**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

BA/BSc/BAITT students registered for

Level **FIVE**

Title**: Research Methods and Statistics III**

Code: **PSY5001**

Semester: **One**

Date: **13th** **January 2020**

Time: **9:30 am – 10:30 am**

TIME ALLOWED: **ONE** HOUR

This is an open book exam. Students are allowed to bring in notes, textbooks and calculators. Attempt all questions. Start each section on a new page.

**Section A**

A team of researchers wanted to assess how keeping secrets about someone might affect the secret keepers’ well-being. At the start of the experiment, 40 participants were each told three bits of information about three people they would shortly meet in the lab; that John had won the departmental raffle (good secret), Mark will move to a different office next week (neutral secret), and, Steven’s job will be terminated at the end of the month (bad secret). Participants had to keep this information secretly in mind whilst they completed tasks with the three lab workers.

Participants’ feelings about the three secrets were measured at the start and at the end of the lab session using, an anxiety scale. They denoted how anxious they felt about keeping the information secret, by marking a mark on a 10cm line, where the 0cm point denoted not at all anxious and 10cm point denoted extremely anxious.

The researchers expected that the anxiety of keeping secrets would increase the longer they are kept. They also predicted the participants would feel most anxious about keeping negative secrets and the least for neutral secrets. However they were unsure if the anxiety would increase more with time for a particular type of secret or not.

A.1 Do you think that the dependent variable in this experiment should be classified as parametric or not? Explain your answer (3 marks)

A2. Is this a between, within or mixed design? Explain your answer (2 marks)

A3. What is Mauchly’s test of Sphericity used for? What does the reported Mauchly’s test show? (3 marks)

A4. Using the information in Table A3, plot a line graph of the descriptive data with AnxietyMeasure on the x-axis. (5 marks)

A5. Interpret and report these findings as they would be presented in the results section of a research paper. (10 marks)

A6. A few months later, the researchers wondered if they would get the same effects if the secret keeper and the person the secret was about did not actually have any personal interactions. Suggest how such a follow-up study could be devised, whilst minimising potential extraneous variables (2 marks).

(Total marks 25)

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| **Table A1** | | | | |
|  | | | | |
| AnxietyMeasure | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| Start | 4.642 | .076 | 4.489 | 4.794 |
| End | 5.714 | .085 | 5.543 | 5.886 |

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| **Table A2** | | | | |
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| SecretType | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| Positive | 4.846 | .110 | 4.625 | 5.068 |
| Neutral | 4.188 | .098 | 3.990 | 4.385 |
| Negative | 6.500 | .140 | 6.218 | 6.782 |

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| **Table A3** | | | | | |
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| AnxietyMeasure | SecretType | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| Start | Positive | 4.450 | .116 | 4.215 | 4.685 |
| Neutral | 3.975 | .161 | 3.649 | 4.301 |
| Negative | 5.500 | .140 | 5.218 | 5.782 |
| End | Positive | 5.243 | .205 | 4.828 | 5.657 |
| Neutral | 4.400 | .164 | 4.068 | 4.732 |
| Negative | 7.500 | .140 | 7.218 | 7.782 |

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| **Table A4.** | | | | | | | |
| Mauchly’s test of Sphericity | | | | | | | |
| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilonb | | |
| Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| AnxietyMeasure | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| SecretType | .898 | 4.080 | 2 | .130 | .908 | .949 | .500 |

**Table A5.**

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| **Tests of Within-Subjects Effects** | | | | | | | |
| Measure: MEASURE\_1 | | | | | | | |
| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| AnxietyMeasure | Sphericity Assumed | 69.015 | 1 | 69.015 | 91.865 | .000 | .702 |
| Greenhouse-Geisser | 69.015 | 1.000 | 69.015 | 91.865 | .000 | .702 |
| Huynh-Feldt | 69.015 | 1.000 | 69.015 | 91.865 | .000 | .702 |
| Lower-bound | 69.015 | 1.000 | 69.015 | 91.865 | .000 | .702 |
| Error(AnxietyMeasure) | Sphericity Assumed | 29.300 | 39 | .751 |  |  |  |
| Greenhouse-Geisser | 29.300 | 39.000 | .751 |  |  |  |
| Huynh-Feldt | 29.300 | 39.000 | .751 |  |  |  |
| Lower-bound | 29.300 | 39.000 | .751 |  |  |  |
| SecretType | Sphericity Assumed | 227.107 | 2 | 113.553 | 91.392 | .000 | .701 |
| Greenhouse-Geisser | 227.107 | 1.815 | 125.112 | 91.392 | .000 | .701 |
| Huynh-Feldt | 227.107 | 1.899 | 119.601 | 91.392 | .000 | .701 |
| Lower-bound | 227.107 | 1.000 | 227.107 | 91.392 | .000 | .701 |
| Error(SecretType) | Sphericity Assumed | 96.913 | 78 | 1.242 |  |  |  |
| Greenhouse-Geisser | 96.913 | 70.794 | 1.369 |  |  |  |
| Huynh-Feldt | 96.913 | 74.056 | 1.309 |  |  |  |
| Lower-bound | 96.913 | 39.000 | 2.485 |  |  |  |
| AnxietyMeasure \* SecretType | Sphericity Assumed | 27.158 | 2 | 13.579 | 14.593 | .000 | .272 |
| Greenhouse-Geisser | 27.158 | 1.474 | 18.419 | 14.593 | .000 | .272 |
| Huynh-Feldt | 27.158 | 1.518 | 17.886 | 14.593 | .000 | .272 |
| Lower-bound | 27.158 | 1.000 | 27.158 | 14.593 | .000 | .272 |
| Error(AnxietyMeasure\*SecretType) | Sphericity Assumed | 72.582 | 78 | .931 |  |  |  |
| Greenhouse-Geisser | 72.582 | 57.505 | 1.262 |  |  |  |
| Huynh-Feldt | 72.582 | 59.219 | 1.226 |  |  |  |
| Lower-bound | 72.582 | 39.000 | 1.861 |  |  |  |

**Section B**

Researchers were interested in seeing the effect of different types of toys on primary school children’s’ (6-8years) behaviour when playing with them. They asked 20 boys and 20 girls during their afternoon break time to come and take part in the study. They gave them some life-like dolls to play with, in an observation room with a one-way mirror. The experimenters then videoed the children through the mirror for ten minutes.

They used the videos to rate how aggressively the children behaved when playing with the toys. They defined aggressive behaviour as violent or pretend violent acts or shouting or other similar behaviours. The children’s average aggressive behaviour was measured as a percentage of all behaviours performed during the 10 minutes.

The same children were observed a week later but this time they were given toy guns to play with. Finally, they were measured a week later again and given plastic building blocks to play with.

The researchers expected that children would show most aggression when playing with the toy guns and least when playing with the blocks; they also expected boys to show more aggression when playing than girls. They were however unsure if the two factors would interact.

B1. Does the experiment adhere to ethical guidelines? Explain your answer (3 marks).

B2. Name the two independent/predictor variables. How many levels does each have? (4 marks)

B3. Interpret and report these overall findings as they would be presented in the results section of a research paper. (10 marks)

B4. Which of the three effects was the strongest? Explain your answer (2 marks)

B5. What additional analysis would be appropriate to conduct? Explain your answer (4 marks)

B6. A fellow researcher commented that observing the same children playing with three different sets of toys confounded the data. How would you modify the study to eliminate this confound? (2 marks)

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| **Table B1** | | | | |
| Gender | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| Boy | 12.133 | .421 | 11.281 | 12.985 |
| Girl | 7.517 | .421 | 6.665 | 8.369 |

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| **Table B2** | | | | |
| ToyType | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| Dolls | 8.025 | .401 | 7.213 | 8.837 |
| Guns | 11.575 | .455 | 10.654 | 12.496 |
| Blocks | 9.875 | .414 | 9.036 | 10.714 |

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| **Table B3** | | | | | |
| Gender | ToyType | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| Boy | Dolls | 8.900 | .567 | 7.752 | 10.048 |
| Guns | 15.050 | .644 | 13.747 | 16.353 |
| Blocks | 12.450 | .586 | 11.263 | 13.637 |
| Girl | Dolls | 7.150 | .567 | 6.002 | 8.298 |
| Guns | 8.100 | .644 | 6.797 | 9.403 |
| Blocks | 7.300 | .586 | 6.113 | 8.487 |

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| **Table B4**  **Mauchly's Test of Sphericitya** | | | | | | | | | | | | | | |
| Within Subjects Effect | | Mauchly's W | Approx. Chi-Square | | df | | Sig. | | Epsilonb | | | | | |
| Greenhouse-Geisser | | Huynh-Feldt | | Lower-bound | |
| ToyType | | .962 | 1.447 | | 2 | | .485 | | .963 | | 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. Design: Intercept + Gender  Within Subjects Design: ToyType | | | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | | | |
| **Table B5**  **Tests of Within-Subjects Effects** | | | | | | | | | | | | | | | | |
| Source | | | | | Type III Sum of Squares | | df | | Mean Square | | F | | Sig. | | Partial Eta Squared | |
| ToyType | | Sphericity Assumed | | | 252.200 | | 2 | | 126.100 | | 23.019 | | .000 | | .377 | |
| Greenhouse-Geisser | | | 252.200 | | 1.926 | | 130.936 | | 23.019 | | .000 | | .377 | |
| Huynh-Feldt | | | 252.200 | | 2.000 | | 126.100 | | 23.019 | | .000 | | .377 | |
| Lower-bound | | | 252.200 | | 1.000 | | 252.200 | | 23.019 | | .000 | | .377 | |
| ToyType \* Gender | | Sphericity Assumed | | | 139.467 | | 2 | | 69.733 | | 12.730 | | .000 | | .251 | |
| Greenhouse-Geisser | | | 139.467 | | 1.926 | | 72.408 | | 12.730 | | .000 | | .251 | |
| Huynh-Feldt | | | 139.467 | | 2.000 | | 69.733 | | 12.730 | | .000 | | .251 | |
| Lower-bound | | | 139.467 | | 1.000 | | 139.467 | | 12.730 | | .001 | | .251 | |
| Error(ToyType) | | Sphericity Assumed | | | 416.333 | | 76 | | 5.478 | |  | |  | |  | |
| Greenhouse-Geisser | | | 416.333 | | 73.193 | | 5.688 | |  | |  | |  | |
| Huynh-Feldt | | | 416.333 | | 76.000 | | 5.478 | |  | |  | |  | |
| Lower-bound | | | 416.333 | | 38.000 | | 10.956 | |  | |  | |  | |

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| **Table B6**  **Tests of Between-Subjects Effects** | | | | | | |
| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Intercept | 11583.675 | 1 | 11583.675 | 1089.778 | .000 | .966 |
| Gender | 639.408 | 1 | 639.408 | 60.155 | .000 | .613 |
| Error | 403.917 | 38 | 10.629 |  |  |  |

**END OF EXAMINATION**