Ivan Jacob Agaloos Pesigan

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References

Barnard et al.: Nonparametric standard errors and confidence intervals: Discussion

Barnard-Collins-Farewell-etal-1981

George A. Barnard et al. "Nonparametric standard errors and confidence intervals: Discussion". In: *The Canadian Journal of Statistics / La Revue Canadienne de Statistique* 9.2 (1981), pp. 158–170. DOI: 10.2307/3314609.

Baron et al.: The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations   **Baron-Kenny-1986**

Reuben M. Baron and David A. Kenny. "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations". In: *Journal of Personality and Social Psychology* 51.6 (1986), pp. 1173–1182. DOI: 10.1037/0022-3514.51.6.1173.

Abstract: In this article, we attempt to distinguish between the properties of moderator and mediator variables at a number of levels. First, we seek to make theorists and researchers aware of the importance of not using the terms moderator and mediator interchangeably by carefully elaborating, both conceptually and strategically, the many ways in which moderators and mediators differ. We then go beyond this largely pedagogical function and delineate the conceptual and strategic implications of making use of such distinctions with regard to a wide range of phenomena, including control and stress, attitudes, and personality traits. We also provide a specific compendium of analytic procedures appropriate for making the most effective use of the moderator and mediator distinction, both separately and in terms of a broader causal system that includes both moderators and mediators.

Bentler et al.: Covariance structures under polynomial constraints: Applications to correlation and alpha-type structural models   Bentler-Lee-1983

Abstract: This paper provides methods for the estimation of covariance structure models under polynomial constraints. Estimation is based on maximum likelihood principles under constraints, and the test statistics, parameter estimates, and standard errors are based on a statistical theory that takes into account the constraints. The approach is illustrated by obtaining statistics for the squared multiple correlation, for predictors in a standardized metric, and in the analysis of longitudinal data via old and new models having constraints that cannot be obtained by standard methods.

Bollen: Total, direct, and indirect effects in structural equation models   Bollen-1987

Abstract: Decomposing the total effects of one variable on another into direct and indirect effects has long been of interest to researchers who use path analysis. In this paper, I review the decomposition of effects in general structural equation models with latent and observed variables. I present the two approaches to defining total effects. One is based on sums of powers of coefficient matrices. The other defines total effects as reducedform coefficients. I show the conditions under which these two definitions are equivalent. I also compare the different types of specific indirect effects. These are the influences that are transmitted through particular variables in a model. Finally, I propose a more general definition of specific effects that includes the effects transmitted by any path or combination of paths. I also include a section on computing standard errors for all types of effects.

Browne: Asymptotically distribution-free methods for the analysis of covariance structures   Browne-1984

Michael W. Browne. "Asymptotically distribution-free methods for the analysis of covariance structures". In: *British Journal of Mathematical and Statistical Psychology* 37.1 (May 1984), pp. 62–83. DOI: 10.1111/j.2044-8317.1984.tb00789.x.

Abstract: Methods for obtaining tests of fit of structural models for covariance matrices and estimator standard error which are asymptotically distribution free are derived. Modifications to standard normal theory tests and standard errors which make them applicable to the wider class of elliptical distributions are provided. A random sampling experiment to investigate some of the proposed methods is described.

Chesher et al.: The bias of a heteroskedasticity consistent covariance matrix estimator   Chesher-Jewitt-1987

Andrew Chesher and Ian Jewitt. "The bias of a heteroskedasticity consistent covariance matrix estimator". In: *Econometrica* 55.5 (Sept. 1987), p. 1217. DOI: 10.2307/1911269.

Cloninger: Neurogenetic adaptive mechanisms in alcoholism   Cloninger-1987

C. Robert Cloninger. "Neurogenetic adaptive mechanisms in alcoholism". In: *Science* 236.4800 (Apr. 1987), pp. 410–416. ISSN: 1095-9203. DOI: 10.1126/science.2882604.

Abstract: Clinical, genetic, and neuropsychopharmacological studies of developmental factors in alcoholism are providing a better understanding of the neurobiological bases of personality and learning. Studies of the adopted-away children of alcoholics show that the predisposition to initiate alcohol-seeking behavior is genetically different from susceptibility to loss of control after drinking begins. Alcohol-seeking behavior is a special case of exploratory appetitive behavior and involves different neurogenetic processes than do susceptibility to behavioral tolerance and dependence on

the antianxiety or sedative effects of alcohol. Three dimensions of personality have been described that may reflect individual differences in brain systems modulating the activation, maintenance, and inhibition of behavioral responses to the effects of alcohol and other environmental stimuli. These personality traits distinguish alcoholics with different patterns of behavioral, neurophysiological, and neuropharmacological responses to alcohol.

Cox et al.: A motivational model of alcohol use   Cox-Klinger-1988

Abstract: The final, common pathway to alcohol use is motivational. A person decides consciously or unconsciously to consume or not to consume any particular drink of alcohol according to whether or not he or she expects that the positive affective consequences of drinking will outweigh those of not drinking. Various factors (e.g., past experiences with drinking, current life situation) help to form expectations of affective change from drinking, these factors always modulated by a person's neurochemical reactivity to alcohol. Such major influences include the person's current nonchemical incentives and the prospect of acquiring new positive incentives and removing current negative incentives. Our motivational counseling technique uses nonchemical goals and incentives to help the alcoholic develop a satisfying life without the necessity of alcohol. The technique first assesses the alcoholic's motivational structure and then seeks to modify it through a multicomponent counseling procedure. The counseling technique is one example of the heuristic value of the motivational model.

Cudeck: Analysis of correlation matrices using covariance structure models

Cudeck-1989

Abstract: It is often assumed that covariance structure models can be arbitrarily applied to sample correlation matrices as readily as to sample covariance matrices. Although this is true in many cases and leads to an analysis that is mostly correct, it is not permissible for all structures. This article reviews three interrelated problems associated with the analysis of structural models using a matrix of sample correlations. Depending upon the model, applying a covariance structure to a matrix of correlations may (a) modify the model being studied, (b) produce incorrect values of the omnibus test statistic, or (c) yield incorrect standard errors. An important class of models are those that are scale invariant (Browne, 1982), for then Errors a and b cannot occur when a correlation matrix is analyzed. A number of examples based on restricted factor analysis are presented to illustrate the concepts described in the article.

Efron: Nonparametric standard errors and confidence intervals — Efron-1981a

Bradley Efron. "Nonparametric standard errors and confidence intervals". In: *Canadian Journal of Statistics / La Revue Canadienne de Statistique* 9.2 (1981), pp. 139–158. DOI: 10.2307/3314608.

Abstract: We investigate several nonparametric methods; the bootstrap, the jackknife, the delta method, and other related techniques. The first and simplest goal is the assignment of nonparametric standard errors to a real-valued statistic. More ambitiously, we consider setting nonparametric confidence intervals for a real-valued parameter. Building on the well understood case of confidence intervals for the median, some hopeful evidence is presented that such a theory may be possible.

Efron: Nonparametric standard errors and confidence intervals: Rejoinder

Efron-1981b

Bradley Efron. "Nonparametric standard errors and confidence intervals: Rejoinder". In: *The Canadian Journal of Statistics / La Revue Canadienne de Statistique* 9.2 (1981), pp. 170–172. DOI: 10.2307/3314610.

Abstract: We consider the problem of setting approximate confidence intervals for a single parameter θ in a multiparameter family. The standard approximate intervals based on maximum likelihood theory, $\hat{\theta} \pm \hat{\sigma} z^{(\alpha)}$, can be quite misleading. In practice, tricks based on transformations, bias corrections, and so forth, are often used to improve their accuracy. The bootstrap confidence intervals discussed in this article automatically incorporate such tricks without requiring the statistician to think them through for each new application, at the price of a considerable increase in computational effort. The new intervals incorporate an improvement over previously suggested methods, which results in second-order correctness in a wide variety of problems. In addition to parametric families, bootstrap intervals are also developed for nonparametric situations.

Abstract: The bootstrap is a nonparametric technique for estimating standard errors and approximate confidence intervals. Rasmussen has used a simulation experiment to suggest that bootstrap confidence intervals perform very poorly in the estimation of a correlation coefficient. Part of Rasmussen's simulation is repeated. A careful look at the results shows the bootstrap intervals performing quite well. Some remarks are made concerning the virtues and defects of bootstrap intervals in general.

Abstract: Although it takes time for a cause to exert an effect, causal models often fail to allow adequately for time lags. In particular, causal models that contain cross-sectional relations (i. e., relations between values of 2 variables at the same time) are unsatisfactory because (a) they omit the values of variables at prior times, (b) they omit effects that variables can have on themselves, and (c) they fail to specify the length of the causal interval that is being studied. These omissions can produce severe biases in estimates of the size of causal effects. Longitudinal models also can fail to take account of time lags properly, and this too can lead to severely biased estimates. The discussion illustrates the biases that can occur in both cross-sectional and longitudinal models, introduces the latent longitudinal approach to causal modeling, and shows how latent longitudinal models can be used to reduce bias by taking account of time lags even when data are available for only 1 point in time.

Abstract: Discusses mediation relations in causal terms. Influences of an antecedent are transmitted to a consequence through an intervening mediator. Mediation relations may assume a number of functional forms, including nonadditive, nonlinear, and nonrecursive forms. Although mediation and moderation are distinguishable processes, with nonadditive forms (moderated mediation) a particular variable may be both a mediator and a moderator within a single set of functional relations. Current models for testing mediation relations in industrial and organizational psychology often involve an interplay between exploratory (correlational) statistical tests and causal inference.

It is suggested that no middle ground exists between exploratory and confirmatory (causal) analysis and that attempts to explain how mediation processes occur require specified causal models.

Judd et al.: Process analysis   Judd-Kenny-1981

Abstract: This article presents the rationale and procedures for conducting a process analysis in evaluation research. Such an analysis attempts to identify the process that mediates the effects of some treatment, by estimating the parameters of a causal chain between the treatment and some outcome variable. Two different procedures for estimating mediation are discussed. In addition we present procedures for examining whether a treatment exerts its effects, in part, by altering the mediating process that produces the outcome. Finally, the benefits of process analysis in evaluation research are underlined.

Kaplan et al.: Pathways to adolescent drug use: Self-derogation, peer influence, weakening of social controls, and early substance use   Kaplan-Martin-Robbins-1984

Abstract: We test a model that accounts for the adoption of drug use among adolescents in terms of four explanatory perspectives: self-derogation, peer influence, social control, and early substance use. The data come from a three-wave panel study of junior high school students in Houston (N = 3,052). Using nine variables at Time 1, 10 variables at Time 2, and drug use at Time 3, we operationalize components of all four theoretical perspectives in a path model predicting drug use. Results indicate that the four theoretical perspectives complement each other in predicting subsequent adoption of drug use. Significant primary and intervening roles can be attributed to

each of the four perspectives. We discuss these findings in terms of an integrative approach to multivariate models of drug use.

Kunsch: The jackknife and the bootstrap for general stationary observations

Abstract: We extend the jackknife and the bootstrap method of estimating standard errors to the case where the observations form a general stationary sequence. We do not attempt a reduction to i.i.d. values. The jackknife calculates the sample variance of replicates of the statistic obtained by omitting each block of l consecutive data once. In the case of the arithmetic mean this is shown to be equivalent to a weighted covariance estimate of the spectral density of the observations at zero. Under appropriate conditions consistency is obtained if $l = l(n) \to \infty$ and $l(n)/n \to 0$. General statistics are approximated by an arithmetic mean. In regular cases this approximation determines the asymptotic behavior. Bootstrap replicates are constructed by selecting blocks of length l randomly with replacement among the blocks of observations. The procedures are illustrated by using the sunspot numbers and some simulated data.

MacKinnon et al.: Some heteroskedasticity-consistent covariance matrix estimators with improved finite sample properties

Abstract: We examine several modified versions of the heteroskedasticity-consistent covariance matrix estimator of Hinkley (1977) and White (1980). On the basis of sampling experiments which compare the performance of quasi t-statistics, we find that one estimator, based on the jackknife,

performs better in small samples than the rest. We also examine the finite-sample properties of using modified critical values based on Edgeworth approximations, as proposed by Rothenberg (1984). In addition, we compare the power of several tests for heteroskedasticity, and find that it may be wise to employ the jackknife heteroskedasticity-consistent covariance matrix even in the absence of detected heteroskedasticity.

McArdle et al.: Some algebraic properties of the Reticular Action Model for moment structures

McArdle-McDonald-1984

J. Jack McArdle and Roderick P. McDonald. "Some algebraic properties of the Reticular Action Model for moment structures". In: *British Journal of Mathematical and Statistical Psychology* 37.2 (Nov. 1984), pp. 234–251. ISSN: 2044-8317. DOI: 10.1111/j.2044-8317.1984.tb00802.x.

Abstract: A number of models for the analysis of moment structures, such as linear structural relations, have recently been shown to be capable of being given a particularly simple and economical representation, in terms of the reticular action model (RAM). A formal algebraic treatment is presented that shows that RAM directly incorporates many common structural models, including models describing the structure of means. It is also shown that RAM treats coefficient matrices with patterned inverses simply and generally.

Micceri: The unicorn, the normal curve, and other improbable creatures

Micceri-1989

Theodore Micceri. "The unicorn, the normal curve, and other improbable creatures". In: *Psychological Bulletin* 105.1 (1989), pp. 156–166. DOI: 10.1037/0033-2909.105.1.156.

Nel: A matrix derivation of the asymptotic covariance matrix of sample correlation coefficients

Nel-1985

D.G. Nel. "A matrix derivation of the asymptotic covariance matrix of sample correlation coeffi-

cients". In: *Linear Algebra and its Applications* 67 (June 1985), pp. 137–145. ISSN: 0024-3795. DOI: 10.1016/0024-3795(85)90191-0.

Abstract: The asymptotic covariance matrix of the sample correlation matrix is derived in matrix form as an application of some new matrix theory in multivariate statistics.

Newey et al.: A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix   Newey-West-1987

Whitney K. Newey and Kenneth D. West. "A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix". In: *Econometrica* 55.3 (May 1987), p. 703. DOI: 10.2307/1913610.

Rasmussen: Estimating correlation coefficients: Bootstrap and parametric approaches   Rasmussen-1987

Jeffrey L. Rasmussen. "Estimating correlation coefficients: Bootstrap and parametric approaches". In: *Psychological Bulletin* 101.1 (1987), pp. 136–139. DOI: 10.1037/0033-2909.101.1.136.

Abstract: The bootstrap, a computer-intensive approach to statistical data analysis, has been recommended as an alternative to parametric approaches. Advocates claim it is superior because it is not burdened by potentially unwarranted normal theory assumptions and because it retains information about the form of the original sample. Empirical support for its superiority, however, is quite limited. The present article compares the bootstrap and parametric approaches to estimating confidence intervals and Type I error rates of the correlation coefficient. The parametric approach is superior to the bootstrap under both assumption violation and nonviolation. The bootstrap results in overly restricted confidence intervals and overly liberal Type I error rates.

Rogosa: A critique of cross-lagged correlation Rogosa-1980

David R. Rogosa. "A critique of cross-lagged correlation". In: *Psychological Bulletin* 88.2 (Sept. 1980), pp. 245–258. ISSN: 0033-2909. DOI: 10.1037/0033-2909.88.2.245.

Abstract: Comments that cross-lagged correlation (CLC) is not a useful procedure for the analysis of longitudinal panel data. In particular, the difference between CLCs is not a sound basis for causal inference. Demonstrations of the failure of CLC are based mainly on results for the 2-wave, 2-variable longitudinal panel design. Extensions of these results to panels with multiple waves and multiple measures reveal additional problems; each 2-wave snapshot did not yield dependable results. Taken together, the 2-wave analyses were often contradictory and misleading.

Schenker: Better bootstrap confidence intervals: Comment Schenker-1987

Nathaniel Schenker. "Better bootstrap confidence intervals: Comment". In: *Journal of the American Statistical Association* 82.397 (Mar. 1987), p. 192. DOI: 10.2307/2289150.

Singh: On the asymptotic accuracy of Efron's bootstrap Singh-1981

Kesar Singh. "On the asymptotic accuracy of Efron's bootstrap". In: *The Annals of Statistics* 9.6 (Nov. 1981). ISSN: 0090-5364. DOI: 10.1214/aos/1176345636.

Abstract: In the non-lattice case it is shown that the bootstrap approximation of the distribution of the standardized sample mean is asymptotically more accurate than approximation by the limiting normal distribution. The exact convergence rate of the bootstrap approximation of the distributions of sample quantiles is obtained. A few other convergence rates regarding the bootstrap method are also studied.

Sobel: Asymptotic confidence intervals for indirect effects in structural equation models   **Sobel-1982**

Michael E. Sobel. "Asymptotic confidence intervals for indirect effects in structural equation models". In: *Sociological Methodology* 13 (1982), p. 290. DOI: 10.2307/270723.

Sobel: Some new results on indirect effects and their standard errors in covariance structure models   **Sobel-1986**

Michael E. Sobel. "Some new results on indirect effects and their standard errors in covariance structure models". In: *Sociological Methodology* 16 (1986), p. 159. DOI: 10.2307/270922.

Sobel: Direct and indirect effects in linear structural equation models   **Sobel-1987**

Michael E. Sobel. "Direct and indirect effects in linear structural equation models". In: *Sociological Methods & Research* 16.1 (Aug. 1987), pp. 155–176. DOI: 10.1177/0049124187016001006.

Abstract: This article discusses total indirect effects in linear structural equation models. First, I define these effects. Second, I show how the delta method may be used to obtain the standard errors of the sample estimates of these effects and test hypotheses about the magnitudes of the indirect effects. To keep matters simple, I focus throughout on a particularly simple linear structural equation system; for a treatment of the general case, see Sobel (1986). To illustrate the ideas and results, a detailed example is presented.

Venzon et al.: A method for computing profile-likelihood-based confidence intervals   **Venzon-Moolgavkar-1988**

D. J. Venzon and S. H. Moolgavkar. "A method for computing profile-likelihood-based confidence intervals". In: *Applied Statistics* 37.1 (1988), p. 87. DOI: 10.2307/2347496.

Abstract: The method of constructing confidence regions based on the generalised likelihood ratio statistic is well known for parameter vectors. A similar construction of a confidence interval for a single entry of a vector can be implemented by repeatedly maximising over the other parameters. We present an algorithm for finding these confidence interval endpoints that requires less computation. It employs a modified Newton-Raphson iteration to solve a system of equations that defines the endpoints.

White: A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity   White-1980

Abstract: This paper presents a parameter covariance matrix estimator which is consistent even when the disturbances of a linear regression model are heteroskedastic. This estimator does not depend on a formal model of the structure of the heteroskedasticity. By comparing the elements of the new estimator to those of the usual covariance estimator, one obtains a direct test for heteroskedasticity, since in the absence of heteroskedasticity, the two estimators will be approximately equal, but will generally diverge otherwise. The test has an appealing least squares interpretation.