

NATURAL SCIENCES TRIPOS Part IB
NATURAL SCIENCES TRIPOS Part II (General)
NATURAL SCIENCES TRIPOS Preliminary Examination for PartII Psychology

Saturday 24 May 2008

1.30 to 3.00

EXPERIMENTAL PSYCHOLOGY - WRITTEN PRACTICAL

*Answer all **three** parts of Question 1 in Section A and **one** question from Section B.*

Each section carries equal marks.

Answers from each section must be tied up in a separate bundle, with the letter of the section written on each cover sheet.

*Write your number **not** your name on the cover sheet for each section.*

STATIONERY REQUIREMENTS

Loose script paper

Cover sheets

Graph paper x 1 sheet

SPECIAL REQUIREMENTS

Tables and Formulae

Calculators

**You may not start to read the questions
printed on the subsequent pages of this
question paper until instructed that you may
do so by the Invigilator.**

SECTION A

1. In the 1920's, Sir Cyril Burt investigated factors related to "juvenile delinquency" in London. As part of his analysis he compiled a table showing the incidence of juvenile delinquency, and various measures of social conditions (*e.g.* percentage of total population living in conditions classified as overcrowding), for each of twenty-nine London boroughs. Part of the data are presented in the table below:

London Borough	Juvenile Delinquency (Per 10,000)	Percentage Overcrowding
Finsbury	42	34
Holborn	36	20
Shoreditch	28	32
Bermondsey	23	23
St. Pancras	21	22
Southwark	18	24
Stepney	17	29
Battersea	16	12
Deptford	16	13
St. Marylebone	15	18
Westminster	15	10
Paddington	14	15
Bethnal Green	14	28
Islington	14	19
Hammersmith	13	14
Lambeth	12	13
Poplar	12	21
Kensington	12	17
Chelsea	12	14
Greenwich	11	14
Camberwell	10	13
Fulham	9	13
Woolwich	9	8
Hackney	8	12
Lewisham	7	5
City of London	5	7
Wandsworth	4	7
Hampstead	2	7
Stoke Newington	0	8

TURN OVER

- (a) What is the relationship between the two variables (*i.e.*, juvenile delinquency and overcrowding)? Specify the null hypothesis (H_0) and conduct a suitable test to determine the significance of the relationship.
- (b) On being presented with these data, a well-meaning police Chief Inspector is quoted as saying: “*The only way we will ever reduce the amount of juvenile-related crimes in the worst affected boroughs is by tackling the overcrowding problem.*” Is the Chief Inspector correct in making this conclusion? Justify your reasons.
- (c) Suppose that a decision is made that the percentage of overcrowding should not exceed 10% in any newly developed borough. What rate of delinquency might the urban planners predict on the basis of the data presented above? You may assume that any error associated with the measurement of variable X (*i.e.* the “predictor” – percentage of overcrowding) is negligible, and therefore it is permissible to conduct a linear regression analysis on the data.

SECTION B

2. Design an experiment to determine whether variations in digit span between speakers of different languages are attributable to the word-length effect or to some other difference between cultures.
3. It has been suggested that the signals of the short-wave cones of the retina are delayed relative to those of the long- and middle-wave cones. Describe how you would set about testing whether this is the case.

TURN OVER

4. Delusions are a “first-rank” symptom of schizophrenia. There is emerging evidence that many people in the typical population report mild forms of delusional beliefs. How would you design a questionnaire to test whether this tendency reflects an underlying personality trait?

END OF PAPER