Lertap Quiz Research Questions Set B

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The research questions presented below are with reference to the November 2006 version of the Lertap Quiz data set.

This version of the Lertap Quiz data set is in an Excel workbook, *LrtpQuizNov06a.xls,* and may be found at this URL:

http://www.larrynelsonstuff.com/Documentation/Samples/LertapQuiz/LrtpQuizNov06a.xls

The workbook contains two worksheets: 'Data' and 'CCs'. The information contained in these worksheets is located at the following URL:

http://www.larrynelsonstuff.com/Documentation/Samples/LertapQuiz/LrtpQuizNov06aCodeBook.doc

The actual questions used in the original Lertap quiz are published in Appendix A of the Lertap manual; they may be seen by visiting this URL:

http://www.larrynelsonstuff.com/Documentation/Samples/LertapQuiz/AppendixA(LRTPQuiz).doc

There is a precursor to the research questions found in this document. It's called "Lertap Quiz Research Questions Set A", and is available at:

http://www.larrynelsonstuff.com/Documentation/Samples/LertapQuiz/LrtpQuizResearchQs1.pdf

Preliminary steps

No doubt you're super keen to get into action, and turbo-charged after smashing the research questions posed in "Lertap Quiz Research Questions Set A".

Good on you (!).

In order to complete many of the challenges and adventures in this exercise sheet, you'll need to first equip yourself with a copy of the Lertap 5 system. This system consists of an Excel workbook, Lertap5.xlsm, a manual in Microsoft Word format, and a help system known as "**Lelp**" (which stands for Lertap Help, of course). Lelp is available in three formats: PDF, CHM, and HTML; the PDF and HTML formats may be used on any computer, but the CHM file is for Windows users only.

How to get Lertap 5? Pay a visit to this website.

When you have Lertap running on your computer, the next thing you need to do is scroll back to the top of this document and use the appropriate URL links to download a copy of the *LrtpQuizNov06a.xls* workbook, and the corresponding document describing the information found in the workbook, that is, the LrtpQuizNov06aCodeBook.doc file.

Okay? Ready?

No! I forgot something: you need to learn how to run Lertap before you can take on the exercises posed below. To do this, read the stuff and use the various links available on this webpage. And, for even more, why not have a look at Chapter 2 of the Lertap manual. After this there'll be no harnessing you further – up and at 'em, tiger, what you waiting for?

Research questions set 1 (cognitive items)

Use the appropriate options on Lertap's Run menu in order to get Lertap to create the reports / worksheets required to answer these questions:

1.1   Lertap usually produces three reports for cognitive subtests. In this case the reports are titled Stats1f, Stats1b, and Stats1ul. Briefly describe how these reports differ.

1.2   Which was the hardest cognitive question? Which was the easiest? Which items had the best discrimination, and which had the worst? Did the test have adequate reliability?

1.3   Charts. You can get Lertap to quickly make two types of response charts for cognitive items, "simple item response charts", also called "unidimensional response charts", and "quintile plots". Get Lertap to make both types of chart for all 25 cognitive items. To learn how to do this, please refer to the "Response charts" topic in Lelp.

Briefly describe how these chart types differ, using the charts for one or two items as examples (select whichever items you wish).

Research questions set 2 (affective items)

When you used Lertap's Run menu to produce reports, it created several new worksheets. Look now at the Stats2f and Stats2b reports (worksheets), and use these as the basis for answering the following questions.

2.1   The 10 questions in the affective subtest used the Likert style of questioning. Some of the Likert questions were worded in a positive manner, while others were negatively worded. You can see the original questions, the "actual questions", by referring to one of the URLs above, the one with a link to "AppendixA".

Compare the wording of the original questions with the + and – (plus and minus) entries seen under the "pol." column of the Stats2b report. Describe how these + and – signs affect the calculation of the item mean (to do this, you might use a calculator to hand-compute the mean for one of the + items, and then for one of the – (minus) items). Then, briefly answer the question: "Why is it important to use + and – (minus) scoring?"

2.2   What was the reliability of the affective subtest? Can you think of any steps which might be taken to improve it (hint: look at the values in the Cor. column of the Stats2b report).

2.3   Use the appropriate icon on the Lertap toolbar to obtain simple response charts for the 10 affective items.

Research questions set 3 (scoring)

Look at the Scores report / worksheet produced by Lertap, and then complete these exercises:

3.1   To understand how Lertap computes scores for cognitive and affective subtests, go to the Data worksheet, select one of the data records, and manually compute the corresponding test scores, the "Knwldge" score, and the "Comfort" score. Describe how you did this. (If you need help with this, both the manual and Lelp describe how Lertap scores items.)

3.2   It is possible to use the "Reliability Analysis" routine in SPSS, found under Analyze/Scale to score test items.

        Try SPSS. This you could do by following the example seen in this webpage, or you could just copy the 10 affective item responses from the Excel Data worksheet to SPSS, and then use Reliability Analysis. Compare results with those produced by Lertap: are they the same? If not, what are the differences? Did you find it easy to use SPSS to get results, or was it somewhat complicated?

        Then answer this question: describe the steps which would be necessary in order to get SPSS Reliability Analysis to produce results for the 25 cognitive items. You do not need to do the actual work which might be required, just describe the work which you would have to do. (It is possible to get Lertap to create an "IStats" matrix of item scores, something which would make this process much easier. However, answer this question without making reference to IStats.)

3.3   Use Lertap to create histograms of the Knwldge and Comfort scores. You will find that Lertap makes two types of histograms. One is not really a chart – it's a table with a great deal of detail – the other is a true chart.

        What is the "z" score seen in a Lertap histogram; how is it computed?

        Sometimes Lertap will not automatically create the true chart; if it doesn't, refer to the Histogram topic in Lelp for assistance.

Research questions set 4 (correlations)

Now for some matters concerning score correlations:

4.1   The correlation between the Knwldge and Comfort scores may be seen at the bottom of the Scores report.

        Use the appropriate Lertap toolbar icon to get a scatterplot of these two scores; have Excel add a trendline to the scatterplot chart, and get it to display the value of the squared correlation coefficient on the same chart.

4.2   Your boss would like to see YrsComp and YrsTest plotted against Knwldge, and also plotted against Comfort, a total of four new scatterplots.

        To do this, you will first need to use Lertap's Move+ menu to copy YrsComp and YrsTest to the Scores worksheet.

Your boss asks you to answer this question: is there a relationship between the two experience variables and a person's score on each of the two subtests, Knwldge and Comfort? Your answer will probably include several details, such as the appropriate scatterplots, a paragraph or two to answer the question in words, and anything else you might think of.

Research questions set 5 (group differences)

Finally, the boss would like to know if there is a relationship between Type of school, public or private, and score on the Knwldge test. She also wants to know if there is a relationship between Type of school, public or private, and score on the Comfort scale.

Try using Lertap's option to "Breakout scores by groups" to get the basic data required to answer these questions from the boss – try to get Lertap to make boxplots (to do this you will almost certainly have to refer to Lelp; the codes used in the Type variable are numeric, but the boxplot routine expects a text variable). Then, also use SPSS to get boxplots, comparing the required steps in SPSS to those you had to use in Lertap.

Your answer to the boss will probably include several details, such as the appropriate boxplots, a paragraph or two to answer the questions in words, and anything else you might think of.

Note that the *LrtpQuizNov06a.xls* data set has only N=60 respondents, and that the Type variable's results are artificial. It could be that the results will be ambiguous – the charts, for example, may not look too good due to small N.

But give these questions a good try, and submit a written report to your instructor according to his or her instructions.

One more thing to mention. People will sometimes use a program such as Lertap to get detailed item statistics when they may not be needed. There is often a wealth of information available by just looking at the number of responses to each question's options, and drawing corresponding conclusions. It's often not necessary to have high reliability, and discriminating items, in order to interpret results. This is much more fully discussed in Chapter 7 of the manual.