Package 'WABA'

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Type Package

Title Within-and-Between-Analysis for Groups and Dyads

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Description Functions and datasets for within-and-between-analyses
of data from individuals who are nested within groups or dyads.
Based on Dansereau, Alutto, and Yammarino (1984), Griffin and
Gonzalez (1995), Gonzalez and Griffin (1999), and O'Connor (2004).

Imports stats

LazyLoad yes

LazyData yes

License GPL (>= 2)

NeedsCompilation no

R topics documented:

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waba-package | *Within-And-Between-Analysis For Groups and Dyads*

Description

Levels-of-analysis issues arise whenever individual-level data are collected from more than one person from the same dyad, family, classroom, work group, or other interaction unit. Interdependence among cases from the same units also violates the independence-of-observations assumption that underlies many statistical tests. This package contains functions for addressing these issues via: (1) the within-and-between-analyses (WABA) framework described by Dansereau, Alutto, and Yammarino (1984), and (2) the dyad-level analyses described by Gonzalez and Griffin (1999) and Griffin and Gonzalez (1995). Descriptions of the procedures were provided by Yammarino and Markham (1992), Yammarino (1998), and by O'Connor (2004).

References

Dansereau, F., Alutto, J., & Yammarino, F. (1984). Theory testing in organizational behavior. Englewood Cliffs, NJ: Prentice-Hall.

Griffin, D., & Gonzalez, R. (1995). Correlational analysis of dyadlevel data in the exchangeable case. Psychological Bulletin, 118, 430-439.

Gonzalez, R., & Griffin, D. (1999). The correlational analysis of dyad-level data in the distinguishable case. Personal Relationships, 6, 449-469.

O'Connor, B. P. (2004). SPSS and SAS programs for addressing interdependence and basic levels-of-analysis issues in psychological data. Behavior Research Methods, Instrumentation, and Computers, 36, 17-28.

Yammarino, F. J. (1998). Multivariate aspects of the varient /WABA approach. Leadership Quarterly, 9, 203-227.

Yammarino, F. J., & Markham, S. (1992). On the application of within and between analysis: Are absence and affect really group based. Journal of Applied Psychology, 77, 168-176.

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data_Bliese | *data_Bliese*

Description

A data frame with 750 individual-level observations, nested within 50 groups, on 8 variables.

Details

A data frame with 750 individual-level observations, nested within 50 groups, on 8 variables. This simulated dataset was created by Paul Bliese, and results from WABA analyses of this data were reported by Klein et al. (2000). The dataset is provided as trial data for the waba function.

References

Klein, K., Bliese, B., Kozlowski, S., Dansereau, F., Gavin, M., Griffin, M., Hofmann, D., James, L., Yammarino, F., & Bligh, M. (2000). Multilevel analytical techniques: Commonalities, differences, and continuing questions. In K. J. Klein & S. W. J. Kozlowski (Eds.), Multilevel theory, research and methods in organizations (pp. 512-556). San Francisco, CA: Jossey-Bass.

Examples

```
summary(data_Bliese)
```

---

data_Detect_Set_A *data_Detect_Set_A*

Description

A data frame with 40 cases nested within 20 groups.

Details

This dataset is from Dataset A at www.levelsofanalysis.com, and as described in chapter 5 of the DETECT manual (which can be viewed at that Internet site). The dataset, which is synthetic, contains 40 cases nested within 20 groups. It contains values for DYAD, NEGOT, SATIS, and PERF. It is provided as trial data for the waba and wabamodreg functions.

Examples

```
summary(data_Detect_Set_A)
```

---

data_Detect_Set_A_mra *data_Detect_Set_A_mra*

Description

A data frame with 40 cases nested within 20 groups.

Details

This dataset is from Dataset A from www.levelsofanalysis.com, and as described in chapter 5 of the DETECT manual (which can be viewed at that Internet site). The data set, which is synthetic, contains 40 cases nested within 20 groups. It contains values for TASKCLAR, DYAD, NEGOT,and SATIS. It is provided as trial data for the wabamra function, which conducts separate WABA analyses for each value of a specified "Condition" variable, which in this case is TASKCLAR.

Examples

```
summary(data_Detect_Set_A_mra)
```

---

data_ggdist	*data_ggdist*

Description

A data frame with 48 observations on 3 variables from 24 dyads.

Details

A data frame with 48 observations on 3 variables from 24 dyads. It contains values for dyad, person, var1, var2, and var3. It is provided as trial data for the ggdist function.

Examples

```
summary(data_ggdist)
```

---

data_ggexch	*data_ggexch*

Description

A data frame with 48 observations on 3 variables from 24 dyads.

Details

A data frame with 48 observations on 3 variables from 24 dyads. It contains values for dyad, var1, var2, and var3. It is provided as trial data for the ggexch function.

Examples

```
summary(data_ggexch)
```

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data_jsp	*data_jsp*

Description

A data frame with observations on 1129 high school students nested within 49 schools.

Details

A data frame with observations on 1129 high school students nested within 49 schools. This the Year 1 data from the Junior School Project dataset that was analyzed by Goldstein (1995). There are values for school, class, sex, pupil, and scores on ravens, english, maths. The dataset is provided as trial data for the waba, wabamra, and wabamodreg functions.

References

Goldstein, H. (1995) Multilevel Statistical Models. New York, NY: Halstead Press.

Examples

```
summary(data_jsp)
```

---

ggdist	*Correlational Analysis of Dyad-Level Data in the Distinguishable-Case*

Description

Conducts correlational analyses of dyad-level data in the distinguishable-case, based on Gonzalez & Griffin (1999).

Usage

```
ggdist(data)
```

Arguments

data   An all-numeric dataframe where the rows are cases & the columns are the variables. Cases with missing values are not permitted in the data file. The first collumn of data must contain the dyad numbers (the dyad id# given to both dyad members). The second collumn contains the person id #s (e.g., sex) coded as 1 or 2. The third and subsequent collumns contain the variables to be analyzed.

Details

The simplest nested data structures are based on dyads. Imagine that neuroticism and marital satisfaction scores are obtained from both husbands and wives from a large number of couples. The dyadic partners in this case are distinguishable (and not exchangeable or interchangeable), because they are drawn from different classes or categories (men and women) that might well differ in their variable means, variances, and covariances. A variety of potentially important questions can be examined using such scores on two variables from each of the partners. The apparently simple question, "Is neuroticism associated with marital satisfaction?" quickly becomes multifaceted in dyadic datasets. This function performs the statistical analyses described by Gonzalez and Griffin (1999).

Produces the overall within-partner correlation, the overall cross-partner correlation, intraclass correlations, and statistics for dyad-level and individual-level effects.

Author(s)

Brian P. O'Connor

References

Gonzalez, R., & Griffin, D. (1999). The correlational analysis of dyad-level data in the distinguishable case. Personal Relationships, 6, 449-469.

Examples

```
ggdist(data_ggdist)
```

---

ggexch   *Correlational Analyses of Dyad-Level Data in the Exchangeable-Case*

Description

Conducts correlational analyses of dyad-level data in the exchangeable-case, based on Griffin &
Gonzalez (1995).

Arguments

data   An all-numeric dataframe where the rows are cases & the columns are the vari-
                ables. Cases with missing values are not permitted in the data file. The first
                collumn of data must contain the dyad numbers (the dyad id# given to both
                dyad members). The second and subsequent collumns contain the variables to
                be analyzed.

Details

The simplest nested data structures are based on dyads. The ggdist function described elsewhere
in this package can be used when the dyadic partners are distinguishable (and not exchangeable
or interchangeable), because they are drawn from different classes or categories, such as men and
women. The ggexch function can be used for dyad-level data wherein the partners are exchangeable
or interchangeable, as in pairs of men, pairs of women, or pairs of same-sex children. This function
performs the statistical analyses described by Gonzalez and Griffin (1995).

Produces the overall within-partner correlation, the overall cross-partner correlation, intraclass cor-
relations, and statistics for dyad-level and individual-level effects.

Author(s)

Brian P. O'Connor

References

Griffin, D., & Gonzalez, R. (1995). Correlational analysis of dyadlevel data in the exchangeable
case. Psychological Bulletin, 118, 430-439.

Examples

```
ggexch(data_ggexch)
```

---

waba   *Within-And-Between-Analysis*

Description

Conducts Within-And-Between-Analyses and produces a wide range of WABA statistics

Usage

```
waba(data)
```

Arguments

data   An all-numeric dataframe where the rows are cases & the columns are the variables.

         Cases with missing values are not permitted in the data file.

         The first value in each row (i.e., the first column of values in the data file) must be the individuals' group number/code, which must be an integer. The function sorts individuals into groups on the basis of these numbers/codes.

         Variable scores appear in subsequent columns.

         Multiple Variable Analyses (MVA) are conducted when the number of variables = 3, which is a limit that is determined by Hotelling's t-test for dependent correlations. For MVAs involving more than three variables, simply run the function again using new/different combinations of three variables.

Details

Within and between analysis (WABA) was developed by Dansereau, Alutto, and Yammarino (1984). The procedure can process data from groups (not just dyads) of varying sizes, and there are similarities with the Griffin and Gonzalez approaches for dyad-level data described elsewhere in this package. However, the computations in WABA are different, and there is some unique terminology and statistical output.

WABA involves three steps, as described by Yammarino and Markham (1992). First, scores on each variable are examined to determine whether the variance occurs primarily between groups, within groups, or both between and within groups. Next, relationships between variables are examined to determine whether the associations are primarily a function of between-groups covariance, within-groups covariance, or both within- and between-groups covariances. Finally, the results from these two steps are examined for consistency, and appropriate conclusions are drawn.

Produces multiple WABA statistics.

Author(s)

Brian P. O'Connor

References

Dansereau, F., Alutto, J., & Yammarino, F. (1984). Theory testing in organizational behavior. Englewood Cliffs, NJ: Prentice-Hall.

Dansereau, F., Chandrasekaran, G., Dumas, M., Coleman, D., Ehrlich, S., & Bagchi, D. (1986). DETECT: Data enquiry that tests entity and correlational/causal theories.Williamsville, NY: Institute For Theory Testing.

Dansereau, F., & Yammarino, F. J. (2000). Within and between analysis: The varient paradigm as an underlying approach to theory building. In K. J. Klein & S.W. J. Kozlowski (Eds.), Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions (pp. 425-466). San Francisco: Jossey-Bass.

Yammarino, F. J. (1998). Multivariate aspects of the varient /WABA approach. Leadership Quarterly, 9, 203-227.

Yammarino, F. J., & Markham, S. (1992). On the application of within and between analysis: Are absence and affect really group based. Journal of Applied Psychology, 77, 168-176.

Examples

```
waba(data_Detect_Set_A)

waba(data_Bliese)

waba ( cbind( data_jsp$school, data_jsp$english, data_jsp$maths, data_jsp$ravens ))
```

---

wabamodreg	*WABA - Moderated Regression Analysis*

Description

This WABA function focuses on the interaction between two variables in the prediction of a third. It is a WABA extension of regular moderated multiple regression.

Usage

```
wabamodreg(data)
```

Arguments

data   An all-numeric dataframe where the rows are cases & the columns are the variables.

The first value in each row (i.e., the first column of values in the data file) must be the individuals' group number/code, which must be an integer. The function sorts individuals into groups on the basis of these numbers/codes. Variable scores appear in subsequent columns.

The second value in each row (i.e., the second column of values in the data file) are treated by the function as the Dependent/Outcome variable.

The third value in each row (i.e., the third column of values in the data file) are treated by the function as the Independent/Predictor variable.

The fourth value in each row (i.e., the fourth column of values in the data file) are treated by the function as the Moderator variable (technically also an IDV/predictor).

There is no need to enter product term variables or to enter composite variable scores. The function takes care of these aspects of the analyses internally.

Details

In WABA analyses it is possibile to examine interactions between variables (categorical or continuous) in the prediction of a designated dependent or outcome variable. The analytic technique, described by Schriesheim (1995), is a direct extension of familiar moderated multiple regression analysis to the WABA analyses described above. Hierarchical regression analyses are conducted, focusing on whether the product term for two variables (which carries the interaction) accounts for significant variance in the outcome variable beyond the variation that is accounted for by the two predictor variables (main effects). A significant increase in variance accounted for by the product term indicates a significant interaction. These hierarchical analyses are conducted using both the within-groups and the between-groups WABA correlations. The wabamodreg function provides all of the statistics reported by Schriesheim for his illustrative example.

Produces multiple WABA statistics.

Author(s)

Brian P. O'Connor

References

Schriesheim, C. (1995). Multivariate and moderated within-and between-entity analysis (WABA) using hierarchical linear multiple regression. Leadership Quarterly, 6, 1-18.

Schriesheim, C. A., Cogliser, C. C., & Neider, L. L. (1995). Is it "trustworthy"? a multiple levels-of-analysis reexamination of an ohio state leadership study, with implications for future research. Leadership Quarterly, 6, 111-145.

Schriesheim C., Neider L.L., Scadura T. (1998), Delegation and leader-member exchange: main effects, moderators, and measurement issues. Academy of Management Journal, 41(3), 298-318.

Examples

```
wabamodreg(data_Detect_Set_A)

wabamodreg ( cbind( data_jsp$school, data_jsp$english, data_jsp$maths, data_jsp$ravens ))
```

---

wabamra	*WABA - Multiple Relationship Analysis*

Description

Conducts WABA - Multiple Relationship Analyses, as described by Dansereau et al. (1984) and Yammarino (1984).

Usage

```
wabamra(data)
```

Arguments

data   An all-numeric dataframe where the rows are cases & the columns are the variables.

Cases with missing values are not permitted in the data file.

This function conducts separate WABA analyses for each value of a specified "Condition" variable. The function then conducts Multiple Relationship Analysis comparisons of the WABA coefficients for the different Condition values.

The first value in each row (i.e., the first column of values in the data file) must be the Condition number. Condition numbers must be integers. The lowest Condition number cannot be less than one. It is also best for there to be no missing values between the lowest and highest Condition numbers e.g., if the lowest value is 1 and the highest value is 5, then there should also be Condition values of 2, 3, and 4 somewhere in the data file. Gaps in the integers may cause problems.

The second value in each row (i.e., the second column of values in the data file) must be the individual's group number/code. The function sorts individuals into groups on the basis of these numbers/codes.

Variable scores appear in subsequent columns.

Details

Multiple relationship analyses (MRAs) can be conducted on the WABA results for two or more conditions. The focus in this case is on the identification of moderators or contingencies in WABA patterns. A condition is an additional group variable across which WABA patterns may or may not be consistent. For example, WABA patterns for a given set of variables may vary depending on sex, age group, school type, or neighborhood type. MRA involves pairwise testing for possible differences between WABA correlations for all possible combinations of values of the condition variable of interest. Dansereau et al. (1984) and Yammarino (1998) provided guidelines for interpreting the results from the many MRA contrasts.

Produces multiple WABA MRA statistics.

Author(s)

Brian P. O'Connor

References

Dansereau, F., Alutto, J., & Yammarino, F. (1984). Theory testing in organizational behavior. Englewood Cliffs, NJ: Prentice-Hall.

Yammarino, F. J. (1998). Multivariate aspects of the varient /WABA approach. Leadership Quarterly, 9, 203-227.

Examples

```
wabamra(data_Detect_Set_A_mra)

wabamra ( cbind( data_jsp$sex, data_jsp$school, data_jsp$english, data_jsp$maths, data_jsp$ravens ))
```

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