DID HINKLE PROVE LADDERED CONSTRUCTS ARE SUPERORDINATE? A RE-EXAMINATION OF HIS DATA SUGGESTS NOT

Richard C. Bell

School of Psychological Sciences, University of Melbourne, Melbourne, Australia

Laddering is a construct elicitation technique that purports to obtain superordinate constructs. Hinkle, who invented the laddering technique, used an implication grid procedure to test whether the constructs elicited by laddering were superordinate to those used to initiate the laddering procedure. He concluded that laddering did indeed produce superordinate constructs. However the analysis on which this conclusion was based was at the broadest level, including all implicative relationships. No other studies have addressed this issue in this fashion. A re-examination of Hinkle's data focussing on just those implicative relationships between the initiating (subordinate) and the laddered (superordinate) constructs showed each was as likely to imply the other as the reverse. It is concluded that Hinkle's data did not provide support for the superordinacy of laddered constructs and an appropriate model to describe the relationship between initiating and laddered constructs remains to be developed.

Keywords: Laddering, superordinate-subordinate relationships, implication grids

Laddering is the most widely used personal construct psychology technique after repertory grids. It is generally accepted that the laddering process generates superordinate constructs, although there are views that question this (Butt, 1995). However Hinkle (1965) appears to be the only person in the personal construct domain who has formally tested whether or not laddered constructs are superordinate by considering the implicative relationship between constructs. Hinkle tested his laddered constructs together with the constructs used to initiate the laddering in an implication grid format and simply contrasted the implications data between the original and laddered constructs.

Hinkle also published the 28 implications grids as an appendix to his thesis. There were 10 generating constructs (derived from repertory grid triadic elicitation) and 10 constructs laddered from the generating constructs. Hinkle had found in pilot work that subjects could generate 8 to 12 superordinate constructs for any basic construct. He also reported that "the chain of superordinate constructs in the hierarchy generated from the first subordinate was almost invariably repeated in the hierarchies of the remaining subordinates".

In his main study of implication grids he did not identify the level at which these latter constructs were laddered or which generating constructs generated which laddered constructs. He recorded an 'x' in the column of the implying construct at the row of the implied construct and left the symmetric matrix cell (implied construct column and implying construct row) blank. Unrelated constructs were blank in both (row-column and column-row) cells. Where two constructs mutually implied each other, an 'r' was recorded in both cells (row-column and column-row).

The matrix typed up was a 20 x 20 square matrix containing 380 'live cells' as the diagonal represented constructs compared with themselves which was not relevant. However the information in this grid could be represented by a 190 cell half grid (e.g. in lower triangular form) showing each row against each column as a cell. These cells could contain four kinds of information.

i. Null – no relationship between row and column
ii. Row implies column
iii. Column implies row

iv. Row and column imply each other.

Hinkle only tested (and only could test) distinctions between generating and laddered constructs. Thus the above four-fold classification was relevant to distinctions between generating and laddered constructs. Within the subsets of generating and laddered constructs there was no useful distinction between row implies column and column implies row so there was a three-fold classification within those constructs showing each row against each column as a cell. These cells could contain three kinds of information.

i. Null – no relationship between row and column
ii. Row implies column or column implies row
iii. Row and column imply each other.

Hence Hinkle's data had 10 scores of interest:

i. Null – no relationship between generating row and column
ii. Row implies column or column implies row for generating constructs.
iii. Row and column imply each other for generating constructs.
iv. Null – no relationship between row (generating) and column (laddered) constructs
v. Row (generating) implies column (laddered)
vi. Column (laddered) implies row (generating)
vii. Row (generating) and column (laddered) imply each other
viii. Null – no relationship between laddered row and column
ix. Row implies column or column implies row for laddered constructs.
x. Row and column imply each other for laddered constructs.

Data were transcribed from Hinkle's appendices and means and standard deviations calculated for the ten scores. These are shown in Table 1. Standard deviations are substantial indicating that the implication relationships varied substantially among the 28 respondents.

Table 1. *Average relative occurrence of kinds of relationships in Hinkle’s 28 implication grids (as means and standard deviations)*

		Mean	Std. Dev.
i.	Null – no relationship between generating row and column	26.9	8.14
ii.	Row implies column or column implies row for generating constructs.	11.6	5.28
iii.	Row and column imply each other for generating constructs.	6.5	5.39
iv.	Null – no relationship between row (generating) and column (laddered) constructs	46.8	16.82
v.	Row (generating) implies column (laddered)	16.9	8.03
vi.	Column (laddered) implies row (generating)	17.1	10.06
vii.	Row (generating) and column (laddered) imply each other	19.2	14.11
viii.	Null – no relationship between laddered row and column	10.3	9.40
ix.	Row implies column or column implies row for laddered constructs.	17.9	7.50
x.	Row and column imply each other for laddered constructs.	16.8	10.15
Total		190	

Overall there were three types of relationship, null or no relationship, one-way implication, and reciprocal implication. As might be expected, null relationships were the most common (43.4%), followed by one-way implications (33.5%). And more common than might be expected, reciprocal relationships accounted for 23.1%. Hinkle introduced reciprocal relationships in his general discussion or relationship types but did not refer to this kind of relationship as part of his hypotheses. In his discussion (point 20) of the results he suggested that perhaps reciprocal relationships could be examined separately by factor analysis since they were symmetric data (like correlation coefficients). In fact, single reciprocal relationships provide no information as to the super-ordinate / subordinate relationship between constructs. It should be noted however that subsets of symmetric relationships can be used to infer a direction of relationship. This is common in applications of path analysis and in fact is incorporated into the determination of superordinate / subordinate construct relationships by the Caputi, Breiger and Pattison (1990) method.

The only information relevant to the task of determining the superordinate and subordinate status of laddered versus generating constructs are the mean scores for rows v. and vi. in Table 1. These are not significantly different ($t = 0.08$, $df = 27$, $p>.05$) indicating laddered constructs are no more likely to be implied by the generating constructs than the converse. However there are other differences between generating and laddered constructs that tell us something. Generating constructs are less likely to be related to other generating constructs (14.1%) than laddered constructs are to each other (5.4%). This difference is significant ($t = 3.71$, $df = 27$, $p<.001$). Both one-way and reciprocal relationships were significantly more common among laddered constructs than generating constructs (One-way: $t = 3.7$, $df = 27$, $p>.001$; Reciprocal: $t = 4.63$, $df = 27$, $p=<.001$) although for laddered constructs there was no difference between one-way (9.4%) and reciprocal implications (8.8%), $t = 0.39$, $df = 27$, $p>.05$, while for generating constructs, there were more one-way implications (6.1%) than reciprocal ones (3.4%), $t = 6.40$, $df = 27$, $p>.05$.

It would seem thus that laddered constructs are different in a way to constructs elicited in the traditional triadic element fashion. They appear to be more closely interrelated than the triadically elicited constructs. This is not surprising given Hinkle's observation that there was a tendency for the same laddered constructs to emerge from different generating constructs. However it does suggest that laddered constructs will be less cognitively complex since they will be more highly correlated.

Why did Hinkle not find these results? There are a number of reasons. He used a simple chi-square test on the sum of implications. Such a test did not take into account that these sums were not totally independent because reciprocal implications between laddered and generating constructs were counted for both laddered and generating constructs. In addition by simply counting the whole columns and rows of the implications grid he conflated within group (i.e., within laddered or within generating) implications with between group (i.e., laddered versus generating) implications.

In the introduction to this paper, it was noted that Hinkle was the only person in the Personal Construct domain who has formally tested whether or not laddered constructs are superordinate. While this is true of the Personal Construct domain, elsewhere the hierarchical assumption of laddering has been tested with an implication task (van Rekom & Wierenga, 2007). As found in the present analysis , they reported a substantial number of reciprocal implications between subordinate constructs and superordinate constructs. They were investigating the assumption in a business context and referred to the basic generating constructs as 'concrete attributes' and the higher order constructs as 'abstract values'. This is a common distinction in the business applications of laddering. In the Personal Construct Psychology domain, it has been suggested that the presence of abstract constructs in those laddered is evidence for their superordinate status (Hardison & Neimeyer, 2007; Neimeyer, Anderson & Stockton, 2001). The results of van Rekom &

Wierenga (2007) did not support this view. And as noted by Crockett (1982, p.66), implicative relationships need not be hierarchical. As an alternative model, van Rekom & Wierenga suggested a network modelling approach which could represent reciprocal relationships as well as the purely uni-directional relationships of hierarchical modelling. They concluded that a better representation of more important concepts (core constructs in a personal construct framework) was as more central (i.e. with more links to other constructs) rather than more hierarchical. Hays (1958) adopted a similar viewpoint. In an implications modelling framework, he suggested that more important attributes were more central.

In conclusion it seems likely that laddering of constructs produces more abstract values as constructs, although this has not been examined in Hinkle's data. On the other hand it seems unlikely that the relationships between laddered constructs and those used to initiate laddering is hierarchical in nature, and that an appropriate model for these relationships is yet to be identified.

REFERENCES

Butt, T. (1995) Ordinal relationships between constructs. *Journal of Constructivist Psychology, 8,* 227-236.

Caputi, P., Breiger, R., & Pattison, P. (1990). Analyzing implications grids using hierarchical models. *International Journal of Personal Construct Psychology*, *3*, 77-90.

Crockett, W.H. (1982). The organization of construct systems: The organization corollary. In J.C. Mancuso and J.R. Adams-Webber (Eds.) *The construing person*. (pp. 62-95) New York: Praeger.

Hardison, H. G., & Neimeyer, R.A. (2007). Numbers and narratives: Quantitative and qualitative convergence across constructivist assessments. *Journal of Constructivist Psychology, 20,* 285-308.

Hays, W.L. (1958). An approach to the study of trait implication and trait similarity. In R. Tagiuri and L. Petrullo (Eds.) *Person perception and interpersonal behavior.* (pp. 289-299) Stanford, CA: Stanford University Press.

Hinkle, D.N. (1965). *The change of personal constructs from the viewpoint of a theory of construct implications.* Unpublished PhD thesis, Ohio State University. Retrieved from http://www.pcp-net.org/journal/pctp10/hinkle1965.html

Neimeyer, R.A., Anderson, A., & Stockton, L. (2001). Snakes versus ladders: A validation of laddering technique as a measure of hierarchical structure. *Journal of Constructivist Psychology*, *14*, 85-105.

van Rekom, J. & Wierenga, B. (2007). On the hierarchical nature of means–end relationships in laddering data. *Journal of Business Research 60*, 401–410.

ABOUT THE AUTHOR

Richard Bell is a Principal Research Fellow in the Melbourne School of Psychological Sciences at the University of Melbourne. He has published widely in the analysis of repertory grid data.

Email: rcbell12345@gmail.com

REFERENCE

Bell, C. (2014). Did Hinkle prove laddered constructs are superordinate? A re-examination of his data suggests not.
Personal Construct Theory & Practice, *11*, 1-4, 2014

(Retrieved from http://www.pcp-net.org/journal/pctp14/bell14.pdf)

Received: 19 April 2013 - Accepted: 24 December 2013 – Published: 27 January 2014.