LISREL Syntax Guide

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Table of Contents

LISREL SYNTAX GUIDE 1

1 OVERVIEW 8

2 RULES 8

2.1 Using imported data 9

2.2 Using raw data 9

3 SYNTAX CONCEPTS 9

4 ORDER OF LISREL COMMANDS 9

4.1 Title 9

4.2 Data System File 10

4.3 Raw or Summary Data 10

4.4 Labels 13

4.5 Summary Data 14

4.6 Asymptotic Covariance /Weight Matrix 18

4.7 Select and Reorder Variables 19

4.8 Model Parameters 20

4.9 Latent Variables 31

4.10 Freeing Model Parameters 33

4.11 Fixing Model Parameters 34

4.12 Assigning values to fixed parameters 35

4.13 Starting Values 36

4.14 Equality Constraints 37

4.15 Constraining Parameters 37

4.16 Interval Restrictions 39

4.17 Pattern Matrix 40
4.18 Matrix Values 41
4.19 Modification Indices 42
4.20 Path Diagram 43
4.21 Plots 43
4.22 Output Requests 44
5 ALPHABETICAL LIST OF COMMANDS AND KEYWORDS 56
5.1 ALL Option 56
5.2 AC Command 56
5.3 AC option 57
5.4 AD Keyword 57
5.5 $ADAPQ(n) Command 57
5.6 AL Keyword 59
5.7 AM Option 59
5.8 AP Keyword 60
5.9 AV Command 60
5.10 BE Keyword 60
5.11 CM, MM, AM, KM, PM and OM Commands 61
5.12 CO Command 63
5.13 $CLUSTER Command 64
5.14 DA Command 64
5.15 DM Command 65
5.16 EC Keyword 65
5.17 EF Option 65
5.18 EP Keyword 66
5.19 EQ Command 66
5.20 ER Command 67

5.21 FA Command 67
5.22 FI Command 67
5.23 FI Option 68
5.24 FO Option 68
5.25 FR Command 69
5.26 FU Option 70
5.27 GA Keyword 70
5.28 GF Keyword 71
5.29 IM Keyword 71
5.30 IR Command 71
5.31 IT Keyword 72
5.32 IX Keyword 72
5.33 KA Keyword 73
5.34 LA Command 73
5.35 LE Command 75
5.36 LK Command 75
5.37 LS Command 76
5.38 LX Keyword 76
5.39 LY Keyword 77
5.40 MA Command 78
5.41 MA Keyword 78
5.42 ME Command 79
5.43 ME Keyword 80
5.44 MI Keyword 81
5.45 MI Option 81
5.46 MI2S option 81
5.47 ML Option 81
5.48 MO Command 81

5.49 MR Option 82

5.50 MU Command 82

5.51 NC Keyword 83

5.52 ND Keyword 83

5.53 NE Keyword 84

5.54 NF Command 84

5.55 NF Keyword 85

5.56 NG Keyword 85

5.57 NI Keyword 85

5.58 NK Keyword 86

5.59 NM Keyword 86

5.60 NO Keyword 86

5.61 NP Keyword 87

5.62 NS Option 87

5.63 NX Keyword 87

5.64 NY Keyword 88

5.65 OU Command 88

5.66 PA Command 89

5.67 PC Command 90

5.68 PC Option 90

5.69 PH Keyword 90

5.70 $PREDICT Command 91

5.71 PS Keyword 91

5.72 PV Keyword 92

5.73 RA Command 92

5.74 RC Keyword 93

5.75 RE Option 93

5.76 RG Command 93

5.77 RM Keyword....94
5.78 RO Option....94
5.79 RO Command....95
5.80 RP Keyword....95
5.81 RS Option....95
5.82 SC Option....96
5.83 SD Command....96
5.84 SE Command....97
5.85 SI Keyword....98
5.86 SL Keyword....98
5.87 SO Option....98
5.88 SS Option....98
5.89 ST Command....99
5.90 SV Keyword....99
5.91 SY Command....100
5.92 SY Option....100
5.93 TD Keyword....100
5.94 TE Keyword....101
5.95 TH Keyword....102
5.96 TI Command....103
5.97 TM Keyword....103
5.98 TV Keyword....103
5.99 TX Keyword....104
5.100 TY Keyword....104
5.101 VA Command....105
5.102 WM Command....106
5.103 XA Option....106
5.104 XM Keyword....106

5.105 XM Option 107

5.106 XO Keyword 107

1 Overview

- A LISREL syntax file is a text file.
- The default extension of a LISREL syntax file is **.Lis**.
- A LISREL syntax file can be generated by using the options on the **Setup** menu of the **LPJ** window.
- The contents of a LISREL syntax file may be prepared manually by the user by using the **Syntax Only** option on the **New** dialog box or by using any text editor such as Notepad or Wordpad.

2 Rules

- LISREL commands, keywords, and options are NOT case-sensitive.
- Maximum line length is 1024 physical columns.
- Commands may be continued over several lines by adding a space followed by a "C" (for Continue) on the current line.
- A keyword and its specified value should appear on the same line: start a keyword on a new line if its specified value would extend past column 1024.
- Commands may be lengthened (LABELS instead of LA, for example).
- Except for the ALL option on the VA and ST commands and the PATH DIAGRAM command, every command has two significant characters.
- Parentheses () must be entered exactly as shown.
- Equal signs ("=") are required for keywords.
- Blank spaces are used to separate subcommand names, keywords, and options.
- An exclamation mark ("!") or the slash-asterisk combination ("/*") may be used to indicate that everything that follows on the line is to be regarded as comments.
- Blank (empty) lines are allowed.
- Command order is important.
- A parameter matrix element should be written as a parameter matrix name (LY, LX, BE, GA, PH, PS, TE, TD, TH, TY, TX, AL, or KA), followed by row and column indexes (or linear indexes) of the specific element.
- Row and column indexes may be separated by a comma and enclosed in parentheses, for example LY(3,2), LX(4,1), or separated from the matrix name and each other by spaces, for example LY 3 2 LX 4 1.
- The order of the form and mode values for the parameter matrices on the MO command is optional, but if both are given, a comma in between is required.

LISREL 11 allows users to use variable names up to 16-characters long. In the sections to follow, the rules for variable naming and examples of use are given.

- Variable names are case sensitive.
- When a blank space is used as part of the name, the entire name should be enclosed in single quotes. For example, the name 'Visual Percept' will work, but Visual Percept (without quotes) will not as LISREL will assume the blank space in the name to be the space between two successive variable names. Likewise, 'Visual Perception' will not work as the name is 17 characters long.
- All variables, observed or latent, can have names up to 16-characters long.
- The use of special characters, such as $, * , + etc. are allowed provided the name is enclosed in quotes. A name such as Visual-Percept will not work due to the inclusion of "-". To use this name, it should be given as 'Visual-Percept'.
- When neither blank spaces or special characters are used as part of a variable name, no quotes are needed. For example, VisualPerception can successfully be used as a variable name.
- Labels can carry over lines, with a maximum of 256 characters per line.

2.1 Using imported data

If data are imported from an external file and variables have names longer than 16 characters, LISREL will truncate the names to 16 characters. Should the first 16 characters of multiple variables in the imported data be the same, LISREL will stop with an error message indicating duplication.

2.2 Using raw data

If raw data or correlation matrices are used, observed variable names should be given as Observed Variables in SIMPLIS and using the LA command in LISREL. Latent variable names can also be read from an external file in the same way as in previous versions. The best way to read names from an external file is to leave a space between variable names.

3 Syntax Concepts

- <filename> denotes the complete name (including folder name) of the file to be used. If the file and the syntax file are in the same folder, then the folder name (path) of the file may be omitted.
- <filelist> denotes a list of file names separated by blank spaces.
- <varname> denotes a character string. The string is not case-sensitive. If the string includes a blank space, then it should be enclosed in single quotes, for example, 'VIS PERC'.
- <varlist> denotes a list of variable names separated by blank spaces.
- <varrange> denotes a list of sequential variable names with the following syntax: <varname1> - <varname2>
- <number> denotes a real number. If the number is an integer, the decimals and the decimal point may be omitted.
- <numlist> denotes a list of numbers separated by blank spaces.

4 Order of LISREL commands

LISREL commands, keywords and options are NOT case-sensitive.

4.1 Title

TI Command

Purpose
To specify a descriptive title for the analysis.

Status
Optional.

Syntax
TI
<lines>
where <lines> denote a line(s) specifying a title for the analysis.

Example
TI
A model for Job Satisfaction and Organizational Commitment

Notes
- Everything before the line that has DA as the first two non-blank characters (indicating the first LISREL command line) will be regarded as title lines.
- Do not start a title line with the letters DA, or the words Labels or Observed Variables.
- Starting each title line with an exclamation mark ("!"), indicating a comment, is recommended to avoid such conflict.

4.2 Data System File

SY Command

Purpose
To specify the Data System File (DSF) to be analyzed.

Status
Optional, unless a DSF is to be analyzed.

Syntax
SY=<filename>

Example
SY=Satisfaction.DSF

Note
The folder name of the DSF may be omitted if the DSF and the LISREL syntax file are in the same folder.

4.3 Raw or Summary Data

DA Command

Purpose
To specify the structure of the data and the type of moment matrix to be analyzed.

Status
Required.

Syntax
DA <keywords>
where <keywords> refers to one or more of the following keywords:

NI, NO, MA, NG, MI, XM, and RP.

A description of these keywords is given next.

NI keyword

Purpose
To specify the number of variables in the data file.

Status
Required.

Syntax
NI=<number>

NO keyword

Purpose
To specify the number of cases or observations in the data file.

Status
Required, unless raw data are read in from an external file.

Syntax
NO=<number>

MA keyword

Purpose
To specify the matrix to be analyzed.

Status
Optional, unless the covariance matrix is not to be analyzed.

Syntax
MA=<matrix>

where <matrix> is one of the following options:

CM	covariance matrix
MM	moment matrix
AM	augmented moment matrix
KM	correlation matrix of Pearson correlations
PM	polychoric correlation matrix
OM	canonical correlation matrix of Optimal scores
TM	Kendall's Tau-c correlation matrix
RM	Spearman rank correlation matrix

Default
MA=CM

NG Keyword

Purpose
To specify the number of groups in multi-group or multi-sample analysis.

Status
Optional, unless a multiple group analysis is desired.

Syntax
NG=<number>

Default
NG=1

MI Keyword

Purpose
To specify the global numerical value that represents all missing values in the data matrix.

Status
Optional, unless the Full Information Maximum Likelihood (FIML) method is desired.

Syntax
MI=<number>

XM keyword

Purpose
To specify the global numerical value that represents all missing values in the data matrix.

Status
Optional, unless the list-wise deletion method is desired.

Syntax
XM=<number>

RP Keyword

Purpose
To specify the number of repetitions.

Status
Optional, unless Monte Carlo or Bootstrap data are to be analyzed.

Syntax
RP=<number>

Default
RP=1

Example
DA NI=9 NO=325 NG=3 MI=-9.0

Note
It should be the first command after optional title lines.

RA Command

Purpose
To specify the raw data to be analyzed.

Status
Optional, unless the raw data to be analyzed is listed in a LSF or a text data file.

Syntax
RA=<filename> <options>

or

RA <options>
<matrix>

where <options> is one or both of

FO
RE

FO Option

Purpose
To specify the Fortran format statement for the raw data in the text data file.

Status
Optional, unless the raw data to be analyzed are in fixed format in a text file.

Syntax
FO
<format>
where <format> denotes a Fortran format statement.

Example
FO
(19F6.3,12I4)

RE Option

Purpose
To specify the rewinding of the file to the first data entry.

Status
Optional.

Syntax
RE

Default
No rewind.
Example
RA=TurnOver.LSF

Note
The folder name of the data file may be omitted if the data file and the LISREL syntax file are in the same folder.

4.4 Labels

LA Command

Purpose
To specify labels for the observed variables.

Status
Optional.

Syntax
LA
<varlist>
or
LA=<filename> <options>

where <options> is one or both of

FO
RE

FO Option

Purpose
To specify the Fortran format statement for the labels in the text file.

Status
Optional, unless the labels are in fixed format in a text file.

Syntax
FO
<format>
where <format> denotes a Fortran format statement.

Example
FO
(16A4)

RE Option

Purpose
To specify the rewinding of the file to the first label.

Status
Optional.

Syntax
RE

Default
No rewind.

Default
LA
VAR1 VAR2 . . . VAR<*n*>
where <n> denotes the number of observed variables specified in the DA command.

Examples
LA
Age Gender Reading Spelling Math Science
LA=variables.txt

4.5 Summary Data

CM, KM, PM, MM, AM and OM Commands

Purpose
To specify the moment matrix to be analyzed.

Status
Optional, unless the summary data is to be analyzed.

Syntax
<command>=<filename> <options>
or
<command> <options>
<matrix>
where <command> denotes one of the following commands:

CM	covariance matrix
MM	moment matrix
AM	augmented moment matrix
KM	correlation matrix
PM	correlation matrix
OM	canonical correlation matrix of optimal scores

<options> is one of or more of the following:

FO, RE, FU, and SY.

FO Option

Purpose
To specify the Fortran format statement for the moment matrix in the text file.

Status
Optional, unless the moment matrix to be analyzed is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(19F6.3,12I4)

RE Option

Purpose
To specify the rewinding of the file to the first moment matrix entry.

Status
Optional.

Syntax
RE

Default
No rewind.

FU Option

Purpose
To specify that the all the rows and columns of the symmetric moment matrix are listed in the text file.

Status
Optional, unless all the rows and columns of the symmetric moment matrix are listed in a text file.

Syntax
FU

Default
Only the non-duplicated elements of the moment matrix are in the text file.

SY Option

Purpose
To specify that only the non-duplicated elements of the symmetric moment matrix are listed in the text file.

Status
Optional.

Syntax
SY

Note
It is the default option.

and <matrix> denotes the moment matrix.

Example
PM=USA.PCM RE

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

ME Command

Purpose
To specify the means of the observed variables.

Status
Optional, unless a mean-and-covariance structure analysis is desired.

Syntax
ME=<filename> <options>
or
ME <options>
<vector>

<vector> denotes the sample mean vector, and <options> is one or both of the following

FO
RE

FO option

Purpose
To specify the Fortran format statement for the sample means in the text file.

Status
Optional, unless the sample means to be analyzed is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(15F9.4)

RE option

Purpose
To specify the rewinding of the file to the first sample mean.

Status
Optional.

Syntax
RE

Default
No rewind.

Example
ME=USA.MEA

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

SD Command

Purpose
To specify the sample standard deviations of the observed variables.

Syntax
SD=<filename> <options>
or
SD <options>
<vector>

<options> is one or both of the following

FO
RE

and <vector> denotes the sample standard deviation vector.

FO Option

Purpose
To specify the Fortran format statement for the sample standard deviations in the text file.

Status
Optional, unless the sample standard deviations to be analyzed is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(15F9.4)

RE Option

Purpose
To specify the rewinding of the file to the first sample standard deviation.

Status
Optional.

Syntax
RE

Default
No rewind.

Status
Optional, unless a covariance matrix is to be computed from a correlation matrix.

Example
SD=USA.STD

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

4.6 Asymptotic Covariance /Weight Matrix

AC Command

Purpose
To specify the binary file that contains the estimated asymptotic covariance matrix of the elements of the moment matrix to be analyzed.

Status
Optional, unless the Robust Maximum Likelihood (RML), the Weighted Least Squares (WLS) or Diagonally Weighted Least Squares (DWLS) method is desired.

Syntax
AC=<filename>

Example
AC=USA.ACM

Note
The folder name of the binary file may be omitted if the binary file and the LISREL syntax file are in the same folder.

DM Command

Purpose
To specify the text file with the user-supplied estimated asymptotic variances of the elements of the moment matrix to be analyzed.

Status
Optional, unless user-specified asymptotic variance estimates are to be used.

Syntax
DM=<filename>

Example
DM=USA.DM

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

WM Command

Purpose
To specify the text file with the user-supplied estimated asymptotic covariance matrix of the elements of the moment matrix to be analyzed.

Status
Optional, unless a user-specified estimated asymptotic covariance matrix is to be used.

Syntax
WM=<filename>

Example
WM=USA.WM

Note
- The selection of variables (with the SE command) is not possible when the WM command is used.
- The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

4.7 Select and Reorder Variables

SE Command

Purpose
To select in any order any number of variables from the input variables.

Status
Optional, unless the input order of the observed variables is not desired.

Syntax
SE
<varlist> /
or
SE
<numlist> /

Examples
SE
4 7 8 13 3 2 9 5 1 /
SE
Psych401 Psych301 Psych201 Psych101 Math401 Math301 Math201 Math101 /

Note
The Y variables (indicators of dependent latent variables and dependent observed variables) are provided first, followed by the X-variables (indicators of independent latent variables or independent observed variables).

4.8 Model Parameters

MO Command

Purpose
To specify the LISREL model to be fitted to the data.

Status
Required.

Syntax
MO <keywords> <option>

where <keywords> is one of the following:

NY, NX, NE, NK, LY, LX, BE, GA, PH, TE, TH, PS, TY, TX, AL, KA, and AP.

<option> is

FI

A description of these keywords and option is given next.

NY Keyword

Purpose
To specify the number of Y variables of the LISREL model.

Status
Optional.

Syntax
NY=<number>

Default
NY=0

Notes
- Y variables are indicators of ETA (dependent latent) variables.
- Y variables are dependent directly observed variables.

NX Keyword

Purpose
To specify the number of X variables of the LISREL model.

Status
Optional.

Syntax
NX=<number>

Default
NX=0

Notes
- X variables are indicators of ETA (dependent latent) variables.
- X variables are dependent directly observed variables.

NE Keyword

Purpose
To specify the number of ETA variables of the LISREL model.

Status
Optional.

Syntax
NE=<number>

Default
NE=0

Notes
ETA variables are dependent latent variables.

NK Keyword

Purpose
To specify the number of KSI variables of the LISREL model.

Status
Optional.

Syntax
NK=<number>

Default
NK=0

Notes
KSI variables are independent latent variables.

LY Keyword

Purpose
To specify the form and mode of the Lambda_Y matrix of the LISREL model.

Status
Optional.

Syntax
LY=<form>,<mode>

where<form> is one of the following:

DI	(diagonal)
FU	(full)
ID	(identity)
IZ	(identity, zero)
ZI	(zero, identity)

and<mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
LY=FU,FI

Notes
- Lambda_Y specifies the linear relationships between the ETA (dependent latent) variables and their indicators (Y variables).
- The last four modes only apply to multi-group analysis.

LX Keyword

Purpose
To specify the form and mode of the Lambda_X matrix of the LISREL model.

Status
Optional.

Syntax
LX=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)

FU	(full)
ID	(identity)
IZ	(identity, zero)
ZI	(zero, identity)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
LX=FU,FI

Notes
- Lambda_X specifies the linear relationships between the KSI (independent latent) variables and their indicators (X variables).
- The last four modes only apply to multi-group analysis.

BE Keyword

Purpose
To specify the form and mode of the Beta matrix of the LISREL model.

Status
Optional.

Syntax
BE = <form>,<mode>

where<form> is one of the following:

FU	(full)
SD	(subdiagonal)
ZE	(zero)

and<mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
BE = ZE,FI

Notes

Beta specifies the linear relationships among the ETA (dependent latent) variables.
The last four modes only apply to multi-group analysis.

GA Keyword

Purpose
To specify the form and mode of the Gamma matrix of the LISREL model.

Status
Optional.

Syntax
GA=<form>,<mode>

where<form> is one of the following:

DI	(diagonal)
ID	(identity)
FU	(full)
IZ	(identity, zero)
ZI	(zero, identity)

and<mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
GA=FU,FR

Notes

- Gamma specifies the linear relationships between the ETA (dependent latent) and the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

PH Keyword

Purpose
To specify the form and mode of the Phi matrix of the LISREL model.

Status
Optional.

Syntax
PH=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
ID	(identity)
SY	(symmetric)
ST	(standardized symmetric)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
PH=SY,FR

Notes
- Phi specifies the variances and covariances of the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

TE Keyword

Purpose
To specify the form and mode of the Theta_Epsilon matrix of the LISREL model.

Status
Optional.

Syntax
TE=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default

TE=DI,FR

Notes

- Theta_Epsilon specifies the variances and covariances of the measurement errors of the indicators (Y variables) of the ETA (dependent latent) variables.
- The last four modes only apply to multi-group analysis.

TD Keyword

Purpose
To specify the form and mode of the Theta_Delta matrix of the LISREL model.

Status
Optional.

Syntax
TD=<form>,<mode>

where<form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and<mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TD=DI,FR

Notes

- Theta_Delta specifies the variances and covariances of the measurement errors of the indicators (X variables) of the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

TH Keyword

Purpose
To specify the form and mode of the Theta_Delta_Epsilon matrix of the LISREL model.

Status
Optional.

Syntax
TH=<form>,<mode>

where<form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and<mode> is one of the following:

FI	(fixed)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TH=ZE,FI

Notes

- Theta_Delta_Epsilon specifies the covariances between the measurement errors of the indicators (Y variables) of the ETA (dependent latent) variables and those of the indicators (X variables) of the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

PS Keyword

Purpose
To specify the form and mode of the Psi matrix of the LISREL model.

Status
Optional.

Syntax
PS=<form>,<mode>

where<form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
PS=DI,FR

Notes
- Psi specifies the variances and covariances of the error terms for the ETA (dependent latent) variables.
- The last four modes only apply to multi-group analysis.

TY Keyword

Purpose
To specify the mode of the Tau-Y matrix.

Status
Optional.

Syntax
TY=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TY=FI

Notes
- Tau_Y specifies the intercepts of the measurement model for the Y variables (indicators) and the ETA (dependent latent) variables.
- Tau_Y is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

TX Keyword

Purpose
To specify the mode of the Tau-X matrix.

Status
Optional.

Syntax
TX=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)

SS	(same starting values)
IN	(invariant)

Default
TX=FI

Notes
- Tau_X specifies the intercepts of the measurement model for the X variables (indicators) and the KSI (independent latent) variables.
- Tau_X is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

AL Keyword

Purpose
To specify the mode of the Alpha matrix.

Status
Optional.

Syntax
AL=<mode>

where<mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
AL=FI

Notes
- Alpha specifies the intercepts of the structural model for the ETA variables (dependent latent) and the KSI (independent latent) variables.
- Alpha is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

KA Keyword

Purpose
To specify the mode of the Kappa matrix.

Status
Optional.

Syntax
KA=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
KA=FI

Notes
- Kappa specifies the means of the KSI (independent latent) variables.
- Kappa is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

AP Keyword

Purpose
To specify the number of additional independent free parameters.

Status
Optional.

Syntax
AP=<number>

where <number> denotes a positive integer greater than zero.

Default
AP=0

Notes
- Every additional parameter is specified with a CO command.
- Additional parameters are used for analysis of general covariance structures.

and <option> is:

FI Option

Purpose
To specify the elements of the Phi matrix to be fixed and equal to the observed variances and covariances of the X variables.

Status
Optional.

Syntax
FI

4.9 Latent Variables

LK Command

Purpose
To specify labels for the KSI (independent latent) variables.

Status
Optional.

Syntax
LK
<varlist>

or

LK=<filename> <options>

<options> is one or both of

FO
RE

FO Option

Purpose
To specify the Fortran format statement for the labels in the text file.

Status
Optional, unless the labels are in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(16A4)

RE Option

Purpose
To specify the rewinding of the file to the first label.

Status
Optional.

Syntax
RE

Default
No rewind.

Default
LK
KSI1 KSI2 . . . KSI<*n*>

where <n> denotes the number of KSI variables specified in the MO command.

Examples
LK
Depress Impuls
LK=latents.txt

Notes
- The significant length for each label is 16 characters.
- The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

LE Command

Purpose
To specify labels for the ETA (dependent latent) variables.

Status
Optional.

Syntax
LE
<varlist>

or

LE=<filename> <options>

<options> is one or both of

FO
RE

FO Option

Purpose
To specify the Fortran format statement for the labels in the text file.

Status
Optional, unless the labels are in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(16A4)

RE Option

Purpose
To specify the rewinding of the file to the first label.

Status
Optional.

Syntax
RE

Default
No rewind.

Default
LE
ETA1 ETA2 . . . ETA<*n*>

where <n> denotes the number of ETA variables specified in the MO command.

Examples
LE
Depress Agress
LE=latents.txt

Notes
- The significant length for each label is 16 characters.
- The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

4.10 Freeing Model Parameters

FR Command

Purpose
To modify the mode of the elements of the parameter matrices of the LISREL model from fixed (FI) to free (FR).

Status
Optional.

Syntax
FR <elementlist>

where <elementlist> denotes a list of elements of the parameter matrices of the LISREL model and each element of <elementlist> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA

PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a “(“ or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a “,“ or a blank space and
<end> is a “)“ or a blank space.

Examples
FR BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
FR BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

4.11 Fixing Model Parameters

FI Command

Purpose
To modify the mode of the elements of the parameter matrices of the LISREL model from free (FR) to fixed (FI).

Status
Optional.

Syntax
FI <elementlist>

where

< elementlist > denotes a list of elements of the parameter matrices of the LISREL model and each element of <elementlist> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where

<matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY

TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a “(“ or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a “,“ or a blank space and
<end> is a “)“ or a blank space.

Examples
FI BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
FI BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

Note
A VA command is needed if the parameter value is fixed to a value other than zero.

4.12 Assigning values to fixed parameters

VA Command

Purpose
To specify the values for the fixed (FI) elements of the parameter matrices of the LISREL model.

Status
Optional.

Syntax
VA <number> <elementlist>

where

<elementlist> denotes a list of elements of the parameter matrices of the LISREL model and each element of <elementlist> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a “(“ or a blank space,
<column number> is a positive integer greater than zero,

<delimiter> is a “,“ or a blank space and
<end> is a “)“ or a blank space.

Examples
VA 1.0 BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
VA 0.0 BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

4.13 Starting Values

ST Command

Purpose
To specify starting values for the elements of the parameter matrices of the LISREL model.

Status
Optional.

Syntax
ST <number> <elementlist>

where

<elementlist> denotes a list of elements of the parameter matrices of the LISREL model and each element of <elementlist> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where

<matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a “(“ or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a “,“ or a blank space and
<end> is a “)“ or a blank space.

Examples
ST 1.0 BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
ST 0.75 BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

4.14 Equality Constraints

EQ Command

Purpose
To specify the parameters of the LISREL model to be equal to each other.

Status
Optional.

Syntax
EQ <elementlist>

where <elementlist> denotes a list of elements of the parameter matrices of the LISREL model and each element of <elementlist> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
EQ BE(1,9) BE(9,1)
FR GA 2 3 GA 2 4 GA 2 5 GA(2,6)

4.15 Constraining Parameters

CO Command

Purpose
To specify a parameter of the LISREL model or an additional parameter to be a function of the other parameters of the LISREL model.

Status
Optional.

Syntax
CO <expression>

where <expression> has the following syntax:

<parameter>=<function>

where <parameter> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where

<matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space,
<end> is a ")" or a blank space and
<function> denotes an expression in terms of the other parameters in which each parameter has the same syntax as <parameter> and are based on the following guidelines:

- An asterisk (*) indicates multiplication.
- A double asterisk (**) or caret (^) indicates exponentiation.
- Exponents need not be integers.
- Parentheses are not permitted (except for matrix elements).
- Division is not permitted although exponents may be negative.

Examples

CO TD(1,1)=1-LX(1,1)**2-LX(1,2)**2
CO LX(1,4)=LX(1,5)-LX(1,6)**4
CO BE(1,2)=-BE(2,1)
CO BE(3,2)=1.5634*GA(1,2)*GA(1,3)*GA(4,2)**1.37
CO LY(3,3)=TE(3,3)**-1
CO LY(1,1)=3.27*BE(1,2)*GA(1,1)*PH(2,2)*1.7*PS(1,1)+TD(1,1)*TE(1,1)**-1

4.16 Interval Restrictions

IR Command

Purpose
To specify an interval restriction for a parameter of the LISREL model.

Status
Optional.

Syntax
IR <expression>

where <expression> has the following syntax:

<parameter> <limits>

where <parameter> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space,
<end> is a ")" or a blank space and
<limits> denotes the lower and/or upper limit specification of the restriction interval.

Examples
IR TD(2,2) > 0
IR GA(2,4) <1
IR PH(2,1) >-1 <1

4.17 Pattern Matrix

PA Command

Purpose
To specify elements of a parameter matrix of the LISREL model as fixed or free by using a pattern of ones and zeros.

Status
Optional.

Format
PA <matrix name>
<matrix>

or

PA =<filename> <options> <matrix name>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<options> is one or both of

FO
RE

FO Option

Purpose
To specify the Fortran format statement for the entries in the text file.

Status
Optional, unless the pattern is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(15F9.4)

RE Option

Purpose
To specify the rewinding of the file to the first entry in the text file.

Status
Optional.

Syntax
RE

Default
No rewind.

and <matrix> denotes the matrix of ones and zeros.

Notes
- A one indicates a free parameter and a zero indicates a fixed parameter
- One PA command may appear for each matrix.
- If the pattern matrix is in free format and the number of elements is less than the number of elements in the referred matrix, the pattern must end with a forward slash (/). The elements after the slash default to zeros.
- The folder name of the data file may be omitted if the text file and the LISREL syntax file are in the same folder.

4.18 Matrix Values

MA Command

Purpose
To specify values for the elements of a parameter matrix of the LISREL model.

Status
Optional.

Format
MA <matrix name>
<matrix>

or

MA =<name> <options> <matrix name>

where <name> denotes the complete name (including folder name) of the text file that contains the matrix of values, and <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD

AP
TH
PS
TY
TX
AL
KA

<options> is one or both of

FO
RE

and <matrix> denotes the matrix of ones and zeros.

Notes

- One MA command may appear for each matrix.
- The folder name of the data file may be omitted if the text file and the LISREL syntax file are in the same folder.

4.19 Modification Indices

NF Command

Purpose
To specify the elements of the parameter matrices of the LISREL model for which modification indices are not desired.

Status
Optional.

Syntax
NF <elementlist>

where <elementlist> denotes a list of elements of the parameter matrices of the LISREL model and each element of <elementlist> has the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA
<row number> is a positive integer greater than zero,

<start> is a “(“ or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a “,“ or a blank space and
<end> is a “)“ or a blank space.

Examples
NF BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
NF BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

4.20 Path Diagram

PD Command

Purpose
To specify the creation of a PTH (path diagram) file.

Status
Optional.

Syntax
PD

4.21 Plots

PL Command

Purpose
To specify a plot for the fit function against any parameter.

Status
Optional.

Syntax
PL <elementlist> FROM <lower> <upper>

where <elementlist> denotes a list a parameters each with the following syntax:

<matrix name><start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY

TX
AL
KA
<row number> is a positive integer greater than zero,
<start> is a “(“ or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a “,“ or a blank space and
<end> is a “)“ or a blank space

and where <lower> and <upper> denote real numbers.

Examples
PL TD(1,1) TD(2,2) FROM 0.4 to 0.5
PL LX(2,1) LY(3,2) BE(4,3)

Note
If <lower> and <upper> are omitted, the limits of an approximate 95% confidence interval estimate is used.

4.22 Output Requests

OU Command

Purpose
To specify the methods to be used and to specify the results to be produced.

Status
Required.

Syntax
OU <keywords> <options>

where <keywords> is one or more of the following:

ME, ND, NP, MA, SI, LX, LY, BE, GA, PH, TD, TE, PS, TX, TY, KA, AL, PV, SV, TV, XO, IT, IX, IM, EP, AD, TM, RC, and SL.

<options> is one or more of the following:

RS, EF, MI, XM, XA, SS, SC, NS, RO, AM, SO, WP, AC and ALL.

A description of these keywords and options are given next.

ME keyword

Purpose
To specify the method to be used to fit the LISREL model to the data.

Status
Optional, unless a method other than maximum likelihood is desired.

Syntax
ME=<method>

where <method> is one of the following:

IV	(instrumental variables)
TS	(two-stage least squares)
UL	(unweighted least squares)
GL	(generalized least squares)
ML	(maximum likelihood)
WL	(generally weighted least squares)

Default
ME=ML

ND Keyword

Purpose
To specify the number of decimals for the results.

Status
Optional, unless 2 decimals are not desired.

Syntax
ND=<number>

Default
ND=2

NP Keyword

Purpose
To specify the number of decimals for external text files to be produced.

Status
Optional, unless 3 decimals are not desired.

Syntax
NP=<number>

Default
NP=3

MA Keyword

Purpose
To specify the name of the text file for the moment matrix that was analyzed.

Status
Optional.

Syntax
MA=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

SI Keyword

Purpose
To specify the name of the text file for the fitted moment matrix.

Status
Optional.

Syntax
SI=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

LX keyword

Purpose
To specify the name of the text file for the estimated Lambda_X matrix.

Status
Optional.

Syntax
LX=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

LY Keyword

Purpose
To specify the name of the text file for the estimated Lambda_Y matrix.

Status
Optional.

Syntax
LY=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

BE Keyword

Purpose
To specify the name of the text file for the estimated Beta matrix.

Status
Optional.

Syntax
BE=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

GA Keyword

Purpose
To specify the name of the text file for the estimated Gamma matrix.

Status
Optional.

Syntax
GA=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

PH Keyword

Purpose
To specify the name of the text file for the estimated Phi matrix.

Status
Optional.

Syntax
PH=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

TD Keyword

Purpose
To specify the name of the text file for the estimated Theta_Delta matrix.

Status
Optional.

Syntax
TD=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

TE Keyword

Purpose
To specify the name of the text file for the estimated Theta_Epsilon matrix.

Status
Optional.

Syntax
TE=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

TH Keyword

Purpose
To specify the name of the text file for the estimated Theta_Epsilon_Delta matrix.

Status
Optional.

Syntax
TH=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

PS Keyword

Purpose
To specify the name of the text file for the estimated Psi matrix.

Status
Optional.

Syntax
PS=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

TX Keyword

Purpose
To specify the name of the text file for the estimated Tau_X matrix.

Status
Optional.

Syntax
TX=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

TY Keyword

Purpose
To specify the name of the text file for the estimated Tau_Y matrix.

Status
Optional.

Syntax
TY=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

KA Keyword

Purpose
To specify the name of the text file for the estimated Kappa matrix.

Status
Optional.

Syntax
KA=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

AL Keyword

Purpose
To specify the name of the text file for the estimated Alpha matrix.

Status
Optional.

Syntax
AL=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

PV Keyword

Purpose
To specify the name of the text file for the estimated parameters.

Status
Optional.

Syntax
PV=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

SV Keyword

Purpose
To specify the name of the text file for the standard error estimates.

Status
Optional.

Syntax
SV=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

TV Keyword

Purpose
To specify the name of the text file for the t-values of the parameters.

Status
Optional.

Syntax
TV=<filename>

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

XO Keyword

Purpose
To specify the number of repetitions for which results should be written to the output file.

Status
Optional.

Syntax
RP=<number>

Default
XO=number of repetitions

IT Keyword

Purpose
To specify the maximum number of iterations for the iterative algorithm.

Status
Optional.

Syntax
IT=<number>

Default
IT=five times the number of free parameters

IX Keyword

Purpose
To specify the integer starting value for the random number generator. The starting value is used to generate a sequence of random seeds for the subsequent multiple MCMC imputations. Used together with the MI keyword.

Status
Optional. Required for invoking the MCMC imputation routine.

Syntax
IX=<number>

Default
IX= 123456

IM Keyword

Purpose
To specify the number of multiple MCMC imputations. Used together with the IX keyword.

Status
Optional. Required for invoking the MCMC imputation routine.

Syntax
IM=<number>

Default
IM= 10

EP Keyword

Purpose
To specify the convergence criterion for the iterative algorithm.

Status
Optional.

Syntax
EP=<number>

Default
EP=0.000001

AD Keyword

Purpose
To specify the iteration number at which the admissibility of the solution will be checked, and the iterations will stop if the check fails.

Status
Optional.

Syntax
AD=<n> where n denotes a positive integer.

Default
AD=OFF

TM Keyword

Purpose
To specify the maximum number of CPU seconds allowed for the current analysis.

Status
Optional.

Syntax
TM=<number>

Default
TM=172800

RC Keyword

Purpose
To specify the ridge constant to be used if the matrix to be analyzed is not positive definite.

Status
Optional, unless a ridge constant is to be used.

Syntax
RC=<number>

Default
RC=0.001

Note
This constant will be multiplied repeatedly by 10 until the matrix becomes positive-definite.

SL Keyword

Purpose
To specify the significance level of the model automated modification procedure expressed as a percentage.

Status
Optional, unless the automated modification procedure is desired.

Syntax
SL=<number>

Default
SL=1

and <options> is one or more of the following:

RS Option

Purpose
To invoke the printing of the residuals, standardized residuals, QQ-plot, and fitted covariance (or correlation, or moment) matrix in the output file.

Status
Optional.

Syntax
RS

AC Option

Purpose
To request the computation of the Satorra-Bentler adjusted Chi-square and the Chi-square scaled and shifted test statistic values for LISREL models with more than 500 degrees of freedom.

Status
Optional, unless the Satorra-Bentler adjusted Chi-square and the Chi-square scaled and shifted test statistic values for a LISREL model with more than 500 degrees of freedom is desired.

Syntax
AC

EF Option

Purpose
To invoke the printing of the estimated total and indirect effects in the output file.
Status
Optional.

Syntax
EF

MI Option

Purpose
To invoke the printing of the model modification indices in the output file.

Status
Optional.

Syntax
MI

MI2S Option

Purpose
To specify the two-stage multiple imputation structural equation modeling method for ordinal variables.

Status
Optional, unless the two-stage multiple imputation structural equation modeling method for ordinal variables is desired.

Syntax
MI2S

XM Option

Purpose
To suppress the computation and printing of the modification indices.

Status
Optional.

Syntax
XM

Note
When a path diagram is requested, only the printing of modification indices is suppressed.

XA Option

Purpose
To suppress the computation and printing of the additional Chi-square test statistic values.

Status
Optional.

Syntax
XA

Notes

Only C1 (Minimum Fit Function Chi-Square value) will be computed.
Standard error estimates are not affected.
C1 is still an asymptotically correct chi-square for the GLS, ML, and WLS methods but not for ULS and DWLS methods.
It is only intended for those who have very large models and cannot afford (or do not want) to let the computer run for an hour or so.

SS Option

Purpose
To invoke the printing of the standardized solution in the output file.

Status
Optional.

Syntax
SS

SC Option

Purpose
To invoke the printing of the completely standardized solution in the output file.

Status
Optional.

Syntax
SC

NS Option

Purpose
To suppress the computation of internal starting values.

Status
Optional.

Syntax
NS

Note
The user must supply starting values with ST or VA commands.

RO Option

Purpose
To invoke the use of the ridge constant for the moment matrix to be analyzed.

Status
Optional.

Syntax
RO

Note
The RO option will be invoked automatically if the matrix is not positive definite.

AM Option

Purpose
To invoke the automatic model modification procedure.

Status
Optional.

Syntax
AM

Notes
- If this option is present, the program will modify the model sequentially by freeing at each step the fixed or constrained parameter that has the largest modification index.
- It will continue the modification for as long as any index is statistically significant at the alpha level of the SL keyword.
- Use the NF command to prevent specific parameters from being modified.

SO Option

Purpose
To suppress the automated checking of the scale setting for each latent variable.

Status
Optional.

Syntax
SO

Note
The SO option is needed for very special models where scales for latent variables are defined in a different way.

WP Option

Purpose
To specify a column width of 132 for the output file.

Status
Optional.

Syntax
WP

ALL Option

Purpose
To invoke the printing of all the results in the output file.

Status
Optional.

Syntax
ALL

5 Alphabetical list of commands and keywords

5.1 ALL Option

Purpose
To invoke the printing of all the results in the output file.

Status
Optional.

Syntax
Output All

5.2 AC Command

Purpose
To specify the binary file that contains the estimated asymptotic covariance matrix of the elements of the moment matrix to be analyzed.

Status
Optional, unless the Robust Maximum Likelihood (RML), the Weighted Least Squares (WLS) or Diagonally Weighted Least Squares (DWLS) method is desired.

Syntax
AC=<filename>

where <name> denotes the complete name (including folder name) of the binary file that contains the estimated asymptotic covariance matrix of the elements of the moment matrix.

Example
AC=USA.ACM

Note
The folder name of the binary file may be omitted if the binary file and the LISREL syntax file are in the same folder.

5.3 AC option

Purpose
To request the computation of the Satorra-Bentler adjusted Chi-square and the Chi-square scaled and shifted test statistic values for LISREL models with more than 500 degrees of freedom.

Status
Optional, unless the Satorra-Bentler adjusted Chi-square and the Chi-square scaled and shifted test statistic values for a LISREL model with more than 500 degrees of freedom is desired.

Syntax
AC

5.4 AD Keyword

Purpose
To specify the iteration number at which the admissibility of the solution will be checked and the iterations will stop if the check fails.

Status
Optional.

Syntax
AD=<number>

where <number> denotes a positive integer.

Default
AD=20

Note
This check may be turned off with the specification AD=OFF.

5.5 $ADAPQ(n) Command

Purpose
The $ADAPQ(n) command is used to specify the Adaptive Quadrature method of estimation for a mixture of ordinal and continuous variables.

Syntax
$ADAPQ(Npts) <options>

where <options> are one or more of the following:

LINKTYPE
EQTH
GR(Niter)

Npts = user-supplied number of quadrature points. Typically one would assign this according to the following guidelines:

- One latent factor; Npts = 8 or more

- Two and three latent factors; Npts varies from 5 to 10
- Four and five latent factors; Npts varies from 4 to 6
- Six to ten (maximum) latent factors; Npts varies from 3 to 4

LINKTYPE is one of the following link functions
LOGIT
PROBIT
LOGLOG
CLL (Complimentary log-log)

EQTH is an optional keyword; the default is thresholds are not equal. Note that the inclusion of this keyword has a different effect on a single group versus a multiple group analysis

- **Single group**: Corresponding thresholds of each ordinal variable are set equal. This implies that in this case, each ordinal variable should have the same number of categories. The number of threshold-values for an ordinal variable equals the (number of categories minus one) for that variable. For example, for 11 ordinal variables each with 7 categories, the 11 ordinal variables each has the same 6 thresholds-values.
- **Multiple groups**: Thresholds for each ordinal variable are set equal across groups. For example, for 6 ordinal variables each with 4 categories, each group has 18 thresholds, constrained to be equal across all groups.

GR(Niter) is an optional keyword, the default is Niter=2. This option is used to obtain an empirical Hessian matrix based on the sum of the gradient*gradient-transpose contributions. In cases where convergence is slow, it is advisable to use Niter-values varying from 3 to 10. When fitting a new model, it is a good strategy to add this keyword with a value of 5 to check first if convergence is attained.

The $ADAPQ(n) command line is typically inserted in the syntax file following the Raw Data from file (SIMPLIS) or DA (LISREL) lines.

Examples

```
Raw Data from file 'PANMOD1.LSF'
$ADAPQ(6) PROBIT GR(5)
Latent Variables KSI1 KSI2
Relationships
Etc...

DA NI=9 NO=0 NG=2 MI=-999999.0
RA=MathBook1_US.LSF
$ADAPQ(5) LOGIT GR(8)
SE
1 2 3 4 5 6 7 8 9/
MO NX=9 NK=3 LX=FU,FI PH=SY,FR TD=DI,FR KA=FR
LK
CUBE APPLE GROW
Etc...

DA NI=6 NO=0 NG=2 MI=-999999.0
RA=efficacy_grp1.LSF
$ADAPQ(8) LOGIT EQTH GR(5)
SE
1 2 3 4 5 6/
MO NX=6 NK=2 LX=FU,FI PH=SY,FR TD=DI,FR KA=FR
LK
Fac1 Fac2
```

Mixture of ordinal and continuous variables:

See, for example, the syntax files **OR11CO10_1.spl**, **OR11CO10_1.spl**, **OR16CO5_1.spl** and **OR16CO5_2.spl**. Note that the ORFIML module uses the data definitions extracted from the LSF file definitions.

To illustrate, open the file **Ord11Cont10.LSF** and use the **Statistics**, **Data Screening** option to inspect the variable definitions.

If the variables are all defined as ordinal, the default, use the **Data, Define variables, Variable Type** option to change the variable type of those variables that are in fact continuous.

5.6 AL Keyword

Purpose
To specify the mode of the Alpha matrix.

Status
Optional.

Syntax
AL=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
AL=FI

Notes
- Alpha specifies the intercepts of the structural model for the ETA variables (dependent latent) and the KSI (independent latent) variables.
- Alpha is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

5.7 AM Option

Purpose
To invoke the automatic model modification procedure.

Status
Optional.

Syntax
Output AM

Notes

If this option is present, the program will modify the model sequentially by freeing at each step the fixed or constrained parameter that has the largest modification index.
It will continue the modification for as long as any index is statistically significant at the alpha level of the SL keyword.
Use the NF command to prevent specific parameters from being modified.

5.8 AP Keyword

Purpose
To specify the number of additional independent free parameters.

Status
Optional.

Syntax
AP=<number>

where <number> denotes a positive integer greater than zero.

Default
AP=0

Notes

- Every additional parameter is specified with a CO command.
- Additional parameters are used for analysis of general covariance structures.

5.9 AV Command

Purpose
To specify the binary file that contains the estimated asymptotic variances of the elements of the moment matrix to be analyzed.

Status
Optional, unless the Diagonally Weighted Least Squares (DWLS) method is desired.

Syntax
VA=<filename>

where <name> denotes the complete name (including folder name) of the binary file that contains the estimated asymptotic variances of the elements of the moment matrix.

Example
AV=USA.AV

Note
The folder name of the binary file may be omitted if the binary file and the LISREL syntax file are in the same folder.

5.10 BE Keyword

Purpose
To specify the form and mode of the Beta matrix of the LISREL model.

Status
Optional.

Syntax
BE=<form>,<mode>

where <form> is one of the following:

FFU	(full)
SD	(subdiagonal)
ZE	(zero)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
BE=ZE,FI

Notes
Beta specifies the linear relationships among the ETA (dependent latent) variables.
The last four modes only apply to multi-group analysis.

5.11 CM, MM, AM, KM, PM and OM Commands

Purpose
To specify the moment matrix to be analyzed.

Status
Optional, unless the summary data is to be analyzed.

Syntax
<command>=<name> <options>

or

<command> <options>
<matrix>

where <command> denotes one of the following commands:

CM	(covariance matrix)
MM	(moment matrix)
AM	(augmented moment matrix)
KM	(correlation matrix of Pearson correlations)
PM	(polychoric correlation matrix)

OM (canonical correlation matrix of Optimal scores)

<name> denotes the complete name (including folder name) of the LSF or text data file that contains the raw data, <options> is one of the following

FO
RE
FU

and <matrix> denotes the moment matrix.

Example
PM=USA.PCM RE

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

FO Option

Purpose
To specify the Fortran format statement for the moment matrix in the text file.

Status
Optional, unless the moment matrix to be analyzed is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(19F6.3,12I4)

RE Option

Purpose
To specify the rewinding of the file to the first moment matrix entry.

Status
Optional.

Syntax
RE

Default
No rewind.

5.12 CO Command

Purpose
To specify a parameter of the LISREL model or an additional parameter to be a function of the other parameters of the LISREL model.

Status
Optional.

Syntax
CO <expression>

where <expression> has the following syntax:

<parameter>=<function>

where <parameter> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space,
<end> is a ")" or a blank space and
<function> denotes an expression in terms of the other parameters in which each parameter has the same syntax as <parameter> and are based on the following guidelines:

- An asterisk (*) indicates multiplication.
- A double asterisk (**) or caret (^) indicates exponentiation.
- Exponents need not be integers.
- Parentheses are not permitted (except for matrix elements).
- Division is not permitted although exponents may be negative.

Examples
CO TD(1,1)=1-LX(1,1)**2-LX(1,2)**2
CO LX(1,4)=LX(1,5)-LX(1,6)**4
CO BE(1,2)=-BE(2,1)

```
CO BE(3,2)=1.5634*GA(1,2)*GA(1,3)*GA(4,2)**1.37
CO LY(3,3)=TE(3,3)**-1
CO LY(1,1)=3.27*BE(1,2)*GA(1,1)*PH(2,2)*1.7*PS(1,1)+TD(1,1)*TE(1,1)**-1
```

5.13 $CLUSTER Command

Purpose
The $CLUSTER command is used to specify the variable that contains the cluster information of nested data for which a multilevel structural equation modeling analysis is desired. It is an **optional** command. For example, in the case of a standard structural equation modeling analysis, the $CLUSTER command is omitted.

Syntax
$CLUSTER <label>

where <label> denotes the label of the cluster variable.

Status
Optional.

Example
Suppose that the primary sampling units of the complex survey are facility types and that the variable FACTYPE is used to indicate the facility type for each observation. Then, the corresponding $CLUSTER command is

```
$CLUSTER FACTYPE
```

5.14 DA Command

Purpose
To specify the structure of the data and the type of moment matrix to be analyzed.

Status
Required.

Syntax
DA <keywords>

where <keywords> refers to one or more of the following keywords.

NI
NO
MA
NG
MI
XM
RP

Example
DA NI=9 NO=325 NG=3 MI=-9.0

Note
It should be the first command after optional title lines.

5.15 DM Command

Purpose
To specify the text file with the user-supplied estimated asymptotic variances of the elements of the moment matrix to be analyzed.

Status
Optional, unless user-specified asymptotic variance estimates are to be used.

Syntax
DM=<name>

where *<name>* denotes the complete name (including folder name) of the text file that contains the estimated asymptotic variances of the elements of the moment
matrix.

Example
DM=USA.DM

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.16 EC Keyword

Purpose
To specify the name of the text file for the estimated covariance matrix of the
parameter estimators.

Status
Optional.

Syntax
EC=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.17 EF Option

Purpose
To invoke the printing of the estimated total and indirect effects in the output file.

Status
Optional.

Syntax
Output EF

5.18 EP Keyword

Purpose
To specify the convergence criterion for the iterative algorithm.

Status
Optional.

Syntax
EP=<value>

where <value> denotes a real number.

Default
EP=0.000001

5.19 EQ Command

Purpose
To specify the parameters of the LISREL model to be equal to each other.

Status
Optional.

Syntax
EQ <list>

where <list> denotes a list of elements of the parameter matrices of the LISREL model and each element of <list> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
EQ BE(1,9) BE(9,1)
FR GA 2 3 GA 2 4 GA 2 5 GA(2,6)

5.20 ER Command

Purpose
If used together with the LS <lsf filename> command creates a new file **filename.lsf** containing all the observed variables in the model appended with all the latent variable scores and scores of all error terms, i.e. all errors on the Y-, X-, and Eta-variables, in the model.

Status
Optional.

Syntax
ER

5.21 FA Command

Purpose
To specify an exploratory factor analysis

Status
Optional

Syntax
FA <keyword>
where <keyword> is NF .

Example (\nsfex\npv3.lis)
```
Factor Analysis of Nine Psychological Variables
DA NI=9 NO=145
LA
  'VIS PERC' CUBES LOZENGES 'PAR COMP' 'SEN COMP' WORDMEAN
   ADDITION COUNTDOT 'S-C CAPS'
KM=NPV.KM
FA NF=3
OU
```

Note
The resulting output will give TSLS, unrotated, promax, and varimax solutions.

5.22 FI Command

Purpose
To modify the mode of the elements of the parameter matrices of the LISREL model from free (FR) to fixed (FI).

Status
Optional.

Syntax
FI <list>
where <list> denotes a list of elements of the parameter matrices of the LISREL model and each element of <list> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
FI BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
FI BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

Note
A VA command is needed if the parameter value is fixed to a value other than zero.

5.23 FI Option

Purpose
To specify the elements of the Phi matrix to be fixed and equal to the observed variances and covariances of the X variables.

Status
Optional.

Syntax
FI

5.24 FO Option

Purpose
To specify the Fortran format statement for the labels in the text file.

Status
Optional, unless the labels are in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(16A4)

5.25 FR Command

Purpose
To modify the mode of the elements of the parameter matrices of the LISREL model from fixed (FI) to free (FR).

Status
Optional.

Syntax
FR <list>

where <list> denotes a list of elements of the parameter matrices of the LISREL model and each element of <list> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
FR BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
FR BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

5.26 FU Option

Purpose
To specify that the all the rows and columns of the symmetric moment matrix are listed in the text file.

Status
Optional, unless all the rows and columns of the symmetric moment matrix are listed in a text file.

Syntax
FU

Default
Only the non-duplicated elements of the moment matrix are in the text file.

5.27 GA Keyword

Purpose
To specify the form and mode of the Gamma matrix of the LISREL model.

Status
Optional.

Syntax
GA=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
ID	(identity)
FU	(full)
IZ	(identity, zero)
ZI	(zero, identity)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
GA=FU,FR

Notes
- Gamma specifies the linear relationships between the ETA (dependent latent) and the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

5.28 GF Keyword

Purpose
To specify the name of the text file for the values of the goodness-of-fit statistics of the model.

Status
Optional.

Syntax
GF=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.29 IM Keyword

Purpose
To specify the number of multiple MCMC imputations. Used together with the IX keyword.

Status
Optional. Required for invoking the MCMC imputation routine.

Syntax
IM=<number>

Default
IM= 10

5.30 IR Command

Purpose
To specify an interval restriction for a parameter of the LISREL model.

Status
Optional.

Syntax
IR <expression>

where <expression> has the following syntax:

<parameter> <limits>

where <parameter> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space,
<end> is a ")" or a blank space and
<limits> denotes the lower and/or upper limit specification of the restriction interval.

Examples
IR TD(2,2) > 0
IR GA(2,4) <1
IR PH(2,1) >-1 <1

5.31 IT Keyword

Purpose
To specify the maximum number of iterations for the iterative algorithm.

Status
Optional.

Syntax
IT=<number>

where <number> denotes a positive integer.

Default
IT=five times the number of free parameters

5.32 IX Keyword

Purpose
To specify the integer starting value for the random number generator. The starting value is used to generate a sequence of random seeds for the subsequent multiple MCMC imputations. Used together with the MI keyword.

Status
Optional.

Syntax
IX=<number>

where <number> denotes a positive integer.

Default
***IT=five times the number of free parameters

5.33 KA Keyword

Purpose
To specify the mode of the Kappa matrix.

Status
Optional.

Syntax
KA=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
KA=FI

Notes
- Kappa specifies the means of the KSI (independent latent) variables.
- Kappa is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

5.34 LA Command

Purpose
To specify labels for the observed variables.

Status
Optional.

Syntax
LA
<labels>

or

LA=<name> <options>

where <name> denotes the complete name (including folder name) of the text file that contains the labels in free format and <options> is one or both of

FO
RE

Default
LA
VAR1 VAR2 . . . VAR<*n*>

where <n> denotes the number of observed variables specified in the DA command.

Examples
LA
Age Gender Reading Spelling Math Science
LA=variables.txt

Notes
- Maximum length for each label is 16 characters.
- The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

FO Option

Purpose
To specify the Fortran format statement for the labels in the text file.

Status
Optional, unless the labels are in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(16A4)

RE Option

Purpose
To specify the rewinding of the file to the first label.

Status
Optional.

Syntax
RE

Default
No rewind.

5.35 LE Command

Purpose
To specify labels for the ETA (dependent latent) variables.

Status
Optional.

Syntax
LE
<labels>

or

LE=<name> <options>

where <name> denotes the complete name (including folder name) of the text file that contains the labels in free format and <options> is one or both of

FO
RE

Default
LE
ETA1 ETA2 . . . ETA<*n*>

where <n> denotes the number of ETA variables specified in the MO command.

Examples
LE
Depress Agress
LE=latents.txt

Notes
- Maximum length for each label is 16 characters.
- The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.36 LK Command

Purpose
To specify labels for the KSI (independent latent) variables.

Status
Optional.

Syntax
LK
<labels>

or

LK=<name> <options>

where <name> denotes the complete name (including folder name) of the text file that contains the labels in free format and <options> is one or both of

FO
RE

Default
LK
KSI1 KSI2 . . . KSI<*n*>

where <n> denotes the number of KSI variables specified in the MO command.

Examples
LK
Depress Impuls
LK=latents.txt

Notes
- Maximum length for each label is 16 characters.
- The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.37 LS Command

Purpose
If used together with the LS <lsf filename> command creates a new file **filename.lsf** containing all the observed variables in the model appended with all the latent variable scores.

Status
Optional.

Syntax
LS <lsf filename>

5.38 LX Keyword

Purpose
To specify the form and mode of the Lambda_X matrix of the LISREL model.

Status
Optional.

Syntax
LX=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
FU	(full)
ID	(identity)
IZ	(identity, zero)
ZI	(zero, identity)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
LX=FU,FI

Notes
- Lamda_X specifies the linear relationships between the KSI (independent latent) variables and their indicators (X variables).
- The last four modes only apply to multi-group analysis.

5.39 LY Keyword

Purpose
To specify the form and mode of the Lambda_Y matrix of the LISREL model.

Status
Optional.

Syntax
LY=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
FU	(full)
ID	(identity)
IZ	(identity, zero)
ZI	(zero, identity)

and <*mode*> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
LY=FU,FI

Notes
- Lamda_Y specifies the linear relationships between the ETA (dependent latent) variables and their indicators (Y variables).
- The last four modes only apply to multi-group analysis.

5.40 MA Command

Purpose
To specify values for the elements of a parameter matrix of the LISREL model.

Status
Optional.

Format
MA <matrix name>
<matrix>

or

MA =<name> <options> <matrix name>

where <name> denotes the complete name (including folder name) of the text file that contains the matrix of values,

<matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<options> is one or both of

FO
RE

and <matrix> denotes the matrix of ones and zeros.

Notes
- One MA command may appear for each matrix.
- The folder name of the data file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.41 MA Keyword

Purpose
To specify the matrix to be analyzed.

Status
Optional, unless the covariance matrix is not to be analyzed.

Syntax
MA=<matrix>

where <matrix> is one of the following options:

CM	covariance matrix
MM	moment matrix
AM	augmented moment matrix
KM	correlation matrix
PM	correlation matrix
OM	canonical correlation matrix of Optimal scores
TM	Kendall's Tau-c correlation matrix
RM	Spearman rank correlation matrix

Default
MA=CM

5.42 ME Command

Purpose
To specify the means of the observed variables.

Status
Optional, unless a mean-and-covariance structure analysis is desired.

Syntax
ME=<name> <options>

or

ME <options>
<vector>

<name> denotes the complete name (including folder name) of the text file that contains the sample means of the observed variables, <options> is one of the following

FO
RE

and <vector> denotes the sample mean vector.

Example
ME=USA.MEA

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

FO Option

Purpose
To specify the Fortran format statement for the sample means in the text file.

Status
Optional, unless the sample means to be analyzed is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(15F9.4)

RE Option

Purpose
To specify the rewinding of the file to the first sample mean.

Status
Optional.

Syntax
RE

Default
No rewind.

5.43 ME Keyword

Purpose
To specify the method to be used to fit the LISREL model to the data.

Status
Optional, unless a method other than maximum likelihood is desired.

Syntax
ME=<method>
where <method> is one of the following:

IV	(instrumental variables)
TS	(two-stage least squares)
UL	(unweighted least squares)
GL	(generalized least squares)
ML	(maximum likelihood)
WL	(generally weighted least squares)

Default
ME=ML

5.44 MI Keyword

Purpose
To specify the global numerical value that represents all missing values in the data matrix.

Status
Optional, unless the Full Information Maximum Likelihood (FIML) method is desired.

Syntax
MI=<value>

where <value> denotes a real number.

5.45 MI Option

Purpose
To invoke the printing of the model modification indices in the output file.

Status
Optional.

Syntax
Output MI

5.46 MI2S option

Purpose
To specify the two-stage multiple imputation structural equation modeling method for ordinal variables.

Status
Optional, unless the two-stage multiple imputation structural equation modeling method for ordinal variables is desired.

Syntax
MI2S

5.47 ML Option

Purpose
To specify a maximum likelihood solution.

Status
Optional.

Syntax
OU ML

5.48 MO Command

Purpose
To specify the LISREL model to be fitted to the data.

Status
Required.

Syntax
MO <keywords> <options>

where <keywords> is one of the following:

NY
NX
NE
NK
LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

and <options> is:

FI

5.49 MR Option

Purpose
To specify a MINRES exploratory factor analysis.

Status
Optional, unless a MINRES exploratory factor analysis is desired.

Syntax
MR

5.50 MU Command

Purpose
If the data file contains missing values with a missing value code defined in the **lsf** file or in a Missing Value Code command, LISREL will obtain a complete data set by Multiple Imputation using either the EM or MCMC method. This complete data set will be used to estimate the model. This can be used in combination with Robust Estimation (RO command). Cases with missing values on all variables are deleted.

Status
Optional.

Syntax
MU <keyword>

where <keyword> is one of the following:

EM
MC

Example
Efficacy: Model 2 Estimated by Robust Diagonally Weighted Least Squares
da ni=5
ra=EFFICACY.LSF
se
1 3 4 5 6
mu mc
mo nx=5 nk=2 lx=fr
lk
Efficacy Respons
pa lx
1 0
1 0
1 1
0 1
0 1
ro
pd
ou dwls

5.51 NC Keyword

Purpose
To specify the number of principal components for a principal component analysis.

Status
Optional, unless the number of components is known.

Syntax
NC=<number>

where <number> denotes a positive integer greater than zero.

5.52 ND Keyword

Purpose
To specify the number of decimals for the results

Status
Optional, unless 2 decimals are not desired.

Syntax
ND=<number>

where <number> denotes a positive integer less than 9.

Default
ND=2

5.53 NE Keyword

Purpose
To specify the number of ETA variables of the LISREL model.

Status
Optional.

Syntax
NE=<number>

where <number> denotes a positive integer.

Default
NE=0

Notes
ETA variables are dependent latent variables.

5.54 NF Command

Purpose
To specify the elements of the parameter matrices of the LISREL model for which modification indices are not desired.

Status
Optional.

Syntax
NF <list>
where <list> denotes a list of elements of the parameter matrices of the LISREL model and each element of <list> has the following syntax:
<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH

PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
NF BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
NF BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

5.55 NF Keyword

Purpose
To specify the number of factors for an exploratory factor analysis.

Status
Optional, unless the number of factors is known.

Syntax
NF=<number>

where <number> denotes a positive integer greater than zero.

5.56 NG Keyword

Purpose
To specify the number of groups in multi-group or multi-sample analysis.

Status
Optional, unless a multiple group analysis is desired.

Syntax
NG=<number>

where <number> denotes a positive integer greater than zero.

Default
NG=1

5.57 NI Keyword

Purpose
To specify the number of variables in the data file.

Status
Required.

Syntax
NI=<number>

where <number> denotes a positive integer greater than zero.

5.58 NK Keyword

Purpose
To specify the number of KSI variables of the LISREL model.

Status
Optional.

Syntax
NK=<number>

where <number> denotes a positive integer.

Default
NK=0

Note
KSI variables are independent latent variables.

5.59 NM Keyword

Purpose
To specify the number of multiple MCMC imputations.
Status
Optional.

Syntax
NM = <number>

where <number> denotes a positive integer greater than zero.

Example
NM = 50

Default
NM = 10

5.60 NO Keyword

Purpose
To specify the number of cases or observations in the data file.

Status
Required, unless raw data are read in from an external file.

Syntax
NO=<number>

where <number> denotes a positive integer greater than zero.

5.61 NP Keyword

Purpose
To specify the number of decimals for external text files to be produced.

Status
Optional, unless 3 decimals are not desired.

Syntax
NP=<number>

where <number> denotes a positive integer less than 9.

Default
NP=3

5.62 NS Option

Purpose
To suppress the computation of internal starting values.

Status
Optional.

Syntax
NS

Note
The user must supply starting values with ST or VA commands.

5.63 NX Keyword

Purpose
To specify the number of X variables of the LISREL model.

Status
Optional.

Syntax
NX=<number>

where <number> denotes a positive integer.

Default
NX=0

Notes
- X variables are indicators of ETA (dependent latent) variables.
- X variables are dependent directly observed variables.

5.64 NY Keyword

Purpose
To specify the number of Y variables of the LISREL model.

Status
Optional.

Syntax
NY=<number>

where <number> denotes a positive integer.

Default
NY=0

Notes
- Y variables are indicators of ETA (dependent latent) variables.
- Y variables are dependent directly observed variables.

5.65 OU Command

Purpose
To specify the methods to be used and to specify the results to be produced.

Status
Required.

Syntax
OU <keywords> <options>

where <keywords> is one or more of the following:

ME
ND
NP
LX
LY
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX

AL
KA
PV
SV
TV
IX

<options> is one or more of the following:

RS, EF, MI, XM, XA, SS, SC, MI2S, NM, IX, NS, RO, AM, SO, WP, AC and ALL.

5.66 PA Command

Purpose
To specify elements of a parameter matrix of the LISREL model as fixed or free by using a pattern of ones and zeros.

Status
Optional.

Format
PA <matrix name>
<matrix>

or

PA =<name> <options> <matrix name>

where <name> denotes the complete name (including folder name) of the text file that contains the matrix of ones and zeros, <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<options> is one or both of

FO
RE

and <matrix> denotes the matrix of ones and zeros.

Notes
- A one indicates a free parameter and a zero indicates a fixed parameter

- One PA command may appear for each matrix.
- If the pattern matrix is in free format and the number of elements is less than the number of elements in the referred matrix, the pattern must end with a forward slash (/). The elements after the slash default to zeros.
- The folder name of the data file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.67 PC Command

Purpose
To specify a principal component analysis.

Status
Optional, unless a principal component analysis is desired.

Syntax
PC <keyword>

where <keyword> is NC.

5.68 PC Option

Purpose
To invoke the printing of both the estimated asymptotic covariance correlation matrices of the parameter estimators in the output file.

Status
Optional.

Syntax
PC

5.69 PH Keyword

Purpose
To specify the form and mode of the Phi matrix of the LISREL model.

Status
Optional.

Syntax
PH=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
ID	(identity)
SY	(symmetric)
ST	(standardized symmetric)

and <mode> is one of the following:

FI	(fixed)

FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
PH=SY,FR

Notes
- Phi specifies the variances and covariances of the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

5.70 $PREDICT Command

Purpose
The $PREDICT command is used to specify the explanatory variables for the fixed part of a multilevel structural equation model. It is an **optional** command. For example, in the case of a standard structural equation modeling analysis, the $PREDICT command is omitted.

Syntax
$PREDICT <labels>

where <labels> denotes the labels of the explanatory variables.

Status
Optional.

Example
Suppose that the age (AGE) and gender (GENDER) of each respondent are to be used as predictors for the fixed part of a multilevel structural equation model. For this example, the corresponding $PREDICT command is

```
$PREDICT = AGE GENDER
```

5.71 PS Keyword

Purpose
To specify the form and mode of the Psi matrix of the LISREL model.

Status
Optional.

Syntax
PS=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
PS=DI,FR

Notes
- Psi specifies the variances and covariances of the error terms for the ETA (dependent latent) variables.
- The last four modes only apply to multi-group analysis.

5.72 PV Keyword

Purpose
To specify the name of the text file for the estimated parameters.

Status
Optional.

Syntax
PV=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.73 RA Command

Purpose
To specify the raw data to be analyzed.

Status
Optional, unless the raw data to be analyzed is listed in a SLF or a text data file.

Syntax
RA=<name> <options>

or

RA <options>
<matrix>

where <name> denotes the complete name (including folder name) of the LSF or text data file that contains the raw data, <options> is one or both of

FO
RE

and <matrix> denotes the raw data matrix.

Example
RA=TurnOver.LSF

Note
The folder name of the data file may be omitted if the data file and the LISREL syntax file are in the same folder.

5.74 RC Keyword

Purpose
To specify the ridge constant to be used if the matrix to be analyzed is not positive definite.

Status
Optional, unless a ridge constant is to be used.

Syntax
RC=<value>

where <value> denotes a real number.

Default
RC=0.001

Note
This constant will be multiplied repeatedly by 10 until the matrix becomes positive-definite.

5.75 RE Option

Purpose
To specify the rewinding of the file to the first label.

Status
Optional.

Syntax
RE

Default
No rewind.

5.76 RG Command

Purpose
To specify a univariate or a multivariate multiple linear regression analysis or a two stage least squares regression with instrumental variables.

Status
Optional, unless a regression analysis is desired.

Syntax
RG <*y*> ON <*x*> [WITH <*z*>]

where

<y> denotes the list of labels for the dependent variables,
<x> denotes the list of labels for the independent variables and
<z> denotes the list of labels for the instrumental variables.

Examples
RG Y1 ON Y2 X1 WITH X1 X2 X3
RG Y1 ON Y2 X2 X3 WITH X1 X2 X3
RG 2 ON 1 4 7 with 3 5 6 8 9
RG 3 on 1 4 7 with 2 5 6 8 9

5.77 RM Keyword

Purpose
To specify the name of the text file for the estimated regression matrix of the latent variables on the observed variables.

Status
Optional.

Syntax
RM=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.78 RO Option

Purpose
To invoke the use of the ridge constant for the moment matrix to be analyzed.

Status
Optional.

Syntax
RO

Note
The RO option will be invoked automatically if the matrix is not positive definite.

5.79 RO Command

Purpose
This causes LISREL to estimate an asymptotic covariance matrix of the matrix analyzed and use this to obtain robust estimates of standard errors and chi-squares. If not present, LISREL will use an asymptotic covariance matrix estimated under the assumption that the variables have a multivariate normal distribution.

Status
Optional.

Syntax
RO

Example
```
!Estimation of the NPV Model
!by Robust Diagonally Weighted Least Squares
!Using Correlations
DA NI=9 MA=KM
RA=NPV.LSF
MO NX=9 NK=3
LK
Visual Verbal Speed
FR LX(1,1) LX(2,1) LX(3,1)
FR LX(4,2) LX(5,2) LX(6,2)
FR LX(7,3) LX(8,3) LX(9,3)
RO
PD
OU DWLS
```

5.80 RP Keyword

Purpose
To specify the number of repetitions.

Status
Optional, unless Monte Carlo or Bootstrap data are to be analyzed.

Syntax
RP=<number>

where <number> denotes a positive integer greater than zero.

Default
RP=1

5.81 RS Option

Purpose
To invoke the printing of the residuals, standardized residuals, QQ-plot, and fitted covariance (or correlation, or moment) matrix in the output file.

Status
Optional.

Syntax
RS

5.82 SC Option

Purpose
To invoke the printing of the completely standardized solution in the output file.

Status
Optional.

Syntax
OU SC

5.83 SD Command

Purpose
To specify the sample standard deviations of the observed variables.

Syntax
SD=<name> <options>

or

SD <options>
<vector>

where <name> denotes the complete name (including folder name) of the text file that contains the sample standard deviations of the observed variables, <options> is one of the following:

FO
RE

and <vector> denotes the sample standard deviation vector.

Status
Optional, unless a covariance matrix is to be computed from a correlation matrix.

Example
SD=USA.STD

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

FO Option

Purpose
To specify the Fortran format statement for the sample standard deviations in the text file.

Status
Optional, unless the sample standard deviations to be analyzed is in fixed format in a text file.

Syntax
FO
<format>

where <format> denotes a Fortran format statement.

Example
FO
(15F9.4)

RE Option

Purpose
To specify the rewinding of the file to the first sample standard deviation.

Status
Optional.

Syntax
RE

Default
No rewind.

5.84 SE Command

Purpose
To select in any order any number of variables from the input variables.

Status
Optional, unless the input order of the observed variables is not desired.

Syntax
SE
<list> /

where <list> denotes a sequence of variable numbers or labels.

Examples
SE
4 7 8 13 3 2 9 5 1 /
SE
Psych401 Psych301 Psych201 Psych101 Math401 Math301 Math201 Math101 /

Note
The Y variables (indicators of dependent latent variables and dependent observed variables) are provided first, followed by the X-variables (indicators of independent latent variables or independent observed variables).

5.85 SI Keyword

Purpose
To specify the name of the text file for the fitted moment matrix.

Status
Optional.

Syntax
SI=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.86 SL Keyword

Purpose
To specify the significance level of the model automated modification procedure expressed as a percentage.

Status
Optional, unless the automated modification procedure is desired.

Syntax
SL=<number>

where <number> denotes a positive integer greater than zero.

Default
SL=1

5.87 SO Option

Purpose
To suppress the automated checking of the scale setting for each latent variable.

Status
Optional.

Syntax
OU SO

Note
The SO option is needed for very special models where scales for latent variables are defined in a different way.

5.88 SS Option

Purpose
To invoke the printing of the standardized solution in the output file.

Status
Optional.

Syntax
SS

5.89 ST Command

Purpose
To specify starting values for the elements of the parameter matrices of the LISREL model.

Status
Optional.

Syntax
ST <value> <list>

where <value> denotes a real number, <list> denotes a list of elements of the parameter matrices of the LISREL model and each element of <list> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
ST 1.0 BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
ST 0.75 BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

5.90 SV Keyword

Purpose
To specify the name of the text file for the standard error estimates.

Status
Optional.

Syntax
SV=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.91 SY Command

Purpose
To specify the Data System File (DSF) to be analyzed.

Status
Optional, unless a DSF is to be analyzed.

Syntax
SY=<name>

where <name> denotes the complete name (including folder name) of the DSF.

Example
SY=Satisfaction.DSF

Note
The folder name of the DSF may be omitted if the DSF and the LISREL syntax file are in the same folder.

5.92 SY Option

Purpose
To specify that only the non-duplicated elements of the symmetric moment matrix are listed in the text file.

Status
Optional.

Syntax
SY

Note
It is the default option.

5.93 TD Keyword

Purpose
To specify the form and mode of the Theta_Delta matrix of the LISREL model.

Status
Optional.

Syntax
TD=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TD=DI,FR

Notes
- Theta_Delta specifies the variances and covariances of the measurement errors of the indicators (X variables) of the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

5.94 TE Keyword

Purpose
To specify the form and mode of the Theta_Epsilon matrix of the LISREL model.

Status
Optional.

Syntax
TE=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and <mode> is one of the following:

FI	(fixed)
FR	(free)

PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TE=DI,FR

Notes
- Theta_Epsilon specifies the variances and covariances of the measurement errors of the indicators (Y variables) of the ETA (dependent latent) variables.
- The last four modes only apply to multi-group analysis.

5.95 TH Keyword

Purpose
To specify the form and mode of the Theta_Delta_Epsilon matrix of the LISREL model.

Status
Optional.

Syntax
TH=<form>,<mode>

where <form> is one of the following:

DI	(diagonal)
SY	(symmetric)
ZE	(zero matrix)

and <mode> is one of the following:

FI	(fixed)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TH=ZE,FI

Notes
- Theta_Delta_Epsilon specifies the covariances between the measurement errors of the indicators (Y variables) of the ETA (dependent latent) variables and those of the indicators (X variables) of the KSI (independent latent) variables.
- The last four modes only apply to multi-group analysis.

5.96 TI Command

Purpose
To specify a descriptive title for the analysis.

Status
Optional.

Syntax
TI
<lines>

where <lines> denote a line(s) specifying a title for the analysis.

Example
TI
A model for Job Satisfaction and Organizational Commitment

Notes

Everything before the line that has DA as the first two non-blank characters (indicating the first LISREL command line) will be regarded as title lines.
Do not start a title line with the letters DA, or the words Labels or Observed Variables.
Starting each title line with an exclamation mark (“!”), indicating a comment, is recommended to avoid such conflict.

5.97 TM Keyword

Purpose
To specify the maximum number of CPU seconds allowed for the current analysis.

Status
Optional.

Syntax
TM=<number>

where <number> denotes a positive integer.

Default
TM=172800

5.98 TV Keyword

Purpose
To specify the name of the text file for the t values of the parameters.

Status
Optional.

Syntax
TV=<name>

where <name> denotes the complete name (including folder name) of the text file.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.99 TX Keyword

Purpose
To specify the mode of the Tau-X matrix.

Status
Optional.

Syntax
TX=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)
SS	(same starting values)
IN	(invariant)

Default
TX=FI

Notes
- Tau_X specifies the intercepts of the measurement model for the X variables (indicators) and the KSI (independent latent) variables.
- Tau_X is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

5.100 TY Keyword

Purpose
To specify the mode of the Tau-Y matrix.

Status
Optional.

Syntax
TY=<mode>

where <mode> is one of the following:

FI	(fixed)
FR	(free)
PS	(same pattern and starting values)
SP	(same pattern)

SS (same starting values)
IN (invariant)

Default
TY=FI

Notes
- Tau_Y specifies the intercepts of the measurement model for the Y variables (indicators) and the ETA (dependent latent) variables.
- Tau_Y is only used if a mean-and-covariance structure is desired.
- The last four modes only apply to multi-group analysis.

5.101 VA Command

Purpose
To specify the values for the fixed (FI) elements of the parameter matrices of the LISREL model.

Status
Optional.

Syntax
VA <value> <list>

where <value> denotes a real number,
<list> denotes a list of elements of the parameter matrices of the LISREL model and each element of <list> has the following syntax:

<matrix name> <start> <row number> <delimiter> <column number> <end>

where <matrix name> is one of the following:

LY
LX
BE
GA
PH
TE
TD
AP
TH
PS
TY
TX
AL
KA

<row number> is a positive integer greater than zero,
<start> is a "(" or a blank space,
<column number> is a positive integer greater than zero,
<delimiter> is a "," or a blank space and
<end> is a ")" or a blank space.

Examples
VA 1.0 BE(1,9) GA(3,2) GA(4,3) TD(3,2) TE(4,3) PS(1,2)
VA 0.0 BE 1 9 GA 3 2 GA 4 3 TD 3 2 TE 4,3 PS 1 2

5.102 WM Command

Purpose
To specify the text file with the user-supplied estimated asymptotic covariance matrix of the elements of the moment matrix to be analyzed.

Status
Optional, unless a user-specified estimated asymptotic covariance matrix is to be used.

Syntax
DM=<name>

where <name> denotes the complete name (including folder name) of the text file that contains the estimated asymptotic covariance matrix of the elements of the moment matrix.

Example
WM=USA.WM

Note
The selection of variables (with the SE command) is not possible when the WM command is used.

Note
The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

5.103 XA Option

Purpose
To suppress the computation and printing of the additional Chi-square test statistic values

Status
Optional.

Syntax
XA

Notes
- Only C1 (Minimum Fit Function Chi-Square value) will be computed.
- Standard error estimates are not affected.
- C1 is still an asymptotically correct chi-square for the GLS, ML, and WLS methods but not for ULS and DWLS methods.
- It is only intended for those who have very large models and cannot afford (or do not want) to let the computer run for an hour or so.

5.104 XM Keyword

Purpose
To specify the global numerical value that represents all missing values in the data matrix.

Status
Optional, unless the list-wise deletion method is desired.

Syntax
XM=<value>

where <value> denotes a real number.

5.105 XM Option

Purpose
To suppress the computation and printing of the modification indices.

Status
Optional.

Syntax
XM

Note
When a path diagram is requested, only the printing of modification indices is suppressed.

5.106 XO Keyword

Purpose
To specify the number of repetitions for which results should be written to the output file.

Status
Optional.

Syntax
RP=<number>

where <number> denotes a positive integer.

Default
XO=number of repetitions