Chapter 5

Control Cards for Cognitive Subtests

Contents

The purpose of this chapter is to discuss the various Lertap control "cards" used for processing results from cognitive tests and quizzes. The term cognitive refers to an instrument which is meant to measure knowledge, or achievement. For Lertap to work effectively, the items (or questions) used by the instrument must use fixed-choice responses—multiple-choice and true-false questions are examples of items use fixed-choice responses.

Here are some sample cognitive items:

(2) What control word is used on which control card to activate the correction-for-chance scoring option?

A) MDO on *ALT
B) CFC on *TST
C) WT on *SUB
D) MDO on *FMT
E) CFC on *SUB

(3) The minimum number of control cards used for any subtest is two.

A) true
B) false

Additional comments on Lertap 5 control cards, of a more introductory nature, may be found in Chapter 4.

List of Control Cards for Cognitive Subtests:

Here is an overview of the control cards which are used for processing results from cognitive subtests:

Card	Required?	Comments (cognitive subtests)
*col	yes	This card does several things; above all, it tells Lertap how many items there are in the subtest, and the columns where these items are found in the Data worksheet.
*sub	no	Not required if the items use A B C D as their response set. Otherwise it's required. Although not strictly required, this card is commonly used to provide a name and title for the subtest.
*key	yes	Tells Lertap the correct answer to each item.
*alt	no	Used when the items do not all have the same number of options. If all items use the same number of options, this card is not required.
*wts	no	Use this card when the correct answer to the subtest's items have different weights, that is, are worth different points.
*mws	no	This is a very special card which is used, for example, when it's necessary to give points for more than one answer to an item.

Now for more detailed comments about these cards, with some examples:

*col	The definition of every subtest ***must*** begin with a *col card. This card tells Lertap where the item responses are in the Data worksheet. It does this by using a format exemplified in these sample *col cards: *col (c3-c12) *col (c5, c7, c9, c11-c20) Here the first example says that item responses start in column 3 and end in column 12. The second example says pick up the first item response from column 5, the second from column 7, the third from column 9, and the rest starting in column 11 and ending in column 20.	
*sub	The *sub card is not required with cognitive subtests, but it's recommended, mostly because it provides the chance to add a name and title to the work you're doing. There are several control words which may be used on this card; here's a list:	
	CFC	Means "correct for chance". This control word is not used very often. When it's found on a *sub card, subtest scores will be corrected for the chance benefits which might result from informed guessing.
	Mastery	The presence of this word causes Lertap's U-L (upper-lower) item analysis to be based on a cut-off percentage, usually referred to as the "mastery" level. The default level is 70%.
	Mastery=	Use of the = sign allows the mastery level to be set to a specified value. For example, Mastery=80 would set the mastery level to 80%.
	Name=()	Allows a name to be given to the subtest. The name may be of any length, and may contain any characters except an opening or closing parenthesis. Lertap's subtest name is equivalent to SPSS' variable label. Optional.

	PER	Means "percentage" scoring. Original subtest scores will be reported for each test taker, along with a percentage-of-maximum-possible score. Optional.
	Res=()	This is an important control word. It tells Lertap both the number and nature of response codes used by the items of the subtest. Examples: Res=(A,B,C,D) Res=(A,B,C,D,E,F) Res=(1,2,3,4,5) Res=(u,v,w,x,y,z) If the items of your cognitive subtest use res=(A,B,C,D), you don't have to have an res=() declaration on the *sub card—this response code set is the default for cognitive items. The maximum number of response codes which may be used is 10.
	SCALE	Means "scaled" score. Original scores will be reported for each test taker, along with a scaled score, which, for cognitive subtests, is a z-score. Optional.
	Title=()	Gives a short name, or title, to the subtest. There may be up to 8 characters between the parentheses. Whilst any characters may be used, it is suggested that only letters and digits be employed. For compatibility with SPSS, the title should begin with a letter, and should not contain a space or full stop (period). Lertap's subtest title is the same as SPSS' variable name. Optional.
	Wt=	Assigns a compositing weight to the subtest. By default, Lertap assigns Wt=1 for all subtests. If there is more than one subtest with Wt=1, Lertap forms a Total test score by adding together all subtest scores. To exclude a subtest from the Total, use Wt=0 (zero).
	<u>Examples</u>: *sub res=(1,2,3,4,5,6,7), name=(Hopkins chap 5), title=(Hopkins5) *sub title=(Ed503), name=(Ed 503 quiz), wt=0 Here the second example does not have an res=() declaration, and Lertap will use its default assignment for cognitive subtests, which is res=(A,B,C,D).	
*key	This is a required card—every cognitive subtest ***must*** have a *key card which indicates the keyed-correct answer for each item. Example: *key BCBDD AADCA There must be one keyed-correct answer for every item. There must be a space before the first keyed-correct answer, but after that spaces are optional.	
*alt	This control card is used when not all items use all of the response codes	

	found in a subtest's res=() declaration. For example, if res=(A,B,C,D,E), and the following card is used *alt 44444 55555 then Lertap will know that the first five items of the subtest use only the first 4 response codes, while the last five items use all 5. Optional.
*wgs	The keyed-correct answer to a cognitive item usually gets 1 (one) point. To give more points a *wgs card may be used. For example, the following card indicates that three items, the second, sixth, and tenth are to have 2 points given for their keyed-correct answer. *wgs 12111 21112 This card is optional. If only one or two item are to have scoring changes of this type, *mws cards may be easier to use.
*mws	The "multiple-weights specification" card is used to change the response weights for a designated item. Its use is optional. As an example, if a subtest is using response weights of res=(A,B,C,D), and the following *mws card is used *mws c3, 0, 2, 0, 0 then the weights for the item whose responses are found in column 3 of the Data worksheet will be zero (0) for all but the second response, which, in this case, is "B", as defined by the res=() declaration. The following card will give 1 (one) point if a student selects either the first or third answer for the item whose responses are found in column 30 of the Data worksheet: *mws c30, 1, 0, 1, 0 The weights found on the *mws card do not have to be integers: *mws c17, 0.00, 0.25, 0.50, 0.75, 1.00 this card applies to the item whose responses are found in column 17 of the Data worksheet. For this item, the first response is to have a weight of 0.00, the second a weight of 0.25, the third a weight of 0.50, and so forth. *mws Call, 1, 0, 0, .5 this card's "Call" means all columns, that is, all items which belong to the respective subtest. There are many countries which use a decimal separator different to the full stop (or period). Users in these countries are required to express decimal values as shown here, with the full stop, but Lertap will convert them correctly.

Example sets

Below we've included some real-life examples of sets of control cards for cognitive subtests.

Set 1:

```
*col (c28-c37)
*key ABBDC DDACA
```

There are 10 cognitive items in this subtest. As there is no *sub card with an res=() declaration, Lertap will assign res=(A,B,C,D), the default for cognitive subtests. Since there is no *alt card, all 10 items will be assumed to use all four response codes. And, since there is no *wgs card, the correct answers for the items will get 1 (one) point each.

What will be the Name and Title of this subtest? Again, there is no *sub card, so Lertap will set Name=(Test1), and Title=(Test1).

What would be the minimum possible score on this 10-item subtest? Zero; if a student gets all items wrong, zilch is the resultant subtest score. On the other hand, the maximum possible score will be 10, a "perfect" score on this 10-item subtest.

Set 2:

```
*col (c28-c37)
*sub name=(Class quiz of 25 July), title=(Quiz25J)
*key ABBDC DDACA
```

A *sub card has been added here in order to give a name and title to the output produced by Lertap. The name will appear at the top of various item statistics pages, such as Stats1f and Stats1b while the title will be used to label subtest scores.

Set 3:

```
*col (c28-c37)
*sub res=(A,B,C,D,E,F), title=(Quiz25J)
*key AEBDC DDACF
*alt 35444 55356
```

This example includes an res=() declaration on the *sub card, indicating that items use as many as six response codes. The *alt card adds some precision to the scene, telling Lertap that only one item, the last, uses all 6 response codes. Four items, the second, sixth, seventh, and ninth use (A,B,C,D,E) as response codes. Two items, the first and the eighth, use just the first 3 responses codes, (A,B,C).

In this example, the subtest has been given a title, but not a name. In such cases Lertap will assign a name which is identical to the title.

Set 4:

```
*col (c28-c37)
*sub r=(A,B,C,D,E,F), n=(Class quiz, 25 July), t=(Quiz25J), per
*key AEBDC DDACF
*alt 35444 55356
*wgs 21111 21113
```

The addition of a *wgs card tells Lertap to give 2 points for the correct answers to

the first and sixth items, while a whopping 3 points will go to those who get the last item correct. The maximum possible score on this 10-item subtest is 14.

The "per" on the *sub card tells Lertap to add a percent-correct score for this subtest. This score will appear next to the original subtest score (often called the "raw" score) on the Scores worksheet produced by the program.

Notice how some of the control words on the *sub card have been abbreviated? This is permitted, as mentioned in Chapter 4.

Set 5:

```
*col (c28-c37)
*sub res=(A,B,C,D,E,F), name=(Class quiz of 25 July), title=(Quiz25J)
*key AEBDC DDACF
*alt 35444 55356
*mws c28, 2, 0, 0
*mws c37, 0, 0.50, 0, 0.50, 0, 0
```

A couple of *mws cards are included in this example. The item whose responses are found in column 28 of the Data worksheet is to be scored by giving 2 points to the first answer (or response), which is "A", and zero points to the other two permitted responses.

Why are there only another two permitted answers to this item? Because the *alt card indicates that the first item, which corresponds to that in column 28, uses just the first 3 response codes.

Meanwhile, the item whose responses are found in column 37 of the Data worksheet now has two keyed-correct answers, "B", and "D". A student will get half a point if s/he selects either of these answers.

Set 6:

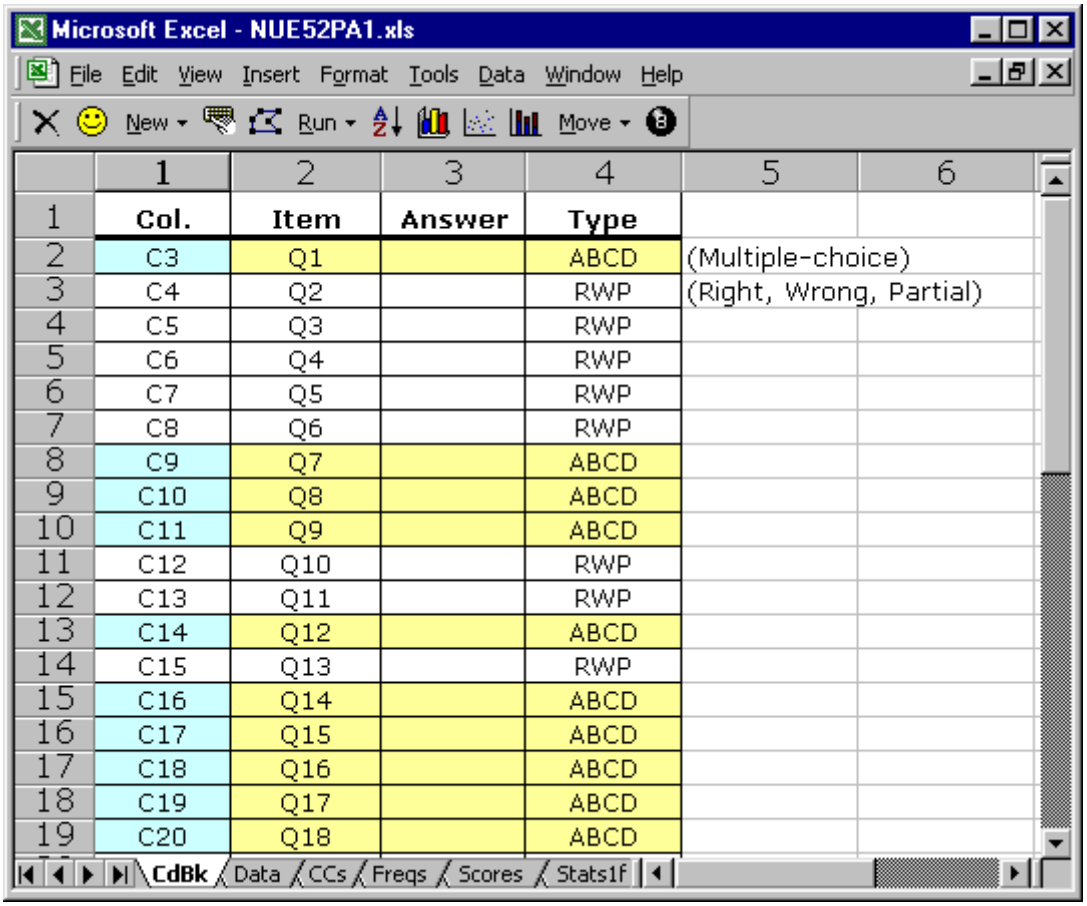
```
*col (c28-c37)
*sub name=(Class quiz of 25 July), title=(Quiz25J)
*key ABBDC DDACA
*col (c28-c37)
*sub cfc, name=(CFC class quiz of 25 July), title=(CFCQuiz)
*key ABBDC DDACA
```

Two subtests are defined by these six control cards. Notice that the *col cards point to the same columns—here a subtest of 10 items is to be scored twice, once in "normal" fashion, and once with the CFC scoring option applied.

Set 7:

```
Data from one of TAFE's applied diploma classes (Sept 2000).
&
*col (c3,c9-c11,c14,c16-c20,c24,c25,c28,c30-c32,c37,c38,c41)
*sub mastery=60, title=(NUE52mc), per
*key DBCDD DCBAD CADAC ADCC
*mws c16, 0, 1, 0, 1
&
*col (c4-c8,c12-c13,c15,c21-c23,c26-c27,c29,c33-c36,c39-c40,c42-c44)
*sub mastery=60, res=(R,P,W), title=(NUE52sa), per
*key RRRRR RRRRR RRRRR RRRRR RRR
*mws Call, 1.0, 0.5, 0.0
&
*col (c3-c44)
*sub mastery=60, title=(total), res=(A,B,C,D,R,P,W), wt=0
*key DRRRR RBCDR RDRDC BADRR RCARR DRACA RRRRD CRRCR RR
```

This is not a straightforward, easy-to-understand job. An instructor has used a test with 42 items, of which 19 were multiple choice, and 23 were short answer. The item types were mixed—as shown in the codebook below, the first item was multiple-choice, the next five were short answer, the next three were multiple-choice, and so on.



	1	2	3	4	5	6
1	**Col.**	**Item**	**Answer**	**Type**		
2	C3	Q1		ABCD	(Multiple-choice)	
3	C4	Q2		RWP	(Right, Wrong, Partial)	
4	C5	Q3		RWP		
5	C6	Q4		RWP		
6	C7	Q5		RWP		
7	C8	Q6		RWP		
8	C9	Q7		ABCD		
9	C10	Q8		ABCD		
10	C11	Q9		ABCD		
11	C12	Q10		RWP		
12	C13	Q11		RWP		
13	C14	Q12		ABCD		
14	C15	Q13		RWP		
15	C16	Q14		ABCD		
16	C17	Q15		ABCD		
17	C18	Q16		ABCD		
18	C19	Q17		ABCD		
19	C20	Q18		ABCD		

The first control card in this example has no asterisk the beginning, and there are three other cards which have the & character at the start. These lines will be ignored by Lertap. Chapter 4 pointed out that lines with no asterisks at the very beginning may be used as comments, and as separators between subtests.

The multiple-choice items all used res=(A,B,C,D), that is, each of the multiple-choice items presented options A, B, C, and D to students. This is called Lertap's default res=() assignment for cognitive tests, and, whenever this is the case, there is no need to use res=() on the *sub card.

The short answer items, on the other hand, were marked Right, Wrong, or Partial Credit, with letters of R, W, and P entered in Lertap's Data worksheet to denote each possible mark.

Now—note the two *mws cards. The first one tells Lertap that the item whose answers were coded in column 16 of the Data sheet is to be scored so that both the second and fourth options, which would be B and D, get 1 (one) point, while the first and third options, A and C, get zero points.

The second *mws card uses "Call", which tells Lertap that it's referring to all the items used by the subtest (Call means "columns all"). For these items, a response of R will get 1 (one point), while P will get half a point (0.5), and W will get zero points.

Finally, the third subtest will <u>not</u> work well as seen above. It's meant to be a total test, one comprised of all 42 items.

The reason this subtest scoring will not work well is because are no *mws cards following the subtest's *key card, meaning that item Q14 (which belongs to column 16, as indicated in the codebook) will not be double-keyed as it was in the first subtest. The lack of *mws cards also means that marks of P (Partial Credit) on the short-answer items will not get the half-point they got in the second subtest.

When we asked the teacher who developed this test why she had not used *mws cards in the third subtest, she said she was just experimenting, and then proceeded to ask us if it was true she'd have to enter 24 *mws cards for the third subtest if she wanted to do the job right.

And yes, this would be the case. She has one item in the multiple-choice set which is to be double-keyed, and 23 items in the short-answer set which have one of their responses, P, getting half a point. If she wanted to have a third subtest with correct item scoring, she'd end up with something like the next example.

Set 8:

```
Data from one of TAFE's applied diploma classes (Sept 2000).
&
*col (c3,c9-c11,c14,c16-c20,c24,c25,c28,c30-c32,c37,c38,c41)
*sub mastery=60, title=(NUE52mc), per
*key DBCDD DCBAD CADAC ADCC
*mws c16, 0, 1, 0, 1
&
*col (c4-c8,c12-c13,c15,c21-c23,c26-c27,c29,c33-c36,c39-c40,c42-c44)
*sub mastery=60, res=(R,P,W), title=(NUE52sa), per
*key RRRRR RRRRR RRRRR RRRRR RRR
*mws Call, 1.0, 0.5, 0.0
&
*col (c3-c44)
*sub mastery=60, title=(total), res=(A,B,C,D,R,P,W), per
*key DRRRR RBCDR RDRDC BADRR RCARR DRACA RRRRD CRRCR RR
*mws c16, 0, 1, 0, 1
*mws c4, 1, 0.5, 0
*mws c5, 1, 0.5, 0
*mws c6, 1, 0.5, 0
*mws c7, 1, 0.5, 0
*mws c8, 1, 0.5, 0
*mws c12, 1, 0.5, 0
*mws c13, 1, 0.5, 0
*mws c15, 1, 0.5, 0
 ... ... ...
*mws c44, 1, 0.5, 0
```

This example is in answer to the instructor whose control cards were shown in Set 7 above. Now there are multiple *mws cards—in fact, we haven't shown all of them (there would be 24 for the third subtest, but we've shown only 10).

We hear some readers asking why an *mws card with "Call" could not have been used for the third subtest, as it was in the second. One reason, the most compelling one, is that this subtest has two different sets of items, multiple-choice and short-answer, and they use different response codes. Another reason has to do with the fact that the scoring pattern for the items in the first subtest is not uniform over all subtest items—sometimes the first response, A, gets one point, sometimes it's the third response, C (and so on). Note that this is not the case in the second subtest, where R always gets one point, P always gets half a point, and W is always a loser.

If you find it difficult to follow the examples shown in the last two control card sets above, worry not. These are complex examples. Lertap is capable of scoring test items in just about any manner imaginable, but things can get a bit hairy in special cases.

Peeking at Sub worksheets

If you're not sure how Lertap will interpret your control cards, use the Run option on the toolbar to "Interpret CCs lines", and then look at the subtest's Sub worksheet.

Sub worksheets are normally hidden from view. To unhide them, use Excel's Format / Sheet option. Sub sheets are not spectacularly formatted, but you will probably be able to understand most of their contents.

The *tst card

There is another card which may be used with any subtest, including cognitive ones. The *tst card is used to break out certain data records from the Data worksheet, after which Lertap's Run options are used to get results for these records only.

For example,

*tst c12=(3)

will have Lertap make a new Excel workbook containing only those cases in the Data worksheet which have a 3 in column 12. Once this workbook is created, all options on Lertap's toolbar are available for use, including, of course, the Run options.

There is more information on the use of the *tst card in Chapter 4.