Chapter 4

An Overview of Lertap 5 Control "Cards"

Contents

You've worked your way through Chapters 2 and 3. Good. You've seen several examples of the job definition statements which go into a data set's CCs worksheet. Very good. You're ready to read more about these statements. Excellent.

Lines, or cards?

The job definition statements which go into the CCs sheet have been referred to as "lines" at times, and as "cards" at other times. The terms are synonymous; whether you hear a Lertap user saying "lines", or "cards", they're talking about the same thing—the term they prefer will be related to their age.

At Lertap headquarters we find it difficult to use any term other than "cards". This is because Lertap came into the world at a time when "punch cards" were the main means of communicating with computers. Such cards were also known as "Hollerith" cards after the man who devised a system for coding information on them (see Sanders, 1981, p.24-25).

The second version of Lertap emerged in 1973. Towards the end of the 70s, and well into the 80s, Lertap 2 was almost a household word. This version was accompanied by an extensive manual (Nelson, 1974), and much of the manual had to do with how to prepare punch cards for Lertap analysis.

At the time these control cards were unique in that they used a free-form, sentence-like syntax which was, at the time, novel. Lertap 2 control cards made a bit of a name for themselves.

The job definition statements seen in Lertap 5, the new version, are very similar to what Lertap 2 users formerly punched onto cards. Hence our inclination to refer to CCs lines as cards.

Lines, or "cards"—in this and the following two chapters the terms will be used interchangeably.

Review (examples from previous chapters)

Let's go over some of the sample control cards which you've already had the chance to admire.

```
*col (C3-C22)
*key ADCAB BDBBD ADBAB BCCCB
```

These two cards, a *col and a *key card, are all that are required to get Lertap to process a cognitive test (or "subtest"). The *col card refers to columns in the workbook's Data worksheet where item responses are to be found. In this example, the responses begin in column 3 of the Data worksheet, and end in column 22, an inclusive span of 20 items.

The *key card gives the keyed-correct answer for each item, starting with the first item. Thus, the right answer to the first item, the one whose responses are in column 3 of the Data worksheet, is A. The right answer to the sixth item is B.

The right answer to the last item is also B.

Let's talk a bit about "syntax", about the "rules", for creating these cards.

They must each have an asterisk as their first character. They must have a space after the card type, col and key. Case is generally not important. These cards are identical to the two above:

```
*COL (c3-c22)
*KEY ADCAB BDBBD ADBAB BCCCB
```

Note that the keyed-correct answers are all upper-case letters. The following *key card is valid, but it's <u>not</u> the same as the *key card above:

```
*KEY adcab bdbbd adbab bcccb
```

The keyed-correct answers must be in the same case used in the Data worksheet to record item responses. In Lertap 5, item responses may be upper- or lower-case letters, or digits. If lower-case letters are used to record answers to cognitive test items, then the letters on the *key card have to be lower-case too.

Let's consider another example:

```
*col (C3-C22)
*sub title=(ChemTest), name=(Class test on 20 May)
*key ADCAB BDBBD ADBAB BCCCB
```

A *sub card has been added to the two control cards. This *sub card is said to use two control "words", or "declarations", or "assignments". They are

title=(ChemTest)
name=(Class test on 20 May)

There are quite a number of control words which may be used on the *sub card; the next two chapters provide more details. For the moment we'll point out that the *sub card's control words must be separated by columns, and their case is not important. The two declarations could have been

Title=(ChemTest)
Name=(Class test on 20 May)

or

TITLE=(ChemTest)
NAME=(Class test on 20 May)

or

T=(ChemTest)
N=(Class test on 20 May)

The last example (above) indicates that only the initial letter of a control word is required. In fact, this also applies to control <u>cards</u>. The following three cards are valid:

```
*c (C3-C22)
*s title=(ChemTest), name=(Class test on 20 May)
*k ADCAB BDBBD ADBAB BCCCB
```

Here's another control card set lifted (and modified) from Chapter 2:

```
*col (c3-c27)
*sub res=(A,B,C,D,E,F), name=(Knowledge of LERTAP2), title=(Knwldge)
*key AECAB BEBBD ADBAB BCCCB BABDC
*alt 35423 35464 54324 43344 45546
```

The set of four cards above define a subtest with 25 items. Item responses are found starting in column 3 of the Data worksheet. The responses used by the items in this subtest involved six upper-case letters, as indicated by the res=(A,B,C,D,E,F) declaration on the *sub card. If an res=() declaration is not found, Lertap internally assigns res=(A,B,C,D).

The *alt control card indicates that the first item in this subtest used only the first 3 of the responses found in res=(A,B,C,D,E,F). That is, the first item used just A B and C as possible responses. A scan of the *alt card shows that only two items used all 6 possible responses (the ninth item, and the last).

If a *alt card is not found, Lertap assumes that all items of the subtest use all of the responses in the res=() declaration.

Have you noticed how we changed the font for the four control cards shown above? If a fixed-pitch font is used, such as Courier or Courier New, then the characters in the *key and *alt cards will line up, making them easier to read.

While we're on this matter of things being easy to read, the strings found in the *key and *alt cards do not have to have spaces in them. We think spaces after every five characters make these cards easier to read, but they're not required. The cards above could be:

```
*col (c3-c27)
*sub res=(A,B,C,D,E,F), name=(Knowledge of LERTAP2), title=(Knwldge)
*key AECABBEBBDADBABBCCCBBABDC
*alt 3542335464543244334445546
```

What about the two cards below?

```
*col (c2-c13)
*sub aff
```

What's happened here? There's no *key card? No, these two cards pertain to an affective test with 12 items. Lertap knows a subtest is to be processed as an affective one whenever it encounters the "aff" control word on a *sub card. These two simple cards are all that would be required to process an affective subtest, providing the items use res=(1,2,3,4,5) as their responses.

Finally, let's look again at the CCs lines which come in the Lertap5.xls workbook:

```
*COL (c3-c27)
*sub res=(A,B,C,D,E,F), name=(Knowledge of LERTAP2), title=(Knwldge)
*key AECAB BEBBD ADBAB BCCCB BABDC
*alt 35423 35464 54324 43344 45546
*COL (c28-c37)
*sub aff, name=(Comfort with using LERTAP2), title=(Comfort)
*pol +---- ++--+
```

Any Lertap analysis can have many subtests. This example has two.

The definition of each subtest begins with a *col card. Sometimes users add something to make it easier to see where subtest definitions begin. This may be done in a variety of ways—below, for example, a line with a single quotation mark has been used as a separator:

```
*col (c3-c27)
*sub name=(Knowledge of LERTAP2), res=(A,B,C,D,E,F), title=(Knwldge)
*key AECAB BEBBD ADBAB BCCCB BABDC
*alt 35423 35464 54324 43344 45546
`
*col (c28-c37)
*sub aff, title=(Comfort), name=(Comfort with using LERTAP2)
*pol +---- ++--+
```

It is <u>not</u> possible to use blank lines as separators. Lertap stops reading the CCs lines whenever it encounters a line with an empty initial column.

Special control cards, *tst included

The most commonly-used control cards are *col, *sub, *key, and *pol, but there are a few others in Lertap's repertoire.

One of these others is the *alt card, mentioned in the examples above. Another is the ***wgs** card. You'll see it in the next chapter—it allows the correct answer to a cognitive item to get more than one point.

There's a particularly-powerful card, ***mws**, used in special situations to give multiple weights to item responses. You'll see this one featured in the next two chapters. The *mws card permits cognitive items to have more than one right answer, and it also finds frequent use in special affective situations.

There is one card which, when used, has to be at the very top of the CCs worksheet. It's the ***tst** card.

The *tst card makes it possible to break out subsets of the records in a data set. Here's an example:

*tst c12=(M)

This card tells Lertap to make a new workbook, one which will have a copy of those records in the active data set which have an M in column 12 of the Data

worksheet. The new workbook will have a CCs worksheet too; its contents will be identical to those in the active workbook, missing out the *tst card.

*tst c9=(C,F), c22=(7)

The *tst card above gets Lertap to make a new data set. Those records in the active data set which have <u>either</u> a C or an F in column 9, <u>and</u> a 7 in column 22 of the Data worksheet will be copied to the new data set. All CCs lines found in the active data set, except the *tst card, will be copied to the new data set's CCS sheet.

By "active data set" we mean the workbook whose CCs worksheet has the *tst card.

Examples from the Syntax sheet

After a while Lertap's control cards will be second nature. However, should you forget what they look like, the Syntax worksheet in the Lertp5.xls workbook is useful. For example, here are *some* of the sample cards which come in the standard Syntax sheet:

---

*col (c3-c12)
Defines a 10-item subtest whose responses are found in columns 3 through 12 of the Data worksheet. The space after *col, before the opening parenthesis, is required.

*col (c1, c3, c5, c7, c9, c11, c13, c15, c17, c19)
Defines a 10-item subtest whose responses are found in every other column of the Data worksheet, beginning with column 1.

*col (c1, c3, c5-c9, c21, c31-c37)
Defines a 15-item subtest whose responses are found in various columns of the Data worksheet.

*sub aff
Defines an <u>affective</u> subtest. Since there is no explicit **res=**() declaration, Lertap will assume res=(1,2,3,4,5). *The *sub card is required for <u>affective</u> subtests.*

*sub aff, res=(1,2,3,4,5,6), name=(Class survey 1.), title=(Survey1)
Defines an <u>affective</u> subtest. The **name=()** and **title=()** are optional, but recommended. The title=() can have 8 characters at most. The res=() declaration may have up to 10 response characters, separated by commas.

*sub aff, mdo
Defines an <u>affective</u> subtest with, **mdo,** the missing-data option, off. Respondents who do not answer an item will get zero points.

*sub name=(Hopkins test, chaps 1 - 5), title=(HopTest1)
Gives a name and title to a <u>cognitive</u> subtest. *It is the absence of the* **aff** *control word which defines a <u>cognitive</u> test.* Since there is no explicit res=() declaration, Lertap will assume res=(A,B,C,D).

You can modify the contents of the Syntax worksheet, putting in some of your own favourite examples. See Chapter 10, Computational Methods, to find out how.

Copying CCs lines

One of the big advantages of using job definition statements, or, if you will, "control cards", is that you can copy them.

There are several ways you can copy CCs lines from a worksheet in one workbook to a CCs sheet in another. The most obvious is to follow a standard select, copy, and paste procedure: select the lines in one worksheet, copy them, go to the other worksheet, and paste them.

But there are faster ways. One is to use Lertap's New option to "Make a new Lertap 5 workbook with present data header rows". Another is to select the CCs worksheet by right-clicking on its tab, and then Move or Copy it to another workbook (Excel methods such as this are discussed in Chapter 9).

Codebooks for tricky jobs

Some Lertap users, the luckiest (to be sure), get into data sets which have, first of all, many subtests, and, secondly, non-contiguous items.

Look at this set of control cards, for example:

```
MSLQ control card set 1, 4 July 2000.
`
*col (c13,c27,c35,c49)
*sub aff, scale, name=(Organisation), title=(Orgnztn)
`
*col (c14,c19,c25,c29,c40,c41,c42,c43,c47,c62,c64,c65)
*sub aff, scale, name=(Self-regulation), title=(SelfReg)
*pol -++++ ++-++ ++
`
*col (c15,c17,c21,c26,c32)
*sub aff, scale, name=(Test anxiety), title=(TestAnx)
`
*col (c16,c30,c36)
*sub aff, scale, name=(Peer learning), title=(PeerLrng)
`
*col (c18,c28,c38,c51,c56,c59,c63,c66)
*sub aff, scale, name=(Time & study environment), title=(Envrmnt)
*pol ++-+++--
`
*col (c20,c34,c46,c60)
*sub aff, scale, name=(Effort regulation), title=(EffrtReg)
*pol -+-+
`
*col (c22,c33,c37,c52,c57)
*sub aff, scale, name=(Critical thinking), title=(CritThnk)
`
*col (c23,c31,c45,c58)
*sub aff, scale, name=(Rehearsal), title=(Rehearse)
`
*col (c39,c48,c50,c53,c55,c67)
*sub aff, scale, name=(Elaboration), title=(Elaborat)
`
*col (c24,c44,c54,c61)
*sub aff, scale, name=(Help seeking), title=(HelpSkng)
*pol -+++
```

The set of control cards shown above was set up to process a version of the University of Michigan's MSLQ instrument (Pintrich, *et al*, 1991).

Before we get into the main points of this little section, we might point out that this set of cards exemplifies the use of comment and separator lines. Any line in the CCs sheet which does not have an asterisk as its first character is ignored by Lertap's CCs parser. Non-asterisk lines may be used for adding comments, as

seen in the first line above, and as subtest separators, as seen in the lines which begin with a single quotation mark.

How many subtests are there above? Ten. Count the number of *col cards—these indicate the start of subtest definitions.

How many items are used by the first subtest, the one whose title is Orgnztn? Four. Count the number of columns pointed to in the respective *col card. Where in the Data worksheets are the item responses for this subtest? In columns 13, 27, 35, and 49.

These columns are not contiguous, they're not next to each other.

In jobs like these it is often of real assistance to set up what some experienced data processors refer to as a "codebook". We set one up for this job, using an Excel worksheet for the task:

Codebook for MSLQ processing.

LEAP MSLQ item number	Michigan item number	Column in Data sheet	Polarity	Scale
1	32	c13		Organisation
2	33	c14	reverse	Self regulation
3	3	c15		Test anxiety
4	34	c16		Peer learning
5	8	c17		Test anxiety
6	35	c18		Time & study environment
7	36	c19		Self regulation
8	37	c20	reverse	Effort regulation
9	14	c21		Test anxiety
10	38	c22		Critical thinking
11	39	c23		Rehearsal
12	40	c24	reverse	Help seeking
13	41	c25		Self regulation
14	19	c26		Test anxiety
15	42	c27		Organisation
16	43	c28		Time & study environment
17	44	c29		Self regulation
18	45	c30		Peer learning
19	46	c31		Rehearsal
20	28	c32		Test anxiety
21	47	c33		Critical thinking
22	48	c34		Effort regulation
23	49	c35		Organisation
24	50	c36		Peer learning
25	51	c37		Critical thinking

Data / CCs \ **Cdbk** / Freqs / Scores / Stats1f / Stats1b / Stats2f / Sta

Setting up Lertap control cards is a lot easier when a codebook has been set up, especially when subtest items are not contiguous.

Summary

There aren't all that many control cards in Lertap—less than 10. They have a particular form to them which has to be followed, a definite "syntax", but it's not

a complex "language" at all. With practice and reference to examples you will, we truly trust, get up to speed in short order.

We've gotten into some non-standard data sets in this chapter, and have at times used a fair number of control cards to set up our jobs. It is possible that some readers will be wondering how long it might take them to become CCs experts, and to them we say *relax, go slow*. Most users do not need to become CCs whizzes. Many users have jobs with are very straightforward. Teachers with their own classroom tests will often be able to use just *col and *key cards, and these are easy to set up. Classroom surveys can often be processed with just two cards too, *col and *sub.

The next two chapters go into control cards in more detail, first for cognitive subtests, then for affective ones. Among other things, you'll see how to "double-key" cognitive items (allow for more than one right answer), and how easy it is to use affective scales, or subtests, having items which need to be reverse scored.