

Chapter 1

Lertap Comes Alive as Version 5

Contents

Basic question types (the input)	1
Speak Lertap (the intermediary).....	3
Scores and reports (the output)	4
Using with other systems	5
The rest of the book	5

Lertap? You'll love it. It's an item, test, and survey analysis system for instructors, teachers, and researchers.

This version of the Laboratory of Educational Research¹ Test Analysis Package is the fifth in a series born in Caracas in 1972. Since then it has travelled the world, finding developmental homes at the University of Colorado, the University of Otago, and Curtin University of Technology. Its growth has been assisted by colleagues working at universities, private and public research agencies, and schools, from Canada through the United States, down to Venezuela and Peru, across the Pacific to the Philippines, Indonesia and Thailand, south to New Zealand and Australia.

Lertap 5 has been created as an application which runs under Microsoft's spreadsheet program, Excel. As such it runs on any platform which supports Excel, including Windows, NT, and Macintosh computers.

This version differs from earlier ones in several ways. The most substantial difference is the move from a stand-alone system to an Excel base, a move which has virtually guaranteed a user interface that will remain current. An Excel base means a near-universal database structure—many other systems can write to, and read from, Excel worksheets. Other major differences include a complete reformatting of former reports pages, the inclusion of many new reports and statistics, and the revival of the Lertap job definition language.

You'll love it.

Basic question types (the input)

There are two fundamental types of questions which Lertap users apply in their teaching and research: cognitive questions, and affective questions.

¹ LER was at the University of Colorado, Boulder.

Here's an example of a *cognitive* question²:

- (10) *MWS control cards are used
- a) for achievement items to multiply-weight the item (indicate that more than one response is to receive a non-zero weight), or to indicate that not all response codes are used by an item.
 - b) for affective items to alter the pattern of forward or reverse weighting established by preceding control cards, or to indicate that not all response codes are used by an item.
 - c) to override item control information entered on any or all previous control cards.
 - d) all of the above.

An example of an *affective* question, or item³:

		Not at all true of me						Very true of me
Q14	I have an uneasy, upset feeling when I take an exam.	1	2	3	4	5	6	7

Of course, questions such as these are seldom used in isolation—you'll have a series, or set, of questions to process. This set may be referred to as a test, a subtest, or a scale, depending on the situation.

How many questions may be in a single test? The answer is determined by Excel, having to do with the number of columns it will allow in a worksheet. At the present time the limit is 256. How many subtests may there be? In theory there is no limit; in practice the answer to this question will depend on the amount of memory your computer lends Excel to work in.

How many test takers may be processed? Again the answer is determined, in the first instance, by Excel. Excel 97 and Excel 2000 limit the number of cases (rows) to 65,356. Some Lertap sites have processed data sets having fifteen thousand records. There may also be a practical operational limit—a computer with limited memory, for example, may mean that only a few thousand records may be processed.

Our marketing section wants us to mention Lertap strengths in this chapter. That would make for a very long chapter, indeed, so here we will just toss out some *hors d'oeuvres*, a tantalising sample of the multitude of dazzling features which will come to light as you progress through the book: questions may use up to ten response codes, and these may be letters or digits. (Above, the cognitive item is using four response codes, all letters, while the affective item is using seven digits.) A cognitive question may have more than one right answer, with different points given to different responses. Affective items may be reverse scored with the flick of the plus and minus keys on your keyboard. Formula scoring may be applied to achievement tests. Missing responses to affective items are not a worry. Responses to affective items may have negative weights. Any number of cognitive and affective subtests may be processed simultaneously.

² This question was lifted from the Lertap Quiz, Appendix A.

³ From Chapter 8. This sample is from the University of Michigan's MSLQ instrument.

The responses people give to your questions are entered into a standard Excel worksheet. Lertap comes with a template, and some data entry tools, which make this job easier. Another worthy feature: your items may have almost any handles you want. You can call them, for example, something as imaginative as "1" (for the first item), or "Q1", or "Item 1", "Soal 1", "PreguntaX", "Love-Handle R", and so forth.

Speak Lertap (the intermediary)

A strong feature of this new version is that it allows all those people who learned how to speak Lertap in the 70s to recall their vocabulary. You talk to Lertap using sets of sentences such as these:

```
*col (c2-c11)
*key bccda ddcca
```

These two Lertap utterances would be placed in an Excel worksheet. They tell Excel that you've entered ten item responses in columns 2 through 11 of the data worksheet, and that the keyed-correct answers to the ten items are as indicated on the *key line above.

Here's some more Lertapese, or "Tap":

```
*col (c1-c10)
*sub affective
```

This dynamic duo gets Excel to look for ten item responses in columns 1 through 10 of the data worksheet, and to see to it that Lertap processes the responses as affective questions. What's that? These are Likert-style questions, and every other one is to be reverse scored? Okay, your chance to talk more Tap; you'd say something like this:

```
*col (c1-c10)
*sub affective
*pol +---+ -+---
```

The *pol line means, of course, scoring "polarities".

Once you get the hang of things, you can be more flowery in your use of the lingo. For example, another way to say the three sentences above would be:

```
*columns (c1-c10)
*subtest affectively_scored
*polarities +---+ -+---
```

Feeling young again? Get cool, mutter code:

```
*c (c1-c10)
*s a
*p +---+ -+---
```

You've heard of rap? With Lertap you speak Tap. Look at some of the rest of this book, and you'll soon be 'tappin and 'rappin. PlayStation 3 look out.

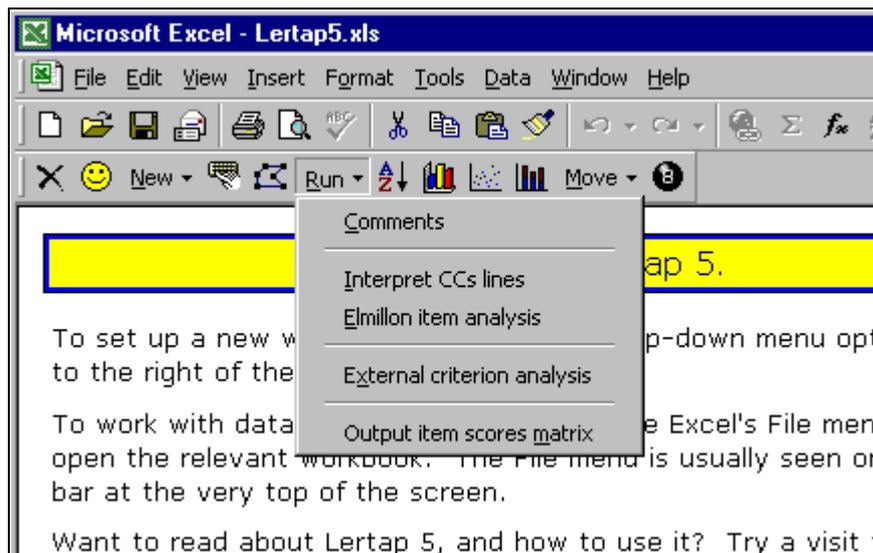
The third and fourth versions of Lertap foolishly abandoned Tap. Instead they used tens of dialog boxes in the grande style which was fashionable for a while.

What you could Tap out in just two lines became some fourteen dialog boxes. This was yuk; we've gone back to Tap in this version. You'll love it.

Scores and reports (the output)

So. You have people answer your questions. You put their answers into an Excel worksheet. You talk Tap in another worksheet. Then what? You get the Runs. You use a special Lertap toolbar in Excel, and apply its Run options.

Here's a picture of Excel, Excel's standard toolbar, Lertap's toolbar with the yellow smiley face, and the Run options exposed:



Look at all those icons, just waiting for your mouse to click on them—you're set for a whale of a time. Notice that Lertap will even let you get behind the 8-ball (the last icon on Lertap's toolbar).

The rest of this book spends much of its time showing what happens when you use the Run options—you can get a quick sample by flipping through the next chapter.

Lertap's standard reports for cognitive tests include several classical statistics, such as: standard correlation-based analyses, using point-biserial, biserial, and conventional product-moment coefficients, corrected for part-whole inflation when required; standard upper-lower group breakouts, reporting the "D" index of item discrimination, and, when appropriate, Brennan's generalised "B" index; mastery-test indices, with a Brennan-Kane variance partitioning, and Peng-Subkoviak estimate of classification consistency. Indices of reliability include coefficient alpha, and, in the mastery-test case, the Brennan-Kane index of dependability.

Reports for affective items, that is, for surveys, include item-criterion correlations, corrected for part-whole inflation; item means and standard deviations; coefficient alpha, and a table indicating how alpha would change if items were omitted.

All Lertap analyses may be conducted with an external criterion. Item response frequencies may be charted (graphed using a standard Excel 3-D bar chart).

Test and scale scores may be plotted using Excel's histogram and scatterplot support⁴, they may also be rearranged using standard Excel data sorts. Score intercorrelations are standard output, found at the bottom of the Scores report.

An item scores report, or "matrix", may be requested for any test or scale. It has three sections: a conventional matrix of item scores, a summary of item means and variances, and an interitem correlation matrix.

All Lertap 5 reports are Excel worksheets. Its graphs are basically Excel charts of one sort or another. The worksheets and graphs may be printed, copied, pasted, you name it—it's Excel through and through.

Using with other systems

You may have heard of SPSS, the Statistical Package for the Social Sciences⁵?

Next to Lertap (rather arguably), SPSS is (hardly arguably) the most popular data analysis system applied in education, sociology, and psychology. However, after 30+ years, it continues to lack support for scoring and analysing cognitive tests. Its help for users of affective scales is still based on the "Reliability" routine, a subprogram which, after how many years?, continues to make it cumbersome to reverse-score questions, and to make composites. Lertap exists, in part, because of these holes in SPSS⁶.

Lertap shines at putting together test and scale scores, but, ah, okay, it might be suggested, by some, that SPSS has maybe just a teeny-weeny bit more support for users who want to do others things with their scores, such as regression analyses, or a means analysis leading to some dandy Boxplots. What about poking one or more of Lertap's item scores matrices into some sort of factor analysis? Yes, SPSS could be your man in such cases⁷.

Lertap's 8-ball will help you prepare your lovingly-sculpted worksheets and reports for export to SPSS.

The rest of the book

The next chapter introduces you to the Runs, showing what happens when you make some of the clicks suggested above. That's followed, in Chapter 3, by a discussion of how to prepare data for the Runs, including how to begin to talk Tap.

Chapters 4, 5, and 6 delve more extensively into Tap, that is, into job definition statements. Then there are two chapters, 7 and 8, which help interpret Lertap's cognitive and affective test reports. Chapter 9 makes more mention of SPSS, and how to interface to it. Chapter 10 is a bit more technical, getting into computational methods, and summarising some of the time trials completed to date. Finally, Chapter 11 looks at the history of Lertap. You'll love it. Get those fingers and feet Tapping.

⁴ The histogram requires Excel's Analysis ToolPak; see Chapter 10.

⁵ www.spss.com

⁶ An SPSS-Lertap powwow was held in Chicago in 1978, with the larger of the two software houses deciding against a merger, or even a plain old lucrative buyout.

⁷ Experienced SPSS users will recognise the intended humour in this paragraph. For readers with less experience, we might note that SPSS has *extensive* support for many different types of statistical analyses.