Inferential Statistics: Selecting Statistical Tests in Psychology

1. **Why are Inferential Statistics Used?**
   Researchers use inferential statistics to assess whether the difference or relationship being tested is statistically significant, typically meaning there's a low probability (e.g., less than 5%) that the results occurred by chance.

2. **What Statistical Tests are on the A-Level Psychology Specification?**
   - Mann-Whitney U
   - Wilcoxon,
   - Spearman's
   - Chi Squared (Test for Difference)

3. **How do you determine which Statistical Test to use?**

   Step One: Determine if the hypothesis is testing a difference or a relationship.

   Step Two: Determine the level of measurement being used in the research. There are three levels of measurement included on the specification.

   Nominal Data: Categories, for example data grouped into categories such as colours.
   Ordinal Data: Data that represent rankings or ordered categories, but the intervals between ranks are not necessarily equal. For example a rating scale.

   Interval Data: Numerical data with **equal intervals** between values.

   Step Three: If it is a test of difference you need to identify what type of experimental design.

   Independent Measures Design: Each participant takes part in only one experimental condition.

   Matched Pairs Design: Participants are paired based on similar characteristics (e.g., age, ability) and one person from each pair is assigned to each condition.

   Repeated Measures Design: The same participants take part in all conditions of the experiment.

4. **What are the criteria for each test?**

	Test For	**Level of Data**	**Experimental Design**
Mann-Whitney U	Difference	Ordinal/Interval	Independent Groups
Wilcoxon,	Difference	Ordinal/Interval	Repeated Measures
Chi Squared	Difference	Nominal	Independent Groups
Spearman's	Relationship	Ordinal/Interval	

Worked Example:

1. Ken is planning to research whether the time of day has an impact on working memory processing speed. He intends to use high school students from the city he lives for his research.

   To test working memory processing speed, Ken intends to ask his participants to complete a series of mathematical calculations in the morning. They will then return to complete another set of mathematical calculations in the afternoon.

   Ken will time (in seconds) how long each participant takes to complete the task in the morning and in the afternoon to see if there is a difference.
   Explain which statistical test Ken would use for his data.

   (2)

   Step 1: Test of Difference (Difference in time morning and afternoon)

   Step 2: Interval (Time)

   Step 3: Repeated Measures (Same participants morning and afternoon)

Answer:

Ken would use a Wilcoxon signed ranks test (1 mark for identifying the correct test), because he is looking for a difference between morning and afternoon memory processing speed (1 mark for identifying one reason).

Note: Interval or Repeated Measures would also have been accepted.

2. Nancy carried out an experiment to see the effects of sensory deprivation on the number of hallucinations participants reported.

Participants were split into groups:

- Condition A: participants had no sensory information for 10 minutes.
- Condition B: participants had no sensory information for 60 minutes.

Nancy totalled the number of hallucinations each participant reported. She then carried out a Mann-Whitney U test on her data.

(a) State **two** reasons why Nancy selected a Mann-Whitney U test to use on her data.

Answer

- Nancy was looking for a difference between those who had sensory deprivation for 10 minutes and those who had sensory deprivation for 60 minutes (1).
- There were two separate groups of participants, so it was an (1).

Exam Style Questions

1. Andi is a clinical psychologist who is investigating whether family relationships improve or deteriorate once a person has been diagnosed with a mental health disorder.
Andi is going to interview two separate groups.

- Group A: Patients and families waiting for a diagnosis of a mental health disorder.
- Group B: Patients and families who already have a diagnosis of a mental disorder.

Andi carries out interviews with patients and their families. She uses both open questions and closed questions in her interviews.

(b) Andi collated the data from her closed questions.

Her results are shown in **Table 1.**

	Patient and family waiting for a diagnosis	**Patient and family who already have a diagnosis**
Family relationships improved	10	25
Family relationships deteriorated	20	15

Table 1

Andi carried out a chi-squared test on her data.

State **two** reasons why Andi used the chi-squared test on her data.

(2)

2. A psychologist wants to investigate whether there is a relationship between the number of hours students spend on social media per day and their level of anxiety. She recruits **15 students** and collects data on:

- **Hours spent on social media per day**
- **Anxiety scores** (on a scale from 0 to 50, where higher scores indicate greater anxiety

Figure one displays their data: **Social Media Use and Anxiety Scores**

Participant	Hours on Social Media (per day)	Anxiety Score (0–50)
1	2	12
2	6	34
3	4	28
4	1	10
5	7	40
6	5	29
7	3	22
8	2	15
9	6	36
10	8	45
11	1	8
12	4	27

Mark Scheme

1. For example:

- Andi was looking for a difference in relationships in patients and their families who were waiting for a diagnosis or who had a diagnosis (1).
- She used nominal data as she measured whether family relationships had improved or deteriorated (1).

Note: Independent Groups Design would also be accepted

2. The psychologist would use Spearman's (1 mark for identifying the correct test) because they are looking for a relationship between hours on social media and anxiety levels (1 marks for identifying one reason.)

Note: Ordinal/Interval data would have been accepted.