response pattern of graded scores. *Psychometric Monographs* No. 17. IA: The Psychometric Society.

Sattath, S., & Tversky, A. (1977). Additive similarity trees *Psychometrika, 42*, 319-345.

Shepard, R. N. (1962). Analysis of proximities: Multidimensional scaling with an unknown distance function (I & II). *Psychometrika, 27*, 125-140 & 219-246.

Sörbom, D. (1976). A statistical model for the measurement of change in true scores. In D. N. M. de Gruijter and J. L. Th. van der Kamp (Eds.), *Advances in psychological and educational measurement* (pp. 159-169). New York: Wiley.

Tanaka, J. S., & Huba, G. J. (1984). Confirmatory hierarchical factor analyses of psychological distress measures. *Journal of Personality and Social Psychology, 46*, 621-635.

Thissen, D., & Steinberg, L. (1988). Data analysis using item response theory. *Psychological Bulletin, 104*, 385-395.

Torgerson, W. S. (1958). Theory of methods of dcaling. New York: Wiley.

Tversky, A. (1977). Features of similarity. *Psychological Review, 84*, 327-352.

Wasserman, S. (1987). Conformity of two sociometric relations. *Psychometrika, 52*, 3-18.

Weerahandi, S. (1995). *Exact statistical methods for data analysis*. New York: Springer-Verlag.

Woodruff, D. J. & Feldt, L. S. (1986). Tests for equality of several alpha coefficients when their sample estimates are dependent. *Psychometrika, 3*, 393-413.

Yung, Y. F. (1997). Finite mixtures in confirmatory factor analysis models. *Psychometrika, 62*, 297-330.

QUANTITATIVE FOUNDATIONS OF PSYCHOLOGICAL RESEARCH

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This article provide a summary for statistical and computational methods that have been designed and developed via addressing issues or solving problems directly relevant to psychological research. The topics include: (a) Theory of psychological measurement (classical and item response theories), (b) Causal inference (continuous and discrete data analyses), (c) Hierarchical data analysis (general and Bayesian approaches), (d) Exact test (randomization and population models), (e) Bayesian network, (f) Social network, and (g) Multidimensional scaling. With a few examples, this article illustrates how the quantitative methods when properly used promote wonderful discoveries in psychology. The examples also support the uniqueness and importance of quantitative methods for psychological research. Finally, the article suggests a few important issues (i.e., incomplete-data collection and analyses, and an integration of statistics and informatics) for studies on quantitative methods in the future.

Keywords: Quantitative methods, Information technology, Incomplete data.