Chapter 15: Mixed design ANOVA

Labcoat Leni's Real Research

The objection of desire

Problem

Bernard, P., et al. (2012). *Psychological Science, 23*(5), 469–471.

There is a concern that images that portray women as sexually desirable objectify them. This idea was tested in an inventive study by Philippe Bernard (Bernard, Gervais, Allen, Campomizzi, & Klein, 2012). People find it harder to recognize upside-down (inverted) pictures than ones the right way up. This 'inversion effect' occurs for pictures of humans, but not for pictures of objects. Bernard et al. used this effect to test whether sexualized pictures of women are processed as objects. They presented people with pictures of sexualized (i.e., not wearing many clothes) males and females. Half of these pictures were inverted (**Inverted_Women** and **Inverted_Men**) and the remainder were upright (**Upright_Women** and **Upright_Men**). They noted the **Gender** of the participant. After each trial participants were shown two pictures and asked to identify the one they had just seen. The outcome was the proportion of correctly identified pictures. An inversion effect is demonstrated by higher recognition scores for upright pictures than inverted ones. If sexualized females are processed as objects you would expect an inversion effect for the male pictures but not the female ones. The data are in **Bernard et al (2012).sav**. Conduct a three-way mixed ANOVA to see whether picture gender (male or female) and picture orientation (upright or inverted) interact. Include participant gender as the between-group factor. Follow up the analysis with *t*-tests looking at (1) the inversion effect for male pictures, (2) the inversion effect for female pictures, (3) the gender effect for upright pictures, and (4) the gender effect for inverted pictures.

Solution

To run the ANOVA select the repeated-measures ANOVA dialog box (Analyze General Linear Model ▸ Repeated Measures...). We have two repeated-measures variables: whether the target picture was of a male or female (let's call this **TargetGender**) and whether the target picture was upright or inverted (let's call this variable **TargetLocation**). The resulting ANOVA will be a 2 (**TargetGender**: male or female) × 2 (**TargetLocation**: upright or inverted) × 2 (**Gender**: male or female) three-way mixed ANOVA with repeated measures on the first two variables. First, we must define our two repeated-measures variables (Figure 1).

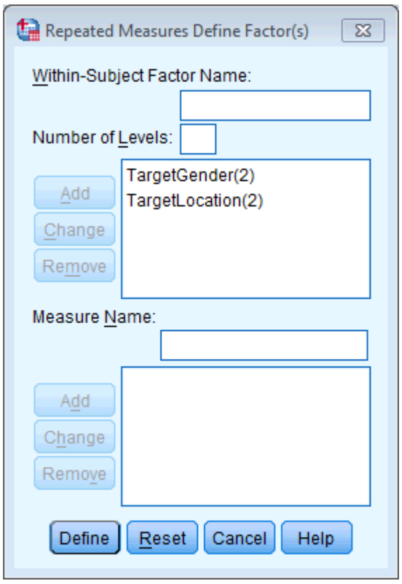


Figure 1

Next, we need to define these variables by specifying the columns in the data editor that relate to the different combinations of the gender and orientation of the picture (Figure 2).

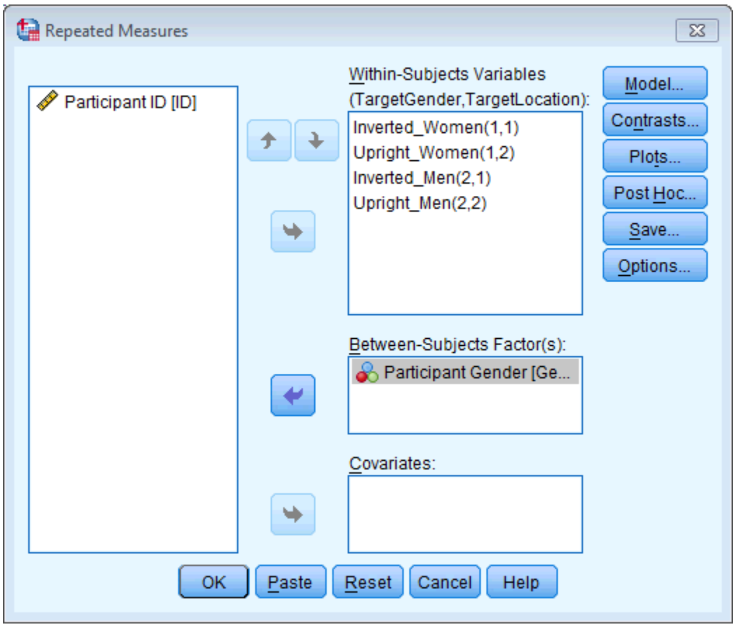


Figure 2

You could also ask for an interaction graph for the three-way interaction (Figure 3).

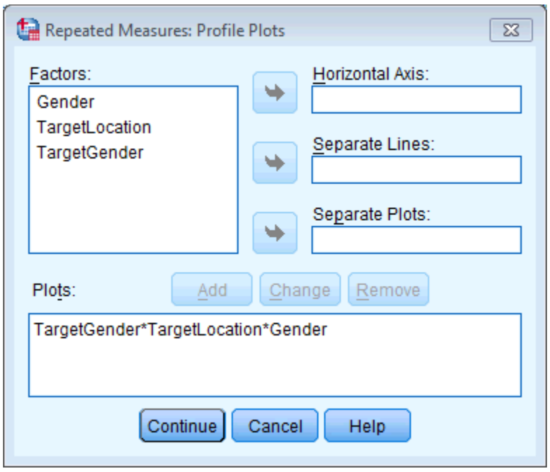


Figure 3

You can set other options as in the book chapter.

Because both of our repeated-measures variables have only two levels, we do not need to worry about sphericity. As you can see in Output 1, SPSS still produces the sphericity table; however, in the column labelled *Sig* there is simply a full stop to indicate that we do not need to worry about the assumption of sphericity.

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
TargetGender	1.000	.000	0	.	1.000	1.000	1.000
TargetLocation	1.000	.000	0	.	1.000	1.000	1.000
TargetGender * TargetLocation	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + Gender
Within Subjects Design: TargetGender + TargetLocation + TargetGender * TargetLocation

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Output 1

Descriptive Statistics

	Participant Gender	Mean	Std. Deviation	N
Inverted Female Image (Proportion of correct responses)	Female	.8611	.12755	36
	Male	.8089	.17603	41
	Total	.8333	.15649	77
Upright Female Image (Proportion of correct responses)	Female	.8704	.13429	36
	Male	.8455	.18024	41
	Total	.8571	.15987	77
Inverted Male Image (Proportion of correct responses)	Female	.7407	.14608	36
	Male	.7215	.18598	41
	Total	.7305	.16770	77
Upright Male Image (Proportion of correct responses)	Female	.8495	.15914	36
	Male	.8516	.17531	41
	Total	.8506	.16685	77

Output 2

Output 2 is the table of the overall descriptive statistics; these will be useful for interpreting the direction of the results in the main ANOVA table. We can also use these values when we report the results.

Figure 4 is the plot for the two-way interaction between target gender and target location for female participants. Looking at the graph, we can see that when the target was of a female (i.e., when Target Gender = 1) female participants correctly recognized a similar number of inverted (blue line) and upright (green line) targets, indicating that there was no inversion effect for female pictures. We can tell this because the dots are very close together. However, when the target was of a male (Target Gender = 2), the female participants' recognition of inverted male targets was very poor compared with their recognition of upright male targets (the dots are very far apart), indicating that the inversion effect was present for pictures of males.

Figure 5 is the plot for the two-way interaction between target gender and target location for male participants. Looking at the graph, we can see that there appears to be a similar pattern of results as for the female participants: when the target was of a female (i.e., when Target Gender = 1) male participants correctly recognized a fairly similar number of inverted (blue line) and upright (green line) targets, indicating no inversion effect for the female target pictures. We can tell this because the dots are reasonably together. However, when the target was of a male (Target Gender = 2), the male participants' recognition of inverted male targets was very poor compared with their recognition of upright male targets (the dots are very far apart), indicating the presence of the inversion effect for male target pictures. The fact that the pattern of results were very similar for male and female participants suggests that there may not be a significant three-way interaction between target gender, target location and participant gender.

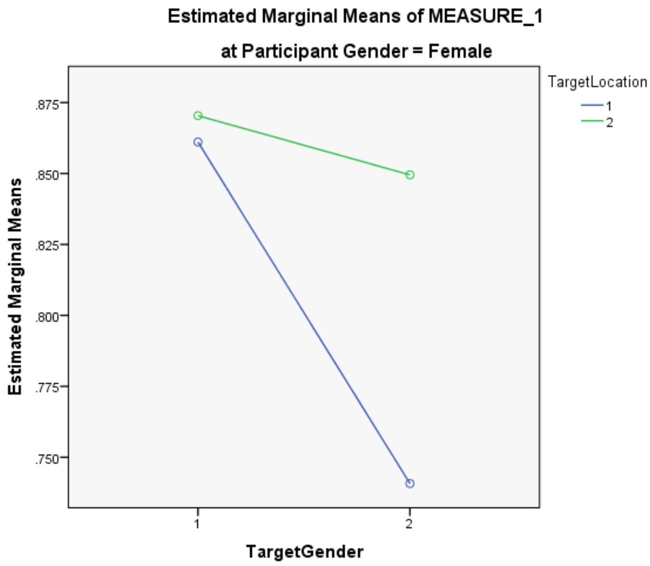


Figure 4

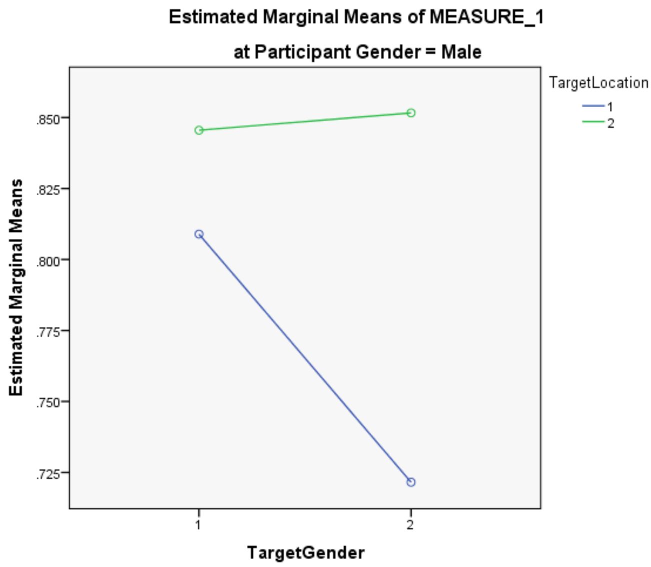


Figure 5

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	205.560	1	205.560	2838.616	.000
Gender	.042	1	.042	.586	.446
Error	5.431	75	.072		

Output 3

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
TargetGender	Sphericity Assumed	.237	1	.237	22.847	.000	.233
	Greenhouse-Geisser	.237	1.000	.237	22.847	.000	.233
	Huynh-Feldt	.237	1.000	.237	22.847	.000	.233
	Lower-bound	.237	1.000	.237	22.847	.000	.233
TargetGender * Gender	Sphericity Assumed	.017	1	.017	1.656	.202	.022
	Greenhouse-Geisser	.017	1.000	.017	1.656	.202	.022
	Huynh-Feldt	.017	1.000	.017	1.656	.202	.022
	Lower-bound	.017	1.000	.017	1.656	.202	.022
Error(TargetGender)	Sphericity Assumed	.779	75	.010			
	Greenhouse-Geisser	.779	75.000	.010			
	Huynh-Feldt	.779	75.000	.010			
	Lower-bound	.779	75.000	.010			
TargetLocation	Sphericity Assumed	.388	1	.388	32.859	.000	.305
	Greenhouse-Geisser	.388	1.000	.388	32.859	.000	.305
	Huynh-Feldt	.388	1.000	.388	32.859	.000	.305
	Lower-bound	.388	1.000	.388	32.859	.000	.305
TargetLocation * Gender	Sphericity Assumed	.011	1	.011	.958	.331	.013
	Greenhouse-Geisser	.011	1.000	.011	.958	.331	.013
	Huynh-Feldt	.011	1.000	.011	.958	.331	.013
	Lower-bound	.011	1.000	.011	.958	.331	.013
Error(TargetLocation)	Sphericity Assumed	.887	75	.012			
	Greenhouse-Geisser	.887	75.000	.012			
	Huynh-Feldt	.887	75.000	.012			
	Lower-bound	.887	75.000	.012			
TargetGender * TargetLocation	Sphericity Assumed	.179	1	.179	15.066	.000	.167
	Greenhouse-Geisser	.179	1.000	.179	15.066	.000	.167
	Huynh-Feldt	.179	1.000	.179	15.066	.000	.167
	Lower-bound	.179	1.000	.179	15.066	.000	.167
TargetGender * TargetLocation * Gender	Sphericity Assumed	.000	1	.000	.015	.904	.000
	Greenhouse-Geisser	.000	1.000	.000	.015	.904	.000
	Huynh-Feldt	.000	1.000	.000	.015	.904	.000
	Lower-bound	.000	1.000	.000	.015	.904	.000
Error (TargetGender*TargetLocation)	Sphericity Assumed	.889	75	.012			
	Greenhouse-Geisser	.889	75.000	.012			
	Huynh-Feldt	.889	75.000	.012			
	Lower-bound	.889	75.000	.012			

Output 4

Output 4 shows the summary table of the repeated-measures effects in the ANOVA with corrected *F*-values. As with factorial repeated-measures ANOVA, the output is split into sections for each of the effects in the model and their associated error terms. The interactions between our between-groups variable of gender and the repeated-measures effects are included in this table also. We could report these effects as follows:

- ✓ There was a significant interaction between target gender and target location, $F(1, 75) = 15.07$, $p < .001$, $\eta^2 = .167$, indicating that if we ignore whether the participant was male or female, the relationship between recognition of upright and inverted targets was different for pictures depicting men and women. The two-way interaction between target location and participant gender was not significant, $F(1, 75) = .96$, $p = .331$, $\eta^2 = .013$, indicating that if we ignore whether the target depicted a picture of a man or a woman, male and female participants did not significantly differ in their recognition of inverted and upright targets. There was also no significant three-way interaction between target gender, target location and participant gender, $F(1, 75)$ = .02, p = .904, η^2 = .000, indicating that the relationship between target location (whether the target picture was upright or inverted) and target gender (whether the target was of a male or female) was not significantly different in male and female participants.

The next part of the question asks us to follow up the analysis with *t*-tests looking at inversion and gender effects. To do this, we need to conduct four paired-samples *t*-tests (See Chapter 9). Once you have the *Paired-Samples T Test* dialog box open, you can transfer pairs of varialbles from the left-hand side to the box labelled *Paired Variables*. The first pair I am going to compare is **Upright Female** vs. **Inverted Female**, to look at the inversion effect for female pictures. The next pair will be **Upright Male** vs. **Inverted Male**, and this comparison will investigate the inversion effect for male pictures. To look at the gender effect for upright pictures we need to compare **Upright Female** vs. **Upright Male**. Finally, to look at the gender effect for inverted pictures we need to compare the variables **Inverted Female** and **Inverted Male**. Your complated dialog box should look like Figure 6.

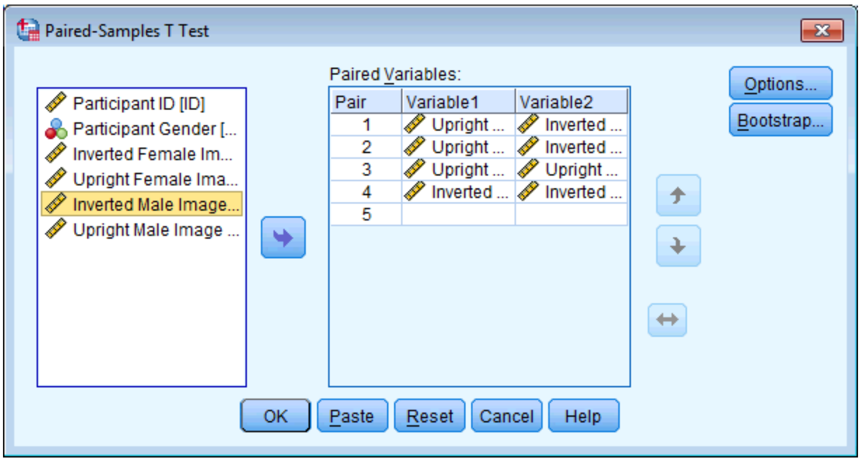


Figure 6

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	UprightWomen	.8568	78	.15885	.01799
	InvertedWomen	.8355	78	.15661	.01773
Pair 2	UprightMen	.8494	78	.16616	.01881
	InvertedMen	.7297	78	.16677	.01888
Pair 3	UprightWomen	.8568	78	.15885	.01799
	UprightMen	.8494	78	.16616	.01881
Pair 4	InvertedWomen	.8355	78	.15661	.01773
	InvertedMen	.7297	78	.16677	.01888

Output 5

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	UprightWomen & InvertedWomen	78	.625	.000
Pair 2	UprightMen & InvertedMen	78	.490	.000
Pair 3	UprightWomen & UprightMen	78	.720	.000
Pair 4	InvertedWomen & InvertedMen	78	.433	.000

Output 6

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	UprightWomen - InvertedWomen	.02137	.13659	.01547	-.00943	.05216	1.382	77	.171
Pair 2	UprightMen - InvertedMen	.11966	.16806	.01903	.08177	.15755	6.288	77	.000
Pair 3	UprightWomen - UprightMen	.00748	.12176	.01379	-.01997	.03493	.542	77	.589
Pair 4	InvertedWomen - InvertedMen	.10577	.17235	.01951	.06691	.14463	5.420	77	.000

Output 7

Output 7 shows the results of the paired samples *t*-tests. The results show that people recognized upright males (*M* = 0.85, *SD* = 0.17) significantly better than inverted males (*M* = 0.73, *SD* = 0.17), *t*(77) = 6.29, *p* < .001, but this pattern did not emerge for females, *t*(77) = 1.38, *p* = .171. Additionally, participants recognized inverted females (*M* = 0.83, *SD* = 0.16) significantly better than inverted males (M = 0.73, *SD* = 0.17), *t*(77) = 5.42, *p* < .001. This effect was not found for upright males and females, *t*(77) = 0.54, *p* = .59. Note: the sign of the *t*-statistic will depend on which way round you entered the variables in the *Paired-Samples T Test* dialog box.

Consistent with the authors' hypothesis, the results showed that the inversion effect emerged only when participants saw sexualized males. This suggests that, at a basic cognitive level, sexualized men were perceived as persons, whereas sexualized women were perceived as objects.

Keep the faith(ful)?

Problem

Schützwohl, A. (2008). *Personality and Individual Differences*, *44*, 633–644.

People can be jealous. People can be especially jealous when they think that their partner is being unfaithful. An evolutionary view of jealousy suggests that men and women have evolved distinctive types of jealousy. Specifically, a woman's sexual infidelity deprives her mate of a reproductive opportunity and could burden him with years investing in a child that is not his. Conversely, a man's sexual infidelity does not burden his mate with unrelated children, but may divert his resources from his mate's progeny. This diversion of resources is signalled by emotional attachment to another female. Consequently, men's jealousy mechanism should have evolved to prevent a mate's *sexual* infidelity, whereas in women it has evolved to prevent *emotional* infidelity. Achim Schützwohl reasoned that if this is the case, women should be on the look-out for emotional infidelity, whereas men should be watching out for sexual infidelity.

He put this hypothesis to the test in a unique study in which men and women saw sentences presented on a computer screen (Schützwohl, 2008). At each trial, participants saw a target sentence that was emotionally neutral (e.g., 'The gas station is at the other side of the street'). However, before each of these targets, a distractor sentence was presented that could also be affectively neutral, or could indicate sexual infidelity (e.g., 'Your partner suddenly has difficulty becoming sexually aroused when he and you want to have sex') or emotional infidelity (e.g., 'Your partner doesn't say "I love you" to you anymore'). The idea was that if these distractor sentences grabbed a person's attention then (1) they would remember them, and (2) they would not remember the target sentence that came afterwards (because their attentional resources were focused on the distractor). These effects should show up only in people currently in a relationship. The outcome was the number of sentences that a participant could remember (out of 6), and the predictors were whether the person had a partner or not (**Relationship**), whether the trial used a neutral distractor, an emotional infidelity distractor or a sexual infidelity distractor, and whether the sentence was a distractor or the target following a distractor. Schützwohl analysed men and women's data seperately. The predictions are that women should remember more emotional infidelity sentences (distractors) but fewer of the targets that followed those sentences (target). For men, the same effect should be found but for sexual infidelity sentences. The data from this study are in the file **Schützwohl(2008).sav**. Labcoat Leni wants you to carry out two three-way mixed ANOVAs (one for men and the other for women) to test these hypotheses.

Solution

We want to run these analyses on men and women separately; therefore, we could (to be efficient) split the file by the variable **Gender** (see Chapter 5), as shown in Figure 7.

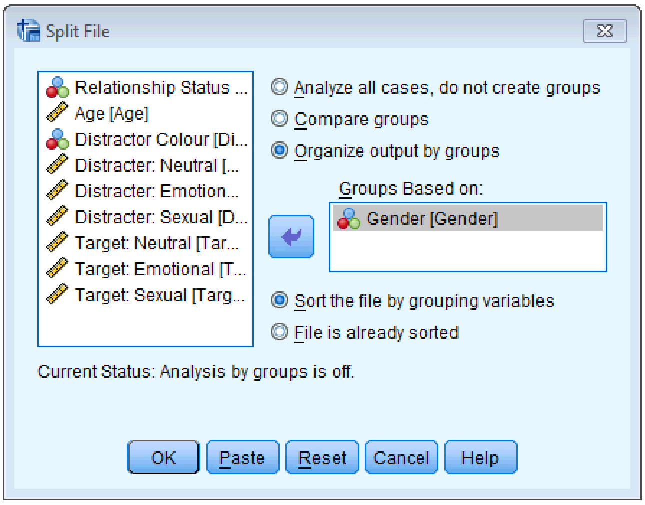


Figure 7

To run the ANOVA, select the repeated-measures ANOVA dialog box (Analyze General Linear Model Repeated Measures...). We have two repeated-measures variables: whether the sentence was a distractor or a target (let's call this **Sentence_Type**) and whether the distractor used on a trial was neutral, indicated sexual infidelity or emotional infidelity (let's call this variable **Distracter_Type**). The resulting ANOVA will be a 2 (relationship: with partner or not) × 2 (sentence type: distractor or target) × 3 (distractor type: neutral, emotional infidelity or sexual infidelity) three-way mixed ANOVA with repeated measures on the last two variables. First, we must define our two repeated-measures variables (Figure 8).

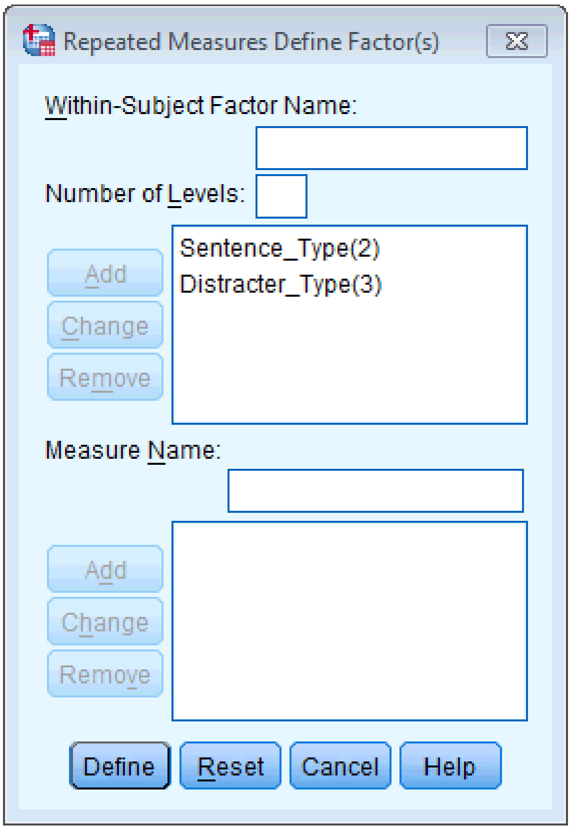


Figure 8

Next, we need to define these variables by specifying the columns in the data editor that relate to the different combinations of the type of sentence and the type of trial. As you can see in Figure 9, we specified **Sentence_Type** first, therefore we have all of the variables relating to distractors specified before those for targets. For each type of sentence there are three different variants, depending on whether the distractor used was neutral, emotional or sexual. Note that we have use the same order for both types of sentence (neutral, emotional, sexual) and that we have put neutral distractors as the first category so that we can look at some contrasts (neutral distractors are the control).

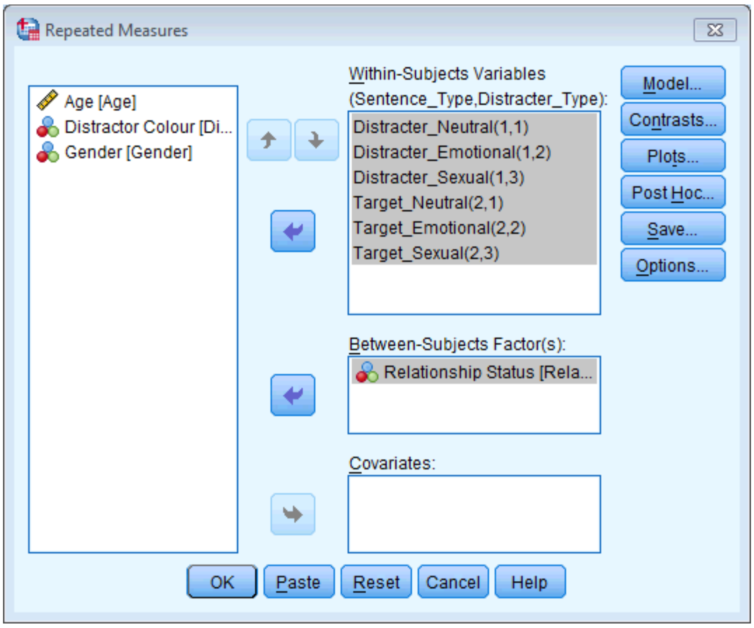
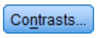


Figure 9

To do some contrasts, select  and select some simple contrasts comparing everything to the first category (Figure 10).

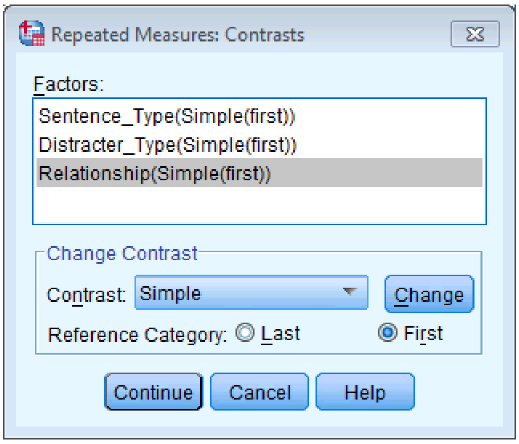


Figure 10

You could also ask for an interaction graph for the three-way interaction (Figure 11).

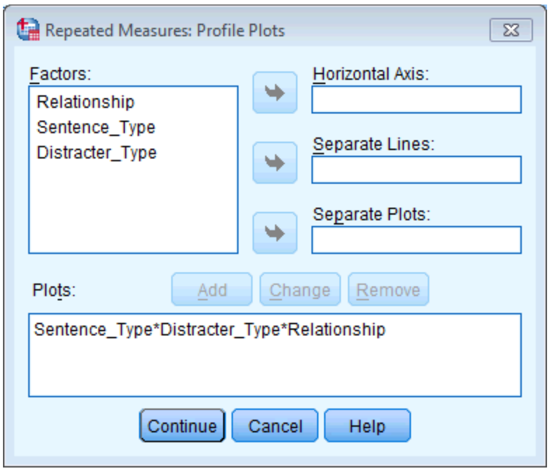


Figure 11

You can set other options as in the book chapter.

Let's look at the men's output first. Sphericity tests, shown in Output 8, are fine (all non-significant) so I've simplified the main ANOVA table in Output 9 to show only the sphericity assumed tests.

Mauchly's Test of Sphericity[b,c]

Measure:MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Sentence_Type	1.000	.000	0	.	1.000	1.000	1.000
Distracter_Type	.956	1.603	2	.449	.958	1.000	.500
Sentence_Type * Distracter_Type	.997	.124	2	.940	.997	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Gender = male

c. Design: Intercept + Relationship
Within Subjects Design: Sentence_Type + Distracter_Type + Sentence_Type * Distracter_Type

Output 8

Tests of Within-Subjects Effects[a]

Measure:MEASURE_1
Epsilon Corrections:Sphericity Assumed

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Sentence_Type	81.250	1	81.250	53.973	.000
Sentence_Type * Relationship	2.925	1	2.925	1.943	.172
Error(Sentence_Type)	55.699	37	1.505		
Distracter_Type	1.286	2	.643	.812	.448
Distracter_Type * Relationship	6.209	2	3.105	3.920	.024
Error(Distracter_Type)	58.603	74	.792		
Sentence_Type * Distracter_Type	1.628	2	.814	1.146	.323
Sentence_Type * Distracter_Type * Relationship	5.389	2	2.694	3.794	.027
Error(Sentence_Type*Distracter_Type)	52.551	74	.710		

a. Gender = male

Output 9

We could report these effects as follows:

- ✓ A three-way ANOVA with current relationship status as the between-subjects factor and men's recall of sentence type (targets vs. distractors) and distractor type (neutral, emotional infidelity and sexual infidelity) as the within-subjects factors yielded a significant main effect of sentence type, $F(1, 37) = 53.97$, $p < .001$, and a significant interaction between current relationship status and distractor content, $F(2, 74) = 3.92$, $p = .024$. More important, the three-way interaction was also significant, $F(2, 74) = 3.79$, $p = .027$. The remaining main effects and interactions were not significant, $F < 2$, $p > .17$.

To pick apart the three-way interaction we can look at the table of contrasts (Output 10).

Tests of Within-Subjects Contrasts[a]

Measure:MEASURE_1

Source	Sentence_Type	Distracter_Type	Type III Sum of Squares	df	Mean Square	F	Sig.
Sentence_Type	Level 2 vs. Level 1	Distracter_Type	54.167	1	54.167	53.973	.000
Sentence_Type * Relationship	Level 2 vs. Level 1	Distracter_Type	1.950	1	1.950	1.943	.172
Error(Sentence_Type)	Level 2 vs. Level 1	Distracter_Type	37.132	37	1.004		
Distracter_Type	Sentence_Type * Distracter_Type	Level 2 vs. Level 1	.721	1	.721	.855	.361
		Level 3 vs. Level 1	1.157	1	1.157	1.836	.184
Distracter_Type * Relationship	Sentence_Type * Distracter_Type	Level 2 vs. Level 1	1.696	1	1.696	2.011	.165
		Level 3 vs. Level 1	1.413	1	1.413	2.243	.143
Error(Distracter_Type)	Sentence_Type * Distracter_Type	Level 2 vs. Level 1	31.202	37	.843		
		Level 3 vs. Level 1	23.317	37	.630		
Sentence_Type * Distracter_Type	Level 2 vs. Level 1	Level 2 vs. Level 1	.013	1	.013	.005	.945
		Level 3 vs. Level 1	4.628	1	4.628	1.590	.215
Sentence_Type * Distracter_Type * Relationship	Level 2 vs. Level 1	Level 2 vs. Level 1	.013	1.000	.013	.005	.945
		Level 3 vs. Level 1	15.705	1.000	15.705	5.394	.026
Error(Sentence_Type*Distracter_Type)	Level 2 vs. Level 1	Level 2 vs. Level 1	98.962	37	2.675		
		Level 3 vs. Level 1	107.731	37	2.912		

a. Gender = male

Output 10

This table tells us that the effect of whether or not you are in a relationship and whether you were remembering a distractor or target was similar in trials in which an emotional infidelity distractor was used compared to when a neutral distractor was used, $F(1, 37) < 1$, $p = .95$ (level 2 vs. level 1 in the table). However, as predicted, there is a difference in trials in which a sexual infidelity distractor was used compared to those in which a neutral distractor was used, $F(1, 37) = 5.39$, $p < .05$ (level 3 vs. level 1).

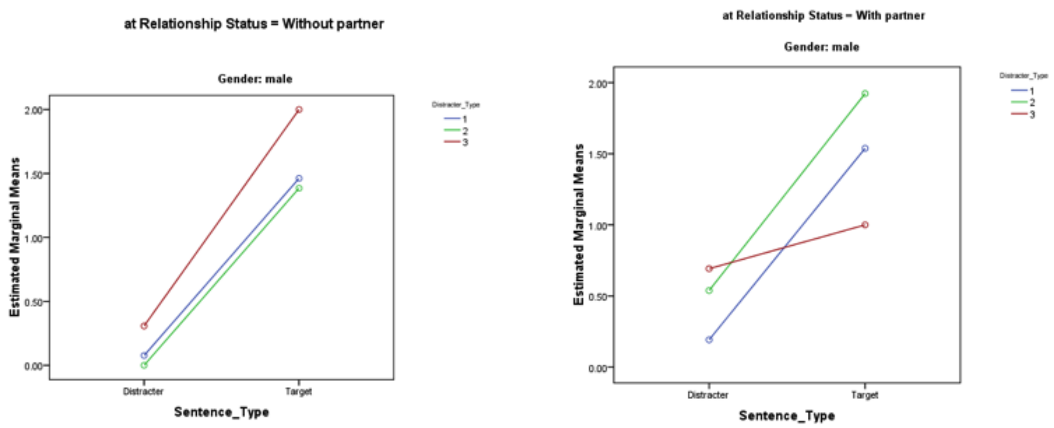


Figure 12

To see what these contrasts tell us, look at the graphs in Figure 12 (I've edited these a bit so that they are clearer). First off, those without partners remember many more targets than they do distractors, and this is true for all types of trials. In other words, it doesn't matter whether the distractor is neutral, emotional or sexual; these people remember more targets than distractors. The same pattern is seen in those with partners *except* for distractors that indicate sexual infidelity (the red line). For these, the number of targets remembered is reduced. Put another way, the slope of the green and blue lines is more or less the same for those in and out of relationships (compare graphs) and the slopes are more or less the same as each other (compare green with blue). The only difference is for the red line, which is comparable to the green and blue lines for those not in relationships, but is much shallower for those in relationships. They remember fewer targets that were preceded by a sexual infidelity distractor. This supports the predictions of the author: men in relationships have an attentional bias such that their attention is consumed by cues indicative of sexual infidelity.

Let's now look at the women's output. Sphericity tests, shown in Output 11, are fine (all non-significant) so I've simplified the main ANOVA table in Output 12 to show only the sphericity assumed tests.

Mauchly's Test of Sphericity[b,c]

Measure:MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Sentence_Type	1.000	.000	0	.	1.000	1.000	1.000
Distracter_Type	.968	1.231	2	.540	.969	1.000	.500
Sentence_Type * Distracter_Type	.945	2.139	2	.343	.948	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Gender = female

c. Design: Intercept + Relationship
Within Subjects Design: Sentence_Type + Distracter_Type + Sentence_Type * Distracter_Type

Output 11

Tests of Within-Subjects Effects[a]

Measure:MEASURE_1
Epsilon Corrections:Sphericity Assumed

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Sentence_Type	72.139	1	72.139	39.681	.000
Sentence_Type * Relationship	2.026	1	2.026	1.114	.298
Error(Sentence_Type)	70.901	39	1.818		
Distracter_Type	5.465	2	2.732	4.236	.018
Distracter_Type * Relationship	.099	2	.049	.077	.926
Error(Distracter_Type)	50.308	78	.645		
Sentence_Type * Distracter_Type	8.092	2	4.046	4.625	.013
Sentence_Type * Distracter_Type * Relationship	9.327	2	4.664	5.331	.007
Error(Sentence_Type*Distracter_Type)	68.234	78	.875		

a. Gender = female

Output 12

We could report these effects as follows:

- ✓ A three-way ANOVA with current relationship status as the between-subject factor and men's recall of sentence type (targets vs. distractors) and distractor type (neutral, emotional infidelity and sexual infidelity) as the within-subject factors yielded a significant main effect of sentence type, $F(1, 39) = 39.68$, $p < .001$, and distractor type, $F(2, 78) = 4.24$, $p = .018$. Additionally, significant interactions were found between sentence type and distractor type, $F(2, 78) = 4.63$, $p = .013$, and, most important, sentence type × distractor type × relationship, $F(2, 78) = 5.33$, $p = .007$. The remaining main effect and interactions were not significant, $F < 1.2$, $p > .29$.

To pick apart the three-way interaction we can look at the table of contrasts (Output 13).

Tests of Within-Subjects Contrasts[a]

Measure:MEASURE_1

Source	Sentence_Type	Distracter_Type	Type III Sum of Squares	df	Mean Square	F	Sig.
Sentence_Type	Level 2 vs. Level 1	Distracter_Type	48.093	1	48.093	39.681	.000
Sentence_Type * Relationship	Level 2 vs. Level 1	Distracter_Type	1.350	1	1.350	1.114	.298
Error(Sentence_Type)	Level 2 vs. Level 1	Distracter_Type	47.267	39	1.212		
Distracter_Type	Sentence_Type * Distracter_Type	Level 2 vs. Level 1	4.617	1	4.617	6.174	.017
		Level 3 vs. Level 1	3.503	1	3.503	5.487	.024
Distracter_Type * Relationship	Sentence_Type * Distracter_Type	Level 2 vs. Level 1	.056	1	.056	.075	.786
		Level 3 vs. Level 1	.088	1	.088	.138	.712
Error(Distracter_Type)	Sentence_Type * Distracter_Type	Level 2 vs. Level 1	29.163	39	.748		
		Level 3 vs. Level 1	24.899	39	.638		
Sentence_Type * Distracter_Type	Level 2 vs. Level 1	Level 2 vs. Level 1	19.448	1	19.448	4.505	.040
		Level 3 vs. Level 1	28.277	1	28.277	9.053	.005
Sentence_Type * Distracter_Type * Relationship	Level 2 vs. Level 1	Level 2 vs. Level 1	32.618	1.000	32.618	7.556	.009
		Level 3 vs. Level 1	.960	1.000	.960	.307	.582
Error(Sentence_Type*Distracter_Type)	Level 2 vs. Level 1	Level 2 vs. Level 1	168.357	39	4.317		
		Level 3 vs. Level 1	121.820	39	3.124		

a. Gender = female

Output 13

This table tells us that the effect of whether or not you are in a relationship and whether you were remembering a distractor or target was significantly different in trials in which a emotional infidelity distractor was used compared to when a neutral distractor was used, $F(1, 39) = 7.56$, $p = .009$ (level 2 vs. level 1 in the table). However, there was not a significant difference in trials in which a sexual infidelity distractor was used compared to those in which a neutral distractor was used, $F(1, 39) = 0.31$, $p = .58$ (level 3 vs. level 1).

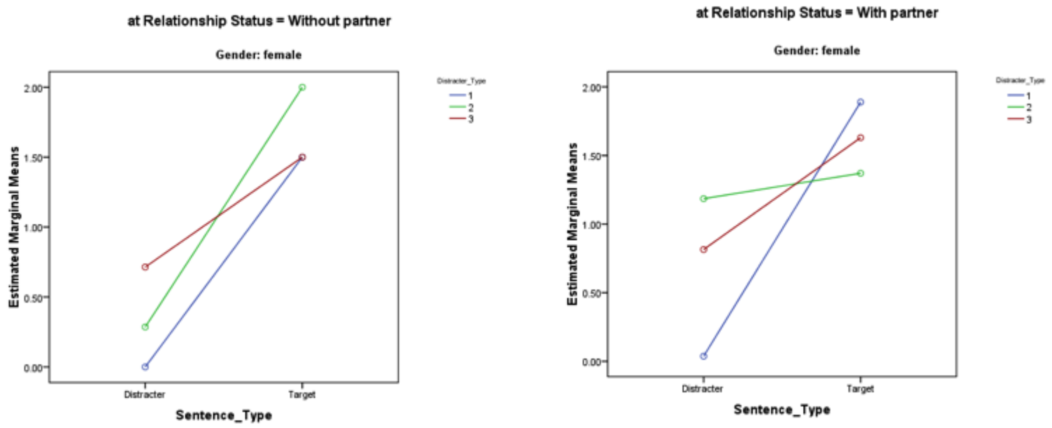


Figure 13

To see what these contrasts tell us look at the graphs in Figure 13 (I've edited these a bit so that they are clearer). As for the men, women without partners remember many more targets than they do distractors, and this is true for all types of trials (although it's less true for the sexual infidelity trials because this line has a shallower slope). The same pattern is seen in those with partners *except* for distractors that indicate emotional infidelity (the green line). For these, the number of targets remembered is reduced. Put another way, the slope of the red and blue lines is more or less the same for those in and out of relationships (compare graphs). The only difference is for the green line, which is much shallower for those in relationships. They remember fewer targets that were preceded by a emotional infidelity distractor. This supports the predictions of the author: women in relationships have an attentional bias such that their attention is consumed by cues indicative of emotional infidelity.