BOOK REVIEWS

Unidimensional Scaling

John P. McIver and Edward G. Carmines
(Sage University Paper Series on Quantitative Applications in the Social Sciences, Series No. 07-024.) Beverly Hills CA: Sage Publications, 1981, $4.50, 96 pp.

Magnitude Scaling: Quantitative Measurement of Opinions

Milton Lodge
(Sage University Paper Series on Quantitative Applications in the Social Sciences, Series No. 07-025.) Beverly Hills CA: Sage Publications, 1981, $4.50, 87 pp.

For the past five years I have taught an undergraduate course in scaling. Every year, however, I have to face the problem of the lack of good introductory texts in unidimensional scaling. For multidimensional scaling there is a good introductory text by Kruskal and Wish (1978), which I have been using as a text in my scaling course ever since its publication. In fact, I was so impressed with their book that I translated it into Japanese. In contrast, I have not been able to find any good introductory texts comparable to Kruskal and Wish's book, on unidimensional scaling methods.

Finally, the much longed for volumes have come out in the Sage Series on Quantitative Applications in Social Sciences (the same series that contains Kruskal and Wish's monograph). *Unidimensional Scaling* by McIver and Carmines focuses on Likert scaling, Guttman scaling, and Coombs' unfolding theory; whereas *Magnitude Scaling* by Lodge concentrates on Stevens' magnitude estimation method for measurement of social stimuli. These volumes on unidimensional scaling will nicely complement Kruskal and Wish's earlier volume on multidimensional scaling to make a fairly complete set of texts for a one-semester course in scaling.

There are a number of features that make these volumes particularly suitable to the novice. First, the scaling methods are to a large extent described verbally; and minimal mathematical expositions are involved. Indeed, it is remarkable how well the models can be explained without recourse to mathematical expressions. Second, many substantively interesting examples of applications are included. They not only empirically motivate the reader but also make the reading enjoyable. Third, procedural and rather technical details necessary to apply the methods are spelled out extremely well. With the information provided, I am sure that the novice can readily set out on an adventure in which the scaling methods play a prominent role. Limiting the scope to the methods that are practically useful rather than merely of theoretical interest is very deliberate. The prices of the volumes are also suitable for textbooks.

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Nevertheless, the books are not completely free from my dissatisfaction. McIver and Carmines expend a considerable amount of their efforts in explaining ways to ensure unidimensionality of scale items. I would have liked them to have a more multidimensional perspective in dealing with this problem, since unidimensionality merely indicates that only a single dimension happens to be needed in a multidimensional analysis. That is, the test of unidimensionality is only a special case of the test of dimensionality in multidimensional scaling. Specifically, it is the test of whether adding an extra dimension will indeed add something significant to the explaining power of the scaling models. In fact, McIver and Carmines did have this multidimensional perspective when they applied factor analysis in Likert scaling; but the same perspective could be extended to Guttman scaling and the unfolding method. In particular, they should note what is being done to secure the unidimensionality of test items in the item response test model (Lord & Novick, 1968), which is essentially a probabilistic version of Guttman scaling. There is also an effective multidimensional scaling version of Guttman scaling called *dual scaling* (Nishisato, 1980)—an extremely versatile multidimensional scaling method for discrete categorical data (a volume on dual scaling would also be a useful future addition to the Sage series).

Whether or not the magnitude estimation method provides a ratio scale of what is being measured is a crucial problem, yet it has been a source of persistent controversy among measurement theorists. Lodge rightfully devotes major portions of his volume to establishing the validity of magnitude scales for both physical and social stimuli. For this he almost exclusively relies on evidence from cross-modality matching experiments. However, as repeatedly pointed out by many authors (e.g., Anderson, 1981; Krantz, 1972; Shepard, 1981), the cross-modality matching task does not provide a sufficient validational basis for magnitude estimation. The "established" power of unity for numbers may not hold invariably across different matching tasks. Cross-task validations of magnitude scales are necessary but, regrettably, they are not given in the text. For example, if a magnitude scale predicts that "for one theft to be considered twice as serious, the dollar amount stolen must be 13 times larger" (p.22), it should be empirically verified that a $13 theft is indeed viewed to be twice as serious as a $1 theft. This is by no means complete, but at least it is a logical first step in order to claim the validity of the magnitude scale.

I also regret that Lodge does not provide any substantial information about the instability of power exponents across different ranges of stimuli employed, across different standard stimuli, across different subjects, and so forth. It is as if there were no instability problems in magnitude estimation. I have the impression that Lodge's keen critical eye is directed only toward category scales, and not toward magnitude scaling. Obviously, he is committed to magnitude scaling. The commitment itself is good, but a fair, critical mind should not be overshadowed because of the commitment.

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