

*Outlander*¹ is an historical/science fiction/time travel television series about a woman who is transported back in time from 1945 to 1743 in Scotland and the lives she leads in both time periods. The television series is based on a book series by author Diana Gabaldon. Let's pretend that executives at Netflix were debating whether to make the next season available all at once, or whether to continue with their existing plan of releasing episodes one at a time. They commissioned a researcher to conduct a study into whether enjoyment of the series is affected by the way in which viewers choose to watch the show. The executives were interested in whether viewers seemed to enjoy the show more if they were able to stream all the episodes all at once, and hence choose to binge-watch the show, or whether releasing episodes one at a time, hence prolonging anticipation, was associated with greater enjoyment. They were additionally interested in whether having read the Diana Gabaldon books prior to watching the television series had any impact. The researcher recruited 30 people who had not watched *Outlander* before and randomly allocated them into three separate groups. One group were only allowed to watch one episode per week. The second group watched several episodes in one sitting but ultimately got through the season in multiple sittings. The third and final group watched the entire season in one sitting. The researcher also randomly allocated half of the participants to read the book before watching the season.

Step 1 – Taking a look at the data.

The screenshot shows the 'DATA VARIABLE' window for 'Enjoyment Rating of Outlander'. The 'Measure type' is set to 'Ordinal' and the 'Data type' is 'Integer'. The 'Levels' list shows 'Hated' (1), '2', '3', and '4'. The 'Retain unused levels' checkbox is unchecked. Below the window, a preview of the data table is visible, showing columns for 'Enjoyment Rating', 'Book Reading', and 'Episodes Per Sitting'.

Our dependent variable “Enjoyment Rating of Outlander” has been specified as an ordinal variable in Measure type and is the first column of data. This variable is rated on a 5-point Likert scale from 1 “Hated” to 5 “Adored.”

N.B., While a Likert scale is technically ordinal, in psychology we commonly treat Likert scale variables as continuous for analysis purposes. In an ANOVA our dependent variable should be continuous.

The screenshot shows the 'DATA VARIABLE' window for 'Book Reading'. The 'Measure type' is set to 'Nominal' and the 'Data type' is 'Integer'. The 'Levels' list shows 'Have read the book' (1) and 'Have not read the book' (2). The 'Retain unused levels' checkbox is unchecked. Below the window, a preview of the data table is visible, showing columns for 'Enjoyment Rating', 'Book Reading', and 'Episodes Per Sitting'.

In the second column of our data spreadsheet we have a variable “Book Reading” which indicates whether the participant was randomly allocated to read the Diana Gabaldon book. The measure type has been set as nominal. There are two groups: have read the book or have not read the book.

¹ Further information about the Outlander television and book series can be found at [https://en.wikipedia.org/wiki/Outlander_\(TV_series\)#Production](https://en.wikipedia.org/wiki/Outlander_(TV_series)#Production).

Conducting a two-way between groups ANOVA in *jamovi*

DATA VARIABLE

Episodes Per Sitting

Description

Measure type Ordinal

Data type Integer

Missing values

Levels

One episode	1
Several episodes	2
Entire season	3

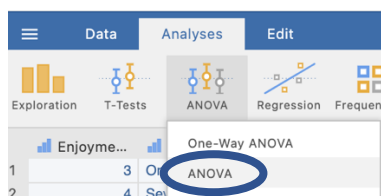
Retain unused levels ☐

Enjoyment... Book Reading Episodes Per Sitting

1	3	Have read the book	One episode
2	4	Have read the book	Several episodes
3	Adored	Have read the book	Entire season
4	4	Have read the book	One episode
5	4	Have read the book	Several episodes
6	Adored	Have read the book	Entire season

In the third column of our data spreadsheet we have a variable “Episodes Per Sitting” which tells *jamovi* which viewing group the participants are in. The measure type has been set as ordinal. There are three groups as created by the researcher. In an ANOVA our independent variable can be ordinal or nominal.

Step 2 – Navigating to the ANOVA analysis menu.



On the Analyses tab select the ANOVA menu, then select ANOVA.

Step 3 – Selecting analysis options to get the output we need for our omnibus test results.

The first thing we will do is specify our dependent and independent variables.

We need to move Enjoyment Rating of Outlander to the Dependent Variables box and Episodes Per Sitting and Book Reading to the Fixed Factors box. This tells *jamovi* we want to compare enjoyment rating means across the combinations of viewing modes and book reading.

Moving our IV and DV into place gives us our initial ANOVA result.

ANOVA

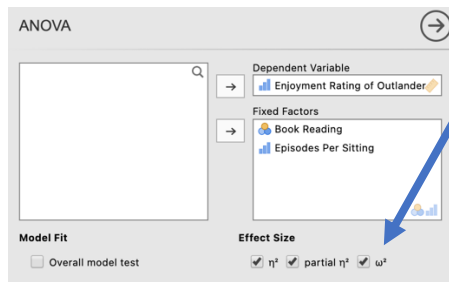
ANOVA - Enjoyment Rating of Outlander

	Sum of Squares	df	Mean Square	F	p
Book Reading	3.33333	1	3.33333	12.50000	0.00169
Episodes Per Sitting	25.86667	2	12.93333	48.50000	<.00001
Book Reading * Episodes Per Sitting	1.86667	2	0.93333	3.50000	0.04637
Residuals	6.40000	24	0.26667		

In our ANOVA table we have three *F* statistics. Two for the main effects of Booking Reading and Episodes Per Sitting, and one for the Booking Reading X Episodes Per Sitting interaction.

Our *p* values here are all less than .05. This means we have a significant Book Reading main effect, a significant Episodes Per Sitting main effect, and a significant Reading X Episodes Per Sitting interaction. We'll need to do some further digging to uncover the specific source and pattern of these significant effects.

We can also ask for effect sizes for our ANOVA under where we specify our variables for the analysis.



You can select between η^2 , η_p^2 and ω^2 . We'll ask for all three so we can compare them.

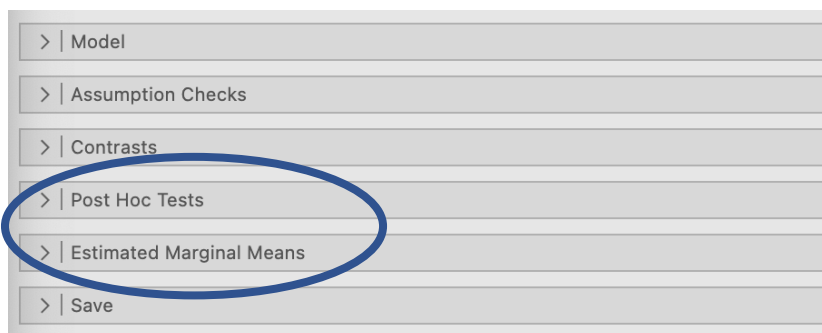
You can see that we now have the three effect sizes we requested added into our ANOVA model table. As expected η_p^2 is much larger than the other two. This is because η_p^2 is based on the proportion of variance explained in the residual DV variance. Both η^2 and ω^2 reflect the proportion of total DV variance explained, with ω^2 adjusted downwards as a population effect size estimate.

ANOVA

ANOVA - Enjoyment Rating of Outlander

	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2	ω^2
Book Reading	3.33333	1	3.33333	12.50000	0.00165	0.08897	0.34247	0.08127
Episodes Per Sitting	25.86667	2	12.93333	48.50000	<.00001	0.69039	0.80165	0.67138
Book Reading * Episodes Per Sitting	1.86667	2	0.93333	3.50000	0.04637	0.04982	0.22581	0.03534
Residuals	6.40000	24	0.26667					

We need to ask for some additional statistics and visual aids to add to our interpretation and write up of the results. There are many options organised under five tabs as can be seen below. For our purposes we only need to use the Post Hoc Tests and the Estimated Marginal Means tabs.



Step 4 – Following up significant main effects with main effect comparisons

Let's walk through how to follow up a significant main effect with main effect comparisons when we have three or more levels of the main effect IV.

Post Hoc Tests

Book Reading
Book Reading * Episodes Per Sitting

← Episodes Per Sitting

Correction

☒ No correction

☐ Tukey

☐ Scheffe

☐ Bonferroni

☐ Holm

Effect Size

☒ Cohen's d

☒ Confidence interval 95 %

Under the Post Hoc Tests tab you will see the two main effects and an interaction term (the one with the asterisk in it) listed.

To obtain post hoc comparisons for any main effect or interaction you need to move the relevant IV across to the right hand side. Here we will move Episodes Per Sitting across as it is the IV with three levels.

Ensure that “No correction” is selected as we will report unadjusted post hoc comparisons.

Finally, ask for Cohen's *d* effect sizes for our post hocs as well as their associated confidence intervals.

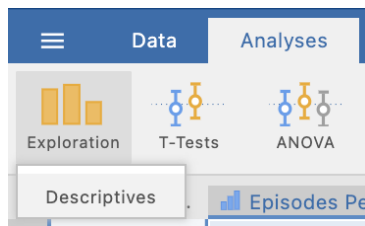
Post Hoc Tests

Post Hoc Comparisons - Episodes Per Sitting

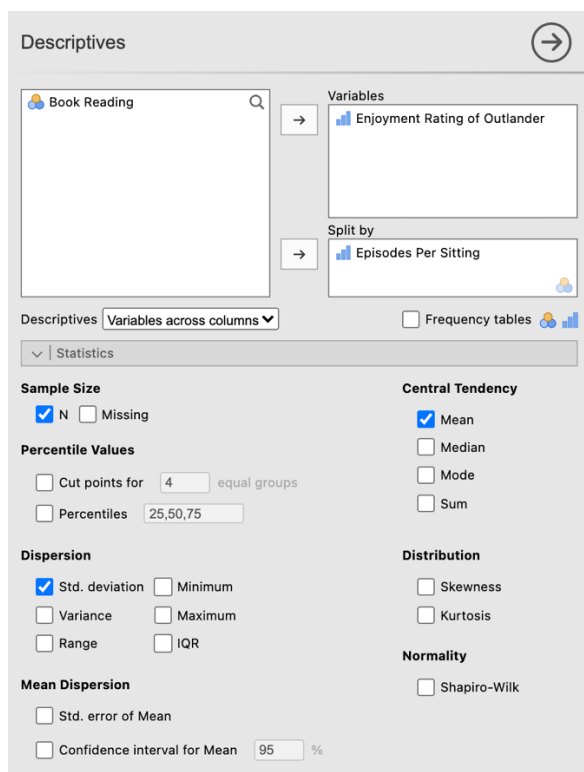
Comparison		Mean Difference	SE	df	t	p	Cohen's d	95% Confidence Interval	
Episodes Per Sitting	Episodes Per Sitting							Lower	Upper
One episode	- Several episodes	-0.60000	0.23094	24.00000	-2.59808	0.01577	-1.16190	-2.14766	-0.17613
	- Entire season	-2.20000	0.23094	24.00000	-9.52628	<.00001	-4.26028	-5.82956	-2.69101
Several episodes	- Entire season	-1.60000	0.23094	24.00000	-6.92820	<.00001	-3.09839	-4.40371	-1.79306

Note. Comparisons are based on estimated marginal means

As we don't obtain the standard deviations or marginal means that these post hoc comparisons are based on, we'll quickly run some descriptives to get these elements for use with our write up later. Head to Descriptives under Exploration in the Analyses tab.



Under the "Statistics" drop down menu the three things we require are the Sample Size N, the mean as our Central Tendency measure and the standard deviation as our measure of dispersion. Untick all additional options and ensure just these three are selected to keep our output focussed on what we need.



Descriptives

Descriptives		
	Episodes Per Sitting	Enjoyment Rating of Outlander
N	One episode	10
	Several episodes	10
	Entire season	10
Mean	One episode	2.60000
	Several episodes	3.20000
	Entire season	4.80000
Standard deviation	One episode	0.84327
	Several episodes	0.63246
	Entire season	0.42164

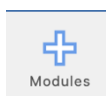
Here are the marginal means (the means associated with each viewing mode, collapsed across Book Reading levels) and their associated standard deviations. We'll come back to these when reporting our results.

Step 5a – Following up significant interactions with simple effects

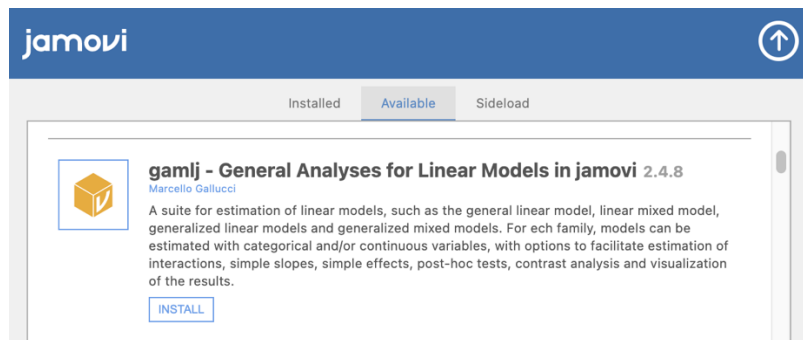
When we obtain a significant interaction the first thing we need to do is check the simple effects. In our case we are going to consider the simple effects of viewing mode when participants had read the Diana Gabaldon book and when they hadn't (the two levels of the second IV book reading).

Within the ANOVA menus that are part of the base *jamovi* program, simple effects are not currently an option that can be requested (as at v. 1.6.12). However *jamovi* has a range of add on modules that can be activated which expand the analysis options available. One of these, the *General Analyses for Linear Models in jamovi*, or *gamlj* module, will allow us to obtain our simple effects.

In order to install an add on module you need to click on the addition icon in the top right hand corner of your *jamovi* window.



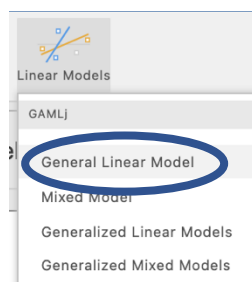
Go to the library tab, and scroll to find the *gamlj* module and click to install it.



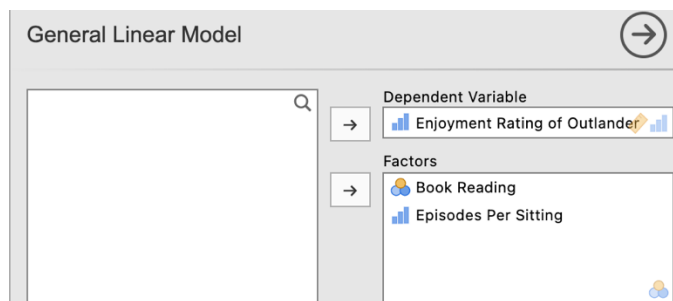
You will now see that you have an additional option on your Analyses toolbar called Linear Models.

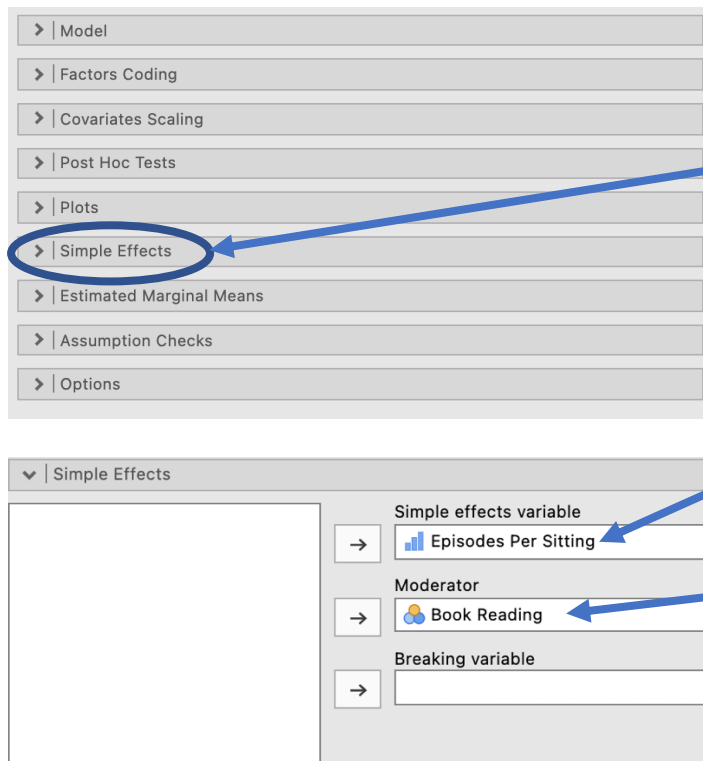


Click on Linear Models and then select General Linear Model.



You'll see a familiar layout to specify your DV and IV. Shift the DV and two IVs across to the Dependent Variable and Factors boxes as you did in the ANOVA menu before.





In order to obtain our simple effects go to the Simple Effects drop down menu.

As we want to explore the simple effects of Episodes Per Sitting we move it across to the “Simple effects variable” slot.

Our Book Reading IV then moves across to the “Moderator” slot.

The “Breaking variable” slot would be of use if we had a third IV and were exploring a three way interaction.

The table we are interested in in the output is the one illustrated below.

Simple Effects

Simple effects of Episodes Per Sitting : Omnibus Tests				
Moderator levels				
Book Reading	F	Num df	Den df	p
Have read the book	13.00000	2.00000	24.00000	0.00015
Have not read the book	39.00000	2.00000	24.00000	<.00001

It seems the simple effect of viewing mode is significant when the book has been read and when it hasn't been as both simple effect p values are less than .05. So we will need to explore the simple comparisons underneath each of these two simple effects.

N.B., Ideally we would also obtain an effect size for these simple effects in the form of η^2 , however there is currently no option to obtain this in *jamovi* (as at v. 1.8.4)

Step 5b – Following up significant simple effects with simple comparisons

To obtain our simple comparisons we can return to our ANOVA Post Hoc Tests output. This time we are going to move the interaction term across to the right hand side.

▼ | Post Hoc Tests

Book Reading

Episodes Per Sitting

→

Book Reading * Episodes Per Sitti...

Correction

☒ No correction
☐ Tukey
☐ Scheffe
☐ Bonferroni
☐ Holm

Effect Size

☒ Cohen's d
☒ Confidence interval 95 %

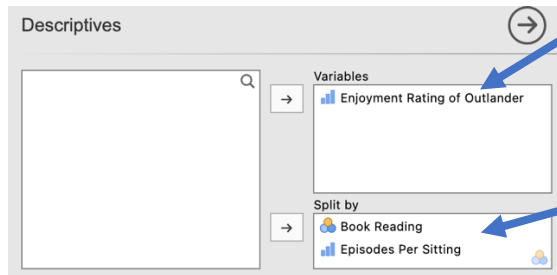
Now we are given a very large table with simple comparisons.

Post Hoc Tests

Post Hoc Comparisons - Book Reading * Episodes Per Sitting											
Comparison				Mean Difference	SE	df	t	p	Cohen's d	95% Confidence Interval	
Book Reading	Episodes Per Sitting	Book Reading	Episodes Per Sitting							Lower	Upper
Have read the book	One episode	- Have read the book	Several episodes	-0.40000	0.32660	24.00000	-1.22474	0.23256	-0.77460	-2.10016	0.55097
		- Have read the book	Entire season	-1.60000	0.32660	24.00000	-4.89898	0.00005	-3.09839	-4.69708	-1.49970
		- Have not read the book	One episode	1.20000	0.32660	24.00000	3.67423	0.00119	2.32379	0.84626	3.80132
		- Have not read the book	Several episodes	0.40000	0.32660	24.00000	1.22474	0.23256	0.77460	-0.55097	2.10016
	Several episodes	- Have not read the book	Entire season	-1.60000	0.32660	24.00000	-4.89898	0.00005	-3.09839	-4.69708	-1.49970
		- Have read the book	Entire season	-1.20000	0.32660	24.00000	-3.67423	0.00119	-2.32379	-3.80132	-0.84626
		- Have not read the book	One episode	1.60000	0.32660	24.00000	4.89898	0.00005	-3.09839	-4.69708	-1.49970
		- Have not read the book	Several episodes	0.80000	0.32660	24.00000	2.44949	0.02198	1.54919	0.16469	2.93370
	Entire season	- Have not read the book	Entire season	-1.20000	0.32660	24.00000	-3.67423	0.00119	-2.32379	-3.80132	-0.84626
		- Have not read the book	One episode	2.80000	0.32660	24.00000	8.57321	<.00001	-5.42218	-7.49893	-3.34542
		- Have not read the book	Several episodes	2.00000	0.32660	24.00000	6.12372	<.00001	-3.87298	-5.61511	-2.13085
		- Have not read the book	Entire season	1.94289e-16	0.32660	24.00000	5.94886e-16	1.00000	0.00000	-1.30532	1.30532
Have not read the book	One episode	- Have not read the book	Several episodes	-0.80000	0.32660	24.00000	-2.44949	0.02198	-1.54919	-2.93370	-0.16469
		- Have not read the book	Entire season	-2.80000	0.32660	24.00000	-8.57321	<.00001	-5.42218	-7.49893	-3.34542
	Several episodes	- Have not read the book	Entire season	-2.00000	0.32660	24.00000	-6.12372	<.00001	-3.87298	-5.61511	-2.13085
		- Have not read the book	Entire season	-2.00000	0.32660	24.00000	-6.12372	<.00001	-3.87298	-5.61511	-2.13085

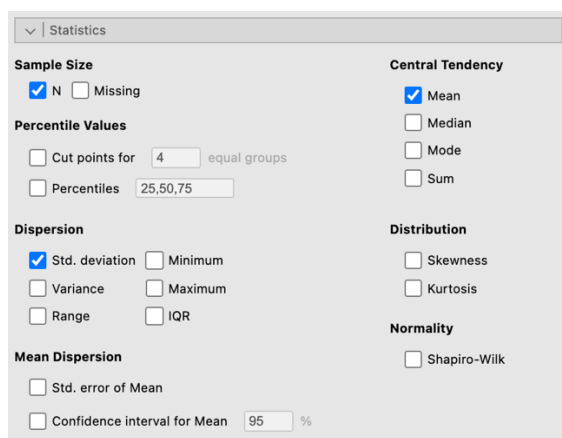
Note. Comparisons are based on estimated marginal means

We'll ask for descriptives to obtain our means and standard deviations for these simple comparisons.



On the Analyses tab select the Exploration menu, then select Descriptives.

Move the dependent variable, Enjoyment Rating of Outlander to the "Variables" box and the independent variables Episodes Per Sitting and Book Reading to "Split by"



As we did before, under the "Statistics" drop down menu ensure just Sample Size N, the mean and standard deviation are selected and untick all other options to keep our output neat.

Descriptives

Descriptives			
	Book Reading	Episodes Per Sitting	Enjoyment Rating of Outlander
N	Have read the book	One episode	5
		Several episodes	5
		Entire season	5
	Have not read the book	One episode	5
		Several episodes	5
		Entire season	5
Mean	Have read the book	One episode	3.20000
		Several episodes	3.60000
		Entire season	4.80000
	Have not read the book	One episode	2.00000
		Several episodes	2.80000
		Entire season	4.80000
Standard deviation	Have read the book	One episode	0.44721
		Several episodes	0.54772
		Entire season	0.44721
	Have not read the book	One episode	0.70711
		Several episodes	0.44721
		Entire season	0.44721

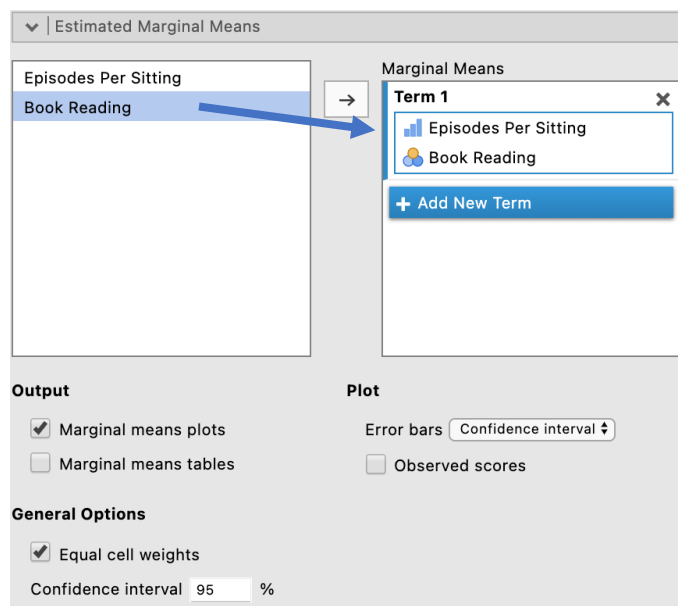
Here we have the means and standard deviations (and *n* for each group) that form the basis of our simple effects and simple comparisons.

Step 6 – Obtaining a plot to help us illustrate our interaction

The Estimated Marginal Means tab gives us options to obtain a plot to illustrate our results.

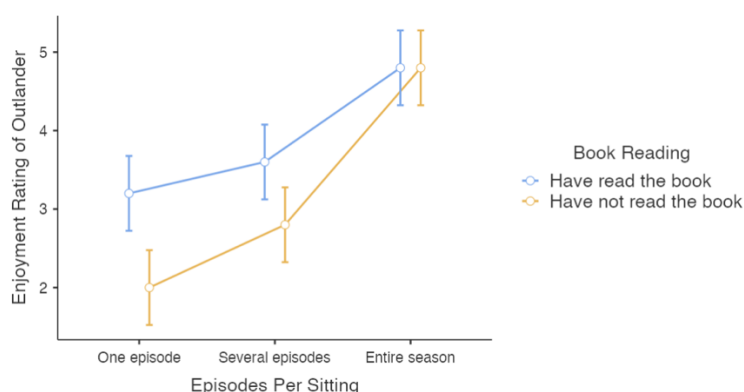
We can ask for plots to illustrate either of our main effects or our interaction. As our interaction is significant we'll create a plot to help illustrate the interaction effect.

Firstly we need to move both our IVs, Episodes Per Sitting and Book Reading, under the "Term 1" heading in the Marginal Means box on the right hand side like this. Note that whichever IV we place at the top of the listed variables under "Term 1" will be the IV whose simple effect is plotted and the second IV in the list will be the IV represented by different lines (i.e., our moderator). In our example we want to see the simple effects of Episodes Per Sitting so it appears at the top of the list followed by Book Reading under Term 1 in the Marginal Means box.



Estimated Marginal Means

Episodes Per Sitting * Book Reading



Here we have created an interaction plot that illustrates the simple effects of Episodes Per Sitting when the book has been read and not read.

Step 7a – Finding the components for reporting the omnibus results

We've now run all the things we need to write up our two-way between groups ANOVA results, complete with follow ups for a significant main effect or interaction. Let's pull it all together.

Firstly, let's report our omnibus results.

The components we obtain here are:

1. The F statistic, dfs and p value – the omnibus ANOVA results for the main effects and interaction
2. An effect size in the form of η^2 for the main effects and interaction.

ANOVA

ANOVA - Enjoyment Rating of Outlander

	Sum of Squares	df	Mean Square	F	p	η^2	η^2p	ω^2
Book Reading	3.33333	1	3.33333	12.50000	0.00169	0.08897	0.34247	0.08127
Episodes Per Sitting	25.86667	2	12.93333	48.50000	<.00001	0.69039	0.80165	0.67138
Book Reading * Episodes Per Sitting	1.86667	2	0.93333	3.50000	0.04637	0.04982	0.22581	0.03534
Residuals	6.40000	24	0.26667					

The Write Up (Part 1):

A two-way between groups factorial ANOVA was conducted to explore the potential main and interactive effects of Book Reading (Have read the book, Have not read the book) and Viewing Mode (One episode per week, Several episodes over multiple settings, All episodes in one sitting) on ratings of enjoyment of the Outlander television series in a sample of 30 participants. The main effects of Book Reading, $F(1,24) = 12.50$, $p = .002$, $\eta^2 = .09$, and Viewing Mode, $F(2,24) = 48.50$, $p < .001$, $\eta^2 = .69$, were both significant, however both main effects are qualified by a significant Book Reading x Viewing Mode interaction, $F(2,24) = 3.50$, $p = .046$, $\eta^2 = .05$.

Step 7b – Finding the components for reporting main effect comparisons to follow a significant main effect.

Next we'll consider how you would write up the results of a main effect comparisons. Note you would not normally do this when you have a significant interaction but we will present them here for completeness of this teaching resource.

The elements needed for the main effect comparisons part of our write up are:

1. **Post hoc comparison results** – to determine which marginal means are significant from each other. It is sufficient to report the *p* value for this.
2. **An effect size** for each post hoc comparison in the form of **Cohen's *d* and associated confidence intervals**.
3. **Marginal Means and standard deviations** – to help describe the pattern of these differences.

Post Hoc Tests

Comparison		Mean Difference	SE	df	t	p	Cohen's d	95% Confidence Interval	
Episodes Per Sitting	Episodes Per Sitting							Lower	Upper
One episode	Several episodes	-0.60000	0.23094	24.00000	-2.59808	0.0157	-1.16190	-2.14766	-0.17613
	Entire season	-2.20000	0.23094	24.00000	-9.52628	<.00001	-4.26028	-5.82956	-2.69101
Several episodes	Entire season	-1.60000	0.23094	24.00000	-6.92820	<.00001	-3.09839	-4.40371	-1.79306

Note. Comparisons are based on estimated marginal means

Descriptives

	Episodes Per Sitting	Enjoyment Rating of Outlander
N	One episode	10
	Several episodes	10
	Entire season	10
Mean	One episode	2.60000
	Several episodes	3.20000
	Entire season	4.80000
Standard deviation	One episode	0.84327
	Several episodes	0.63246
	Entire season	0.42164

The continuation of the write up (if only a main effect was obtained) could go as follows:

The Write Up (Part 2):

Unadjusted main effect comparisons revealed significant differences between each viewing mode with enjoyment ratings when the entire season was watched in one sitting ($M = 4.80$, $SD = 0.42$), significantly higher than when viewed in several multi-episode sittings ($M = 3.20$, $SD = 0.63$, $p = .016$, $d = 1.16$, $95\% CI [0.18, 2.15]$) which in turn yielded significantly higher enjoyment ratings than viewing one episode at a time ($M = 2.30$, $SD = 1.25$, $p < .001$, $d = 3.10$, $95\% CI [1.79, 4.40]$).

Step 7c – Finding the components for reporting the simple effects to follow a significant interaction.

The next step after reporting a significant interaction is to report the results of the simple effects. For our example we are going to report the simple effects of Episodes Per Sitting at different levels of Book Reading.

The components we obtain here are:

1. The F statistic, dfs and p value – the omnibus ANOVA results for each simple effect.
2. Note that ideally we would also report an effect size in the form of η^2 for each simple effect, however these are currently not produced by *jamovi* (as at v. 1.8.4)

For this we turn to the Simple Effects output we created via the *gamlj* add on module.

Simple Effects

Simple effects of Episodes Per Sitting : Omnibus Tests				
Moderator levels				
Book Reading	F	Num df	Den df	p
Have read the book	13.00000	2.00000	24.00000	0.00015
Have not read the book	39.00000	2.00000	24.00000	<.00001

The Write Up (Part 3):

The simple effects of Viewing Mode when participants had read the Diana Gabaldon book, $F(2,24) = 13.00$, $p < .001$, $\eta^2 = .XX$, and when participants had not read the book, $F(2,24) = 39.00$, $p < .001$, $\eta^2 = .XX$, were both significant.

Step 7d – Finding the components for reporting the simple comparisons to follow a significant simple effect.

The final elements to report are the simple comparisons that underpin the significant simple effects noted above.

For these we need to refer to the cell mean descriptives we asked for earlier as well as the post hoc output for the interaction obtained within the ANOVA analysis.

The elements needed for the simple comparisons part of our write up are:

1. **Post hoc comparison results** – to determine which cell means are significant from each other. It is sufficient to report the *p* value for this.
2. **An effect size** for each post hoc comparison in the form of **Cohen's *d*** and its **associated confidence intervals**.
3. **Cell Means and standard deviations** – to help describe the pattern of these differences.

You need to have your wits about you when viewing the Post Hoc Tests table for the simple comparisons. Think about the simple effects you are following up and which comparisons are necessary to achieve this.

Post Hoc Tests

		Comparison		Mean Difference	SE	df	t	p	Cohen's d	95% Confidence Interval	
Book Reading	Episodes Per Sitting	Book Reading	Episodes Per Sitting							Lower	Upper
Have read the book	One episode	- Have read the book	Several episodes	-0.40000	0.32660	24.00000	-1.22474	0.23256	-0.77460	-2.10016	0.55097
		- Have read the book	Entire season	-1.60000	0.32660	24.00000	-4.89898	0.00005	-3.09839	-4.69708	-1.49970
		- Have not read the book	One episode	1.20000	0.32660	24.00000	3.67423	0.00119	2.32379	0.84626	3.80132
		- Have not read the book	Several episodes	0.40000	0.32660	24.00000	1.22474	0.23256	0.77460	-0.55097	2.10016
	Several episodes	- Have not read the book	Entire season	-1.60000	0.32660	24.00000	-4.89898	0.00005	-3.09839	-4.69708	-1.49970
		- Have read the book	Entire season	-1.20000	0.32660	24.00000	-3.67423	0.00119	-2.32379	-3.80132	-0.84626
		- Have not read the book	One episode	1.60000	0.32660	24.00000	4.89898	0.00005	-3.09839	-4.69708	-1.49970
		- Have not read the book	Several episodes	0.80000	0.32660	24.00000	2.44949	0.02198	1.54919	0.16469	2.93370
	Entire season	- Have not read the book	Entire season	-1.20000	0.32660	24.00000	-3.67423	0.00119	-2.32379	-3.80132	-0.84626
		- Have not read the book	One episode	2.80000	0.32660	24.00000	8.57321	<.00001	-5.42218	-7.49893	-3.34542
		- Have not read the book	Several episodes	2.00000	0.32660	24.00000	6.12372	<.00001	-3.87298	-5.61511	-2.13085
		- Have not read the book	Entire season	1.94289e-16	0.32660	24.00000	5.94886e-16	1.00000	0.00000	-1.30532	1.30532
Have not read the book	One episode	- Have not read the book	Several episodes	-0.80000	0.32660	24.00000	-2.44949	0.02198	-1.54919	-2.93370	-0.16469
		- Have not read the book	Entire season	-2.80000	0.32660	24.00000	-8.57321	<.00001	-5.42218	-7.49893	-3.34542
	Several episodes	- Have not read the book	Entire season	-2.00000	0.32660	24.00000	-6.12372	<.00001	-3.87298	-5.61511	-2.13085
		- Have not read the book	Entire season	-2.00000	0.32660	24.00000	-6.12372	<.00001	-3.87298	-5.61511	-2.13085

Note. Comparisons are based on estimated marginal means

Descriptives

Descriptives			
	Book Reading	Episodes Per Sitting	Enjoyment Rating of Outlander
N	Have read the book	One episode	5
		Several episodes	5
		Entire season	5
	Have not read the book	One episode	5
		Several episodes	5
		Entire season	5
Mean	Have read the book	One episode	3.20000
		Several episodes	3.60000
		Entire season	4.80000
	Have not read the book	One episode	2.00000
		Several episodes	2.80000
		Entire season	4.80000
Standard deviation	Have read the book	One episode	0.44721
		Several episodes	0.54772
		Entire season	0.44721
	Have not read the book	One episode	0.70711
		Several episodes	0.44721
		Entire season	0.44721

The Write Up (Part 4):

Unadjusted simple comparisons were conducted to follow up the simple effects of Viewing Mode at both levels of Book Reading. When participants had read the Outlander book, watching the entire season in one sitting ($M = 4.80$, $SD = 0.45$) was associated with significantly higher enjoyment ratings than viewing in several multi-episode sittings ($M = 3.60$, $SD = 0.55$, $p < .001$, $d = 2.32$, 95% CI [0.85, 3.80]) and watching one episode per week ($M = 3.20$, $SD = 0.45$, $p < .001$, $d = 3.10$, 95% CI [1.50, 4.70]), however there was no significant differentiation in enjoyment ratings between the one or several episode per sitting viewing modes ($p = .233$, $d = 0.77$, 95% CI [-0.55, 2.10]). However, when participants had not read the Outlander book prior to viewing, there were significant increments in enjoyment ratings with every increase in viewing mode, with those watching the season in one sitting ($M = 2.00$, $SD = 0.77$), rating their enjoyment significantly higher than those who viewed in several multi-episode sittings ($M = 2.80$, $SD = 0.45$, $p = .022$, $d = 1.55$, 95% CI [0.16, 2.93]) which in turn yielded significantly higher enjoyment ratings than viewing one episode at a time ($M = 4.80$, $SD = 0.45$, $p < .001$, $d = 3.88$, 95% CI [2.13, 5.62]).

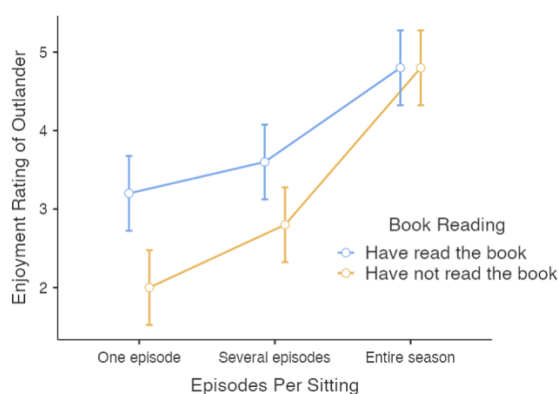
Potential addition of plot:

You could also add the plot we obtained to help illustrate the pattern of results. You might add a sentence like the following if you choose to include the plot:

Figure 1 provides a visual of the interaction and associated simple effects and comparisons discussed above..

Figure 1

Differences in Enjoyment Ratings of the Outlander Television Series by Viewing Mode and Book Reading



Note. Error bars represent 95% confidence intervals.

Created by Janine Lurie in consultation with the Statistics Working Group within the School of Psychology, University of Queensland ²

Based on *jamovi* v.1.8.4 ³

² The Statistics Working Group was formed in November 2020 to review the use of statistical packages in teaching across the core undergraduate statistics unit. The working group is led by Winnifred Louis and Philip Grove, with contributions from Timothy Ballard, Stefanie Becker, Jo Brown, Jenny Burt, Nathan Evans, Mark Horswill, David Sewell, Eric Vanman, Bill von Hippel, Courtney von Hippel, Zoe Walter, and Brendan Zietsch.

³ The jamovi project (2021). jamovi (Version 1.8.4) [Computer Software]. Retrieved from <https://www.jamovi.org>