

**BUS 735: Business Decision Making and Research**  
**Instructor: Dr. James Murray**  
**Conducting Repeated Measures ANOVA in SPSS**

These instructions use as an example the dataset `JobSatisfaction.sav` from your textbook. The data consists of 218 Arab and Jewish social services workers in Israel. Participants were asked background information (gender, age, marital status, education, experience, etc) and were given a set of questions to measure their overall satisfaction with their job, as well as their satisfaction specifically regarding their colleagues, supervisors, salary, and promotion. Please read the more detailed description of the data is given in your text on page 354.

**Research questions:**

1. Are there differences in employee satisfaction regarding employees' colleagues, supervisors, salary, and promotion?
2. Are there differences in employee satisfaction between those with undergraduate degrees and graduate degrees?
3. Are there interaction effects between education and type of satisfaction?

**Within-Subjects Repeated Analysis of Variance: SPSS Instructions**

1. Open up `JobSatisfaction.sav`
2. Go to `Analyze, General Linear Model, Repeated Measures.`
3. Replace text 'factor1' with 'SatCat' (short for Satisfaction Category).
4. Enter '4' in `Number of Levels.`
5. Click `Add.`
6. Click `Define.`
7. Move `Colleague, Supervision, Salary, and Promotion` to `Within-Subjects Variables.`
8. Click on `Options` button.
9. Move `(OVERALL)` and `SatCat` to `Display Means for:.`
10. Click the following check-boxes:
  - `Compare main effects.`

- Descriptive statistics.
11. Change Confidence interval adjustment selection to Bonferroni.
  12. Click continue.
  13. Click OK.

### **Within-Subjects Repeated Analysis of Variance: SPSS Output**

1. Within Subjects Factors, list of groups you are comparing.
2. Descriptive Statistics, mean of the dependent variable for each group.
3. Ignore Multivariate Tests.
4. Mauchly's Test for Sphericity
  - Null hypothesis: There is sphericity (all variances are equal).
  - Alternative hypothesis: At least one of the variances is different.
  - Statistical significance implies the assumption of sphericity is violated.
5. Test of Within-Subjects Effects
  - The first F-test, Sphericity Assumed, is the traditional F-test that requires sphericity.
  - The next three F-tests have the same hypotheses, but do not assume sphericity.
  - Null hypothesis: There is no difference in the mean for the dependent variable among the groups considered.
  - Alternative hypothesis: The mean of the dependent variable for at least one group differs from the others.
6. Ignore Test of Within-Subjects Contrasts.
7. Ignore Tests of Between-Subjects Effects (We did not yet consider between-effects variables).
8. Grand Mean: Mean of the dependent variable for all groups put together.
9. SatCat: Mean of the dependent variable for each group.
10. Pairwise Comparisons: All the Bonferroni tests, comparing the difference between each pair of groups.
11. Ignore Multivariate Tests

## **Between-Within-Subjects Repeated Analysis of Variance: SPSS Instructions**

1. Go to **Analyze, General Linear Model, Repeated Measures**.
2. (Same as above) Replace text 'factor1' with 'SatCat' (short for Satisfaction Category).
3. (Same as above) Enter '4' in **Number of Levels**.
4. (Same as above) Click **Add**.
5. Click **Define**.
6. (Same as above) Move **Colleague, Supervision, Salary, and Promotion** to **Within-Subjects Variables**.
7. Move **Level of Education [Education\_Rec]** to **Between-Subjects Factors**.
8. Click on **Options** button.
9. Move **(OVERALL), Education\_Rec, SatCat, and Education\_Rec \* SatCat** (interaction effect) to **Display Means for:**.
10. (Same as above) Click the following check-boxes:
  - **Compare main effects**.
  - **Descriptive statistics**.
11. (Same as above) Change **Confidence interval adjustment** selection to **Bonferroni**.
12. Click **continue**.
13. Click **OK**.

## **Between-Within-Subjects Repeated Analysis of Variance: SPSS Output**

1. **Within Subjects Factors**, list of within-groups you are comparing (the groups with the same individuals in each group).
2. **Between Subjects Factors**, list of between-groups you are comparing (the groups with different individuals in each group).
3. **Descriptive Statistics**, mean of the dependent variable for each group-subgroup.
4. **Ignore Multivariate Tests**.
5. **Maulchy's Test for Sphericity**, same as above.

## 6. Test of Within-Subjects Effects

- First 4 rows are the same as above.
- Second 4 rows test for an interaction effect.
  - Null hypothesis: Education and Satisfaction Category only *independently* influence Job Satisfaction (but do not jointly influence Job Satisfaction), if at all.
  - Alternative hypothesis: Education and Satisfaction Category jointly influence Job Satisfaction (in addition to any independent influences).

## 7. Ignore Test of Within-Subjects Contrasts.

## 8. Tests of Between-Subject Effects

- Now this is interesting. We ignored it when only testing Within-Subjects RA-NOVA.
- F-test on Education\_Rec is estimating the influence education has on Job Satisfaction.
- Null hypothesis: The means of the dependent variable are equal across the between-groups (Education groups).
- Alternative hypothesis: The mean of the dependent variable differs in at least one of the between groups from the others.

9. **Grand Mean:** Mean of the dependent variable for all groups put together.

10. **SatCat:** Mean of the dependent variable for each group.

11. **Pairwise Comparisons:** All the Bonferroni tests *for the within-groups*, comparing the difference between each pair of groups.

12. **Ignore Multivariate Tests**

13. **Level of Education, Estimates:** means for each between-group.

14. **Pairwise Comparisons:** Bonferroni tests for the differences between the between-groups.

15. **Ignore Univariate Tests.**

16. **Level of Education \* SatCat:** reports the mean for each between-group-within-group subcategory.