

Table of Contents

1 OVERVIEW.....	6
2 RULES.....	6
3 SYNTAX CONCEPTS	7
4 ORDER OF LISREL COMMANDS.....	7
4.1 Title	7
4.2 Data System File.....	8
4.3 Raw or Summary Data	8
4.4 Labels	12
4.5 Summary Data	13
4.6 Asymptotic Covariance /Weight Matrix	18
4.7 Select and Reorder Variables.....	19
4.8 Model Parameters	19
4.9 Latent Variables.....	31
4.10 Freeing Model Parameters	34
4.11 Fixing Model Parameters	35
4.12 Assigning values to fixed parameters	36
4.13 Starting Values	37
4.14 Equality Constraints	38
4.15 Constraining Parameters.....	39
4.16 Interval Restrictions.....	40
4.17 Pattern Matrix.....	41
4.18 Matrix Values	43
4.19 Modification Indices.....	44
4.20 Path Diagram.....	45

4.21	Plots	45
4.22	Output Requests	46
5 ALPHABETICAL LIST OF COMMANDS AND KEYWORDS		58
5.1	ALL Option	58
5.2	AC Command	59
5.3	AD Keyword	59
5.4	\$ADAPQ(n) Command	60
5.5	AM Option	61
5.6	AP Keyword	62
5.7	AV Command	62
5.8	CM, MM, AM, KM, PM and OM Commands	63
5.9	CO Command	64
5.10	\$CLUSTER Command	65
5.11	DA Command	66
5.12	DM Command	66
5.13	EC Keyword	67
5.14	EF Option	67
5.15	EP Keyword	68
5.16	EQ Command	68
5.17	ER Command	69
5.18	FA Command	69
5.19	FI Command	70
5.20	FI Option	71
5.21	FO Option	71
5.22	FR Command	71
5.23	FU Option	72
5.24	GF Keyword	72

5.25	IR Command	73
5.26	IT Keyword.....	74
5.27	LA Command	74
5.28	LE Command	76
5.29	LK Command	76
5.30	LS Command.....	77
5.31	MA Command	77
5.32	MA Keyword	78
5.33	ME Command	79
5.34	ME Keyword	80
5.35	MI Keyword.....	81
5.36	MI Option	81
5.37	ML Option	81
5.38	AL Keyword	81
5.39	BE Keyword.....	82
5.40	GA Keyword.....	83
5.41	KA Keyword	84
5.42	LX Keyword	84
5.43	LY Keyword	85
5.44	PH Keyword	86
5.45	\$PREDICT Command	87
5.46	PS Keyword	87
5.47	TD Keyword	88
5.48	TE Keyword.....	89
5.49	TH Keyword	89
5.50	TX Keyword	90
5.51	TY Keyword	91
5.52	MO Command.....	91

5.53	MR Option	92
5.54	MU Command	92
5.55	NC Keyword	93
5.56	ND Keyword	93
5.57	NE Keyword	94
5.58	NF Command	94
5.59	NF Keyword.....	95
5.60	NG Keyword.....	95
5.61	NI Keyword	96
5.62	NK Keyword.....	96
5.63	NO Keyword.....	96
5.64	NP Keyword.....	97
5.65	NS Option.....	97
5.66	NX Keyword	97
5.67	NY Keyword	98
5.68	OU Command.....	98
5.69	PA Command	99
5.70	PC Command	100
5.71	PC Option	100
5.72	PV Keyword.....	100
5.73	RA Command	101
5.74	RC Keyword	101
5.75	RE Option	102
5.76	RG Command.....	102
5.77	RM Keyword	103
5.78	RO Option.....	103
5.79	RO Command.....	103
5.80	RP Keyword.....	104

5.81	RS Option.....	104
5.82	SC Option.....	105
5.83	SD Command.....	105
5.84	SE Command.....	106
5.85	SI Keyword	107
5.86	SL Keyword	107
5.87	SO Option	107
5.88	SS Option	108
5.89	ST Command.....	108
5.90	SV Keyword.....	109
5.91	SY Command.....	109
5.92	SY Option.....	110
5.93	TI Command	110
5.94	TM Keyword	111
5.95	TV Keyword	111
5.96	VA Command	111
5.97	WM Command	112
5.98	XA Option.....	113
5.99	XM Keyword	113
5.100	XM Option	114
5.101	XO Keyword.....	114

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.
- Only the first 8 characters of variable labels are significant and will be used by the program.
- 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.

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. Only the first 8 characters are significant and will be used by the program. 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 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 **8** 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 **8** 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,
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 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

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=<number>

Default
AD=20

Note
This check may be turned off with the specification 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

EF Option**Purpose**

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

S**tatus**

Optional.

Syntax

EF

MI Option**Purpose**

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

Status

Optional.

Syntax

MI

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 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.

5.4 \$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
```

For further examples, see the \orfimlex and \ls9ex folders.

Mixture of ordinal and continuous variables:

See, for example, the syntax files **OR11CO10_1.spl**, **OR11CO10_2.spl**, **OR16CO5_1.spl** and **OR16CO5_2.spl** in the \Orfimlex folder. Note that the ORFIML module uses the data definitions extracted from the LSF file definitions.

To illustrate, open the file **C:\LISREL9 Examples\ORFIMLEX\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.

5.5 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.

5.6 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.

5.7 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.

5.8 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.

5.9 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

5.10 \$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
```

5.11 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.

5.12 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.

5.13 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.

5.14 EF Option

Purpose

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

Status

Optional.

Syntax

Output EF

5.15 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

5.16 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)
```

5.17 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

Example

See **ba1d.lis** in the \obsresex folder.

5.18 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.

5.19 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.

5.20 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

5.21 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)

5.22 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

5.23 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.

5.24 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.

5.25 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

5.26 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

5.27 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 **8** 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.

5.28 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 **8** 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.

5.29 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 **8** 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.

5.30 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>

Example

See **ba1d.lis** in the \obsresex folder.

5.31 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.

5.32 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

5.33 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.

5.34 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

5.35 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.

5.36 MI Option

Purpose

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

Status

Optional.

Syntax

Output MI

5.37 ML Option

Purpose

To specify a maximum likelihood solution.

Status

Optional.

Syntax

OU ML

5.38 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.

5.39 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.

5.40 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.

5.41 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.

5.42 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.

5.43 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)
	(same pattern and starting values)
PS	(same pattern)
SP	(same starting values)
SS	(invariant)
IN	

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.

5.44 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.

5.45 \$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
```

5.46 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.

5.47 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.

5.48 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.

5.49 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.

5.50 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.

5.51 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.

5.52 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

5.53 MR Option

Purpose

To specify a MINRES exploratory factor analysis.

Status

Optional, unless a MINRES exploratory factor analysis is desired.

Syntax

MR

5.54 MU Command

Purpose

If the data file contains missing values with a missing value code defined in the **Isf** 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

5.55 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.

5.56 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

5.57 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.

5.58 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

5.59 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.

5.60 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

5.61 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.

5.62 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.

5.63 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.

5.64 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

5.65 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.

5.66 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.

5.67 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.

5.68 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

<options> is one or more of the following:

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

5.69 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.

5.70 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.

5.71 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

5.72 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
```

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 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.

5.94 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

5.95 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.

5.96 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

5.97 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.

5.98 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.

5.99 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.

5.100 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.

5.101 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