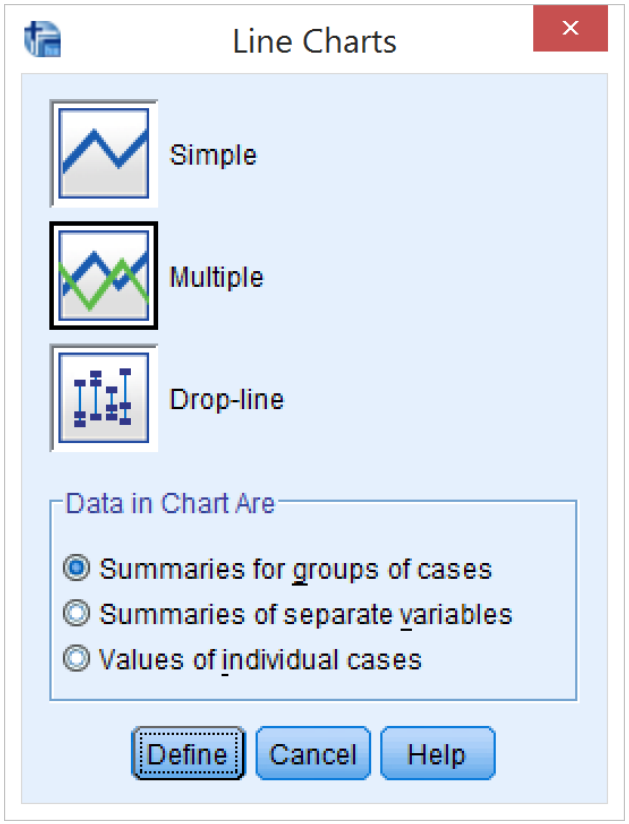
Binning mood

- Choose a comprehensible name for the new binned variable and enter it in “Binned Variable”
- Press OK



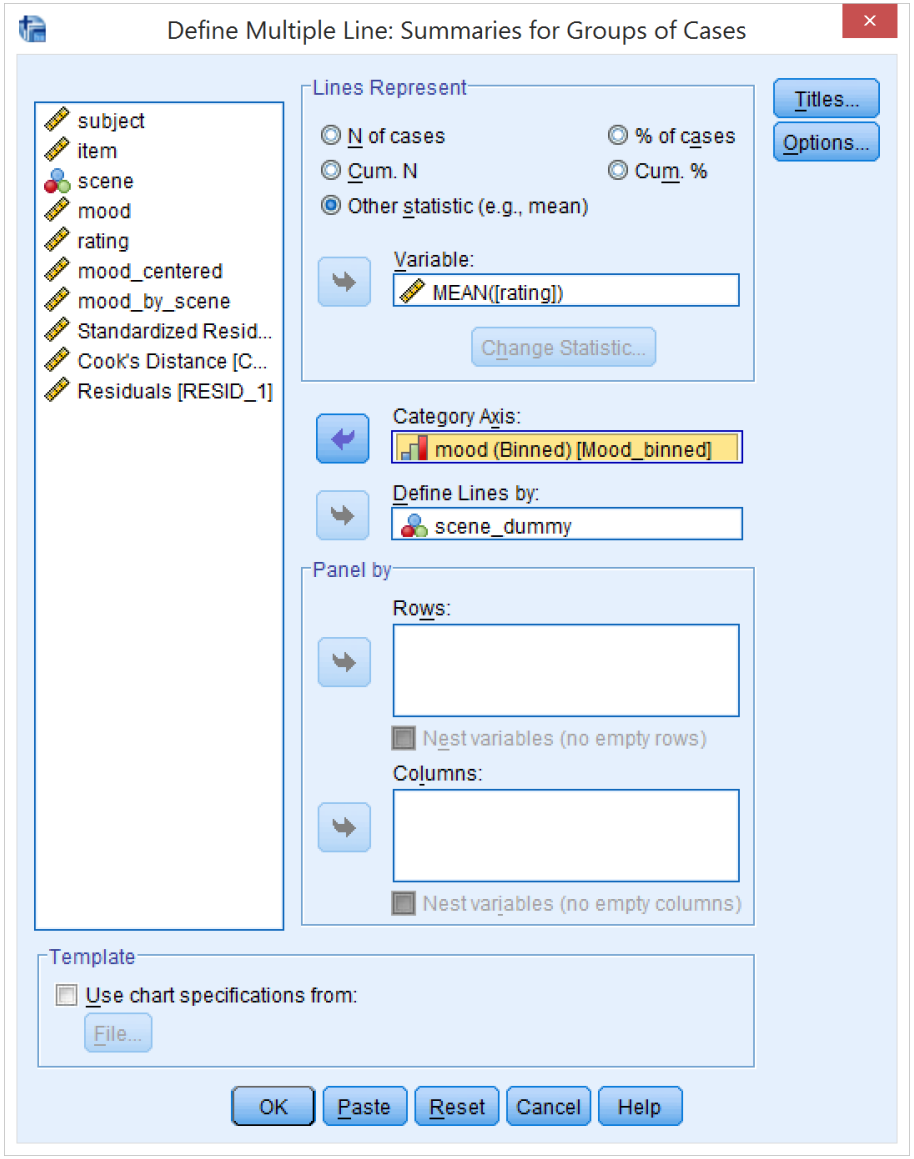
Making the plot

- Graphs → Legacy Dialogs → Line
- Select “Multiple” and “Summaries for groups of cases”
- Click Define



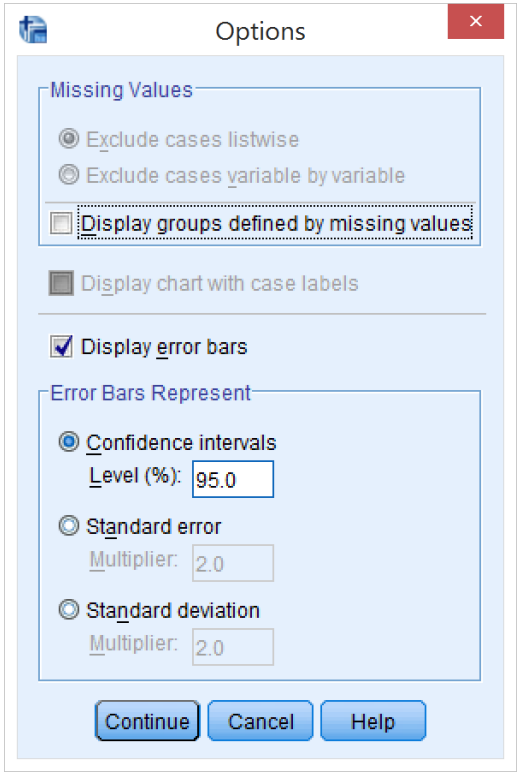
Line plot

- Select “Other statistic”
- Select rating as Variable
- Select the binned mood variable as the Category Axis
- Select “scene” as “Define lines by”
- Click “Options”



Line plot

- Select “Display error bars”
- Select 95% confidence intervals
- Click Continue
- Click OK



Line plot

- There you go. Now just fix the axis labels and the legend