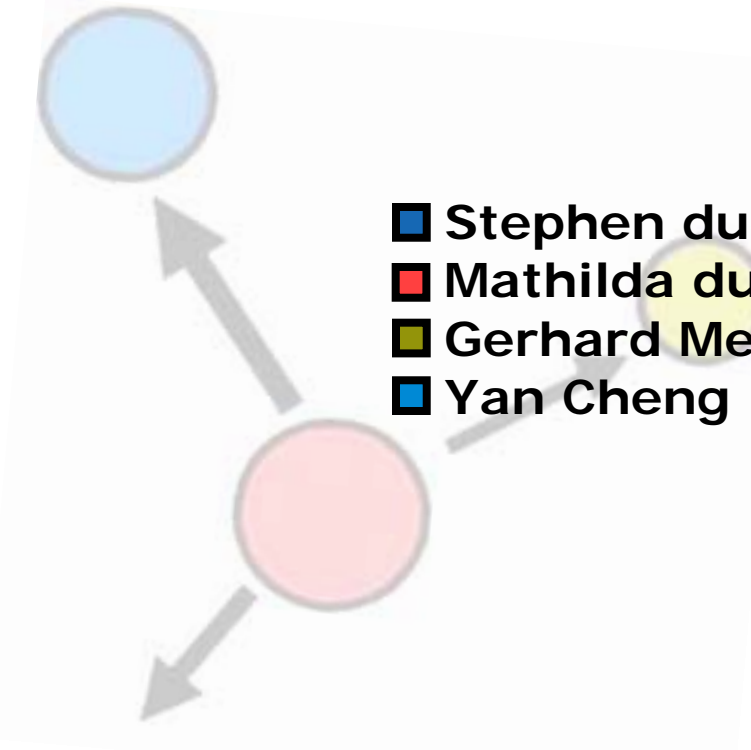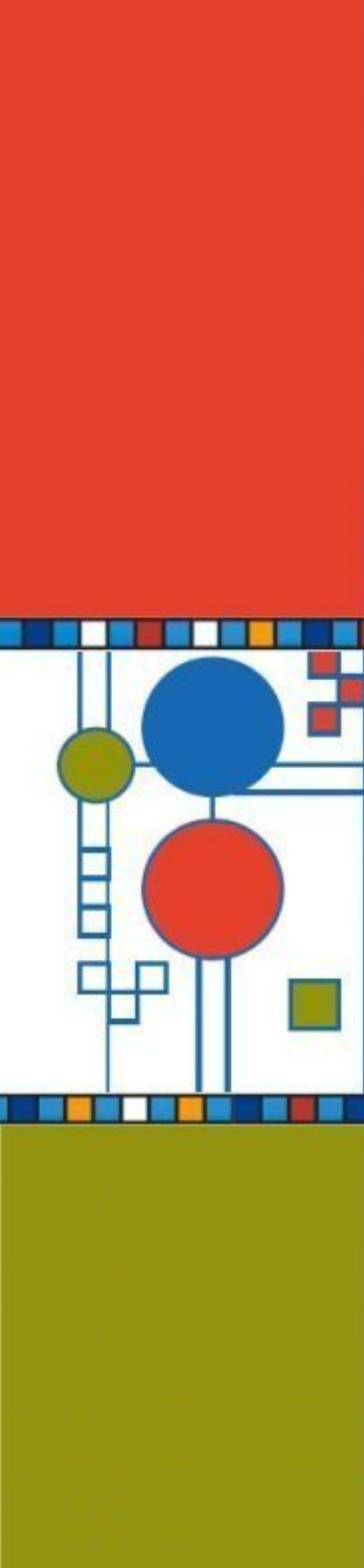Stephen du Toit
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# LISREL for Windows: LISREL Syntax Files

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# LISREL syntax files

## The structure of a LISREL syntax file

The LISREL syntax file, which is generated by the LISREL GUI, can also be created manually by using the LISREL for Windows text editor or any other text editor such as Notepad and WordPad. The general structure of the LISREL syntax file depends on the data to be processed. If the raw data file to be processed is a PSF (PRELIS System File), the LISREL syntax file has the following structure.

```
TI
<string>
DA <dataspecifications>
RA=<filename>.PSF
MO <modelspecifications>
LK
<labels>
LE
<labels>
PD
OU <outputspecifications>
```

where <string> denotes a character string, <filename> denotes the complete name (including the drive and folder names) of the PSF and <labels> denotes a list of one or more names for the latent variables of the model in free format. <dataspecifications> denotes a list of one or more specifications for the data to be processed each of which has the syntax:

```
<keyword> = <selection>
```

where <keyword> is one of CL, MA, MI, NI, NG, NO, RP, ST, WE or WT and <selection> denotes a number, a value or a name.

<modelspecifications> denotes a list of one or more model specifications. These model specifications consist of matrix specifications, variable and parameter specifications and the FI option. Each matrix specification has either the syntax:

```
<keyword> = <form>,<mode>
```

where <keyword> is one of BE, GA, LX, LY, PH, PS, TD, TE or TH, <form> is one of FU for full, ID for identity, IZ for identity, zero, SD for subdiagonal, SY for symmetric, ZE for zero and ZI for zero, identity and <mode> is one of FI for fixed, FR for free, IN for invariant, PS for same pattern and starting values, SP for same pattern and SS for same starting values

or the syntax:

<keyword>=<mode>

where <keyword> is one of AL, KA, TX or TY and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

Each variable and parameter specification has the following syntax:

<keyword> = <number>

where <keyword> is one of AP, NE, NK, NX or NY and <number> denotes a nonnegative integer.

If the data to be analyzed are summarized in a DSF, the structure of the LISREL syntax file is as follows.

TI
<string>
SY=<filename>.DSF
MO <modelspecifications>
LK
<labels>
LE
<labels>
PD
OU <outputspecifications>

where <filename> denotes the complete name (including the drive and folder names) of the DSF.

The LISREL syntax file has the following structure if the data file to be processed is in the form of a text file.

TI
<string>
DA <dataspecifications>
LA

```
<labels>
RA=<filename>
<matrix>=<filename>
AC=<filename>
ME= <filename>
SD=<filename>
MO <modelspecifications>
LK
<labels>
LE
<labels>
PD
OU <outputspecifications>
```

where <filename> denotes the complete name (including the drive and folder names) of a text or binary file and <matrix> denotes one of AM for augmented moment matrix, CM for covariance matrix, KM for Pearson product-moment correlation matrix, OM for canonical correlation matrix of optimal scores, PM for polychoric correlation matrix, RM for Spearman rank correlation matrix or TM for Kendall tau-c correlation matrix.

The three general structures of the LISREL syntax file listed here assume a single-group structural equation model. In the case of a multiple group structural equation model, these structures apply to each group specified in the NG keyword of the DA command.

The SY command is a **required** command only if a DSF is used. If the data to be analyzed do not come from a DSF or PSF, then the DA command and one of the RA, AM, CM, KM, OM, PM, RM or TM commands are required. The MO and OU commands are **required**. The remaining LISREL commands are all optional.

One of the SY or DA commands should be the first command following the TI paragraph. The OU command must be the final command. The other commands and paragraphs can be entered in any order.

In the following sections, the LISREL commands and paragraphs are discussed separately in alphabetical order.

# AC command

The AC command is used to specify the binary file that contains the estimated asymptotic covariance matrix of the elements of the moment matrix to be analyzed. It is an **optional** command.

**Syntax**

AC=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a binary file.

**Example**

AC='G:\Cancer Research Project\USA.ACM'

**Notes**

o The drive and folder names of the binary file may be omitted if the binary file and the LISREL syntax file are in the same folder.
o If the complete file name includes any blank spaces, it should be specified within single quotes.

# AM, CM, KM , MM, OM, PM, RM and TM commands

The purpose of the AM, CM, KM, MM, OM, PM, RM and TM commands is to specify the text file containing the moment matrix to be analyzed. They are **optional** commands.

**Syntax**

<command>=<filename> <options>
<format>

where <command> denotes one of AM for augmented moment matrix, CM for covariance matrix, KM for Pearson product-moment correlation matrix, MM for moment matrix, OM for canonical correlation matrix of optimal scores or PM for polychoric correlation matrix, RM for Spearman rank correlation matrix or TM for Kendall tau-c correlation matrix, <filename> denotes the complete file name (including drive and folder names) of a text file, <options> is one or more of FO for a fixed

format, FU for a full matrix format or SY for a symmetric matrix format and RE for rewind and <format> is an optional Fortran format statement.

### FO option

The FO option is used to indicate that the moment matrix in the text file is in a fixed format.

### FU option

The FU option is used to indicate that the all the rows and columns of the symmetric moment matrix are listed in the text file.

### RE option

There is no rewinding of the text file for each repetition by default. The RE option is used to specify the rewinding of the text file to the first moment matrix entry for each repetition.

### SY option

The purpose of the SY option is to indicate that only the non-duplicated elements of the symmetric moment matrix are listed in the text file.

**Example**

    PM='E:\Cancer Research Project\USA.PCM' RE

**Notes**

- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## AM, CM, KM , MM, OM, PM, RM and TM paragraphs

The purpose of the AM, CM, KM, MM, OM, PM, RM and TM paragraphs is to specify the moment matrix to be analyzed as part of the LISREL syntax file. They are **optional** paragraphs.

**Syntax**

    <paragraph> <options>
    <format>
    <matrix>

where <paragraph> denotes one of AM for augmented moment matrix, CM for covariance matrix, KM for Pearson product-moment correlation matrix, MM for moment matrix, OM for canonical correlation matrix of optimal scores, PM for polychoric correlation matrix, RM for Spearman rank correlation matrix or TM for Kendall tau-c correlation matrix, <options> is one or more of FO for a fixed format and FU for a full matrix format or SY for a symmetric matrix format, <format> is an optional Fortran format statement and <matrix> denotes a symmetric matrix of real numbers.

### FO option

The FO option is used to indicate that the moment matrix is listed in a fixed format in the LISREL syntax file.

### FU option

The FU option is used to indicate that the all the rows and columns of the symmetric moment matrix are listed in the LISREL syntax file.

### SY option

The purpose of the SY option is to indicate that only the non-duplicated elements of the symmetric moment matrix are listed in the LISREL syntax file.

### Example

```
CM
25.0704
12.4363 28.2021
11.7257  9.2281 22.7390
20.7510 11.9732 12.0692 21.8707
```

# CO command

The purpose of the CO command is to specify a parameter of the LISREL model or an additional parameter to be a function of the other parameters of the LISREL model. It is an **optional** command.

### Syntax

CO <expression>

where <expression> has the following syntax:

=<function>

where <parameter> has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space, <end> is a right parenthesis 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:

- o An asterisk (*) indicates multiplication.
- o A forward slash (/) indicates division.
- o A double asterisk (**) or caret (^) indicates exponentiation.
- o Exponents need not be integers.
- o LOG indicates the natural logarithm operator.
- o EXP indicates the exponent operator.

**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
```

# DA command

The DA command is used to specify the structure of the data and the type of moment matrix to be analyzed. It is a **required** command, unless a DSF is used.

**Syntax**

DA <specifications>

where <specifications> is a list of one or more data specifications each of which has the following syntax:

<keyword>=<selection>

where <keyword> refers to one or more of CL, MA, MI, NI, NG, NO, RP, ST, WE and WT and

<selection> denotes a number or a type.

## CL keyword

The CL keyword is used to specify the column number of the clustering variable of the complex survey design.

### Syntax
CL=<number>

where <number> denotes a positive integer.

## MA keyword

The purpose of the MA keyword is to specify the matrix to be analyzed.

### Syntax
MA=<matrix>

where <matrix> denotes one of AM for augmented moment matrix, CM for covariance matrix, KM for Pearson product-moment correlation matrix, MM for moment matrix, OM for canonical correlation matrix of optimal scores, PM for polychoric correlation matrix, RM for Spearman rank correlation matrix or TM for Kendall's Tau-c correlation matrix.

### Default
MA=CM

## MI keyword

The MI keyword is used to specify the numerical value that indicates that a data value is missing.

### Syntax
MI=<value>

where <value> denotes a real number.

## NI keyword

The purpose of the NI keyword is to specify the number of variables in the data to be analyzed. It is a **required** keyword.

### Syntax
NI=<number>

where <number> denotes a nonnegative integer.

## NG keyword

The NG keyword is used to specify the number of groups in multi-group or multi-sample analysis. It is **required** for a multiple group analysis.

where <number> denotes a positive integer.

**Default**
     NG=1

## NO keyword

The purpose of the NO keyword is to specify the number of cases or observations in the data to be analyzed. It is a **required** keyword.

**Syntax**
     NO=<number>

where <number> denotes a nonnegative integer.

## RP keyword

The RP keyword is used to specify the number of repetitions.

**Syntax**
     RP=<number>

where <number> denotes a positive integer.

**Default**
     RP=1

## ST keyword

The ST keyword is used to specify the column number of the stratification variable of the complex survey design.

**Syntax**
     ST=<number>

where <number> denotes a positive integer.

## WE keyword

The purpose of the WE keyword is to specify the column number of the variable containing the weight for each case.

**Syntax**
     WE=<number>

where <number> denotes a positive integer.

## WT keyword

The WT keyword is used to specify the column number of the design weight variable of the

complex survey design.

**Syntax**

   WT=<number>

where <number> denotes a positive integer.

**Example**

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

**Note**

The DA command should be the first command after optional title and comment lines.

# DM command

The DM command is used to specify the text file that contains the user-supplied estimated asymptotic variances of the elements of the moment matrix to be analyzed.

**Syntax**

   DM=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Example**

   DM='G:\Cancer Research Project\USA.DM'

**Notes**

   o   The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
   o   If the complete file name includes any blank spaces, it should be specified within single quotes.

# EQ command

The EQ command is used to specify the parameters of the LISREL model to be equal to each other. It is an **optional** command.

### Syntax

EQ <parameters>

where <parameters> denotes a list of two or more unknown parameters of the LISREL model. Each parameter has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space and <end> is a right parenthesis or a blank space.

### Examples

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

# FA command

The purpose of the FA command is to specify an exploratory factor analysis. It is an **optional** command.

### Syntax

FA <specifications>

where <specifications> refers to the number of factors and one of ML for Maximum Likelihood or MR for MINRES. The number of factors is specified by using the NF keyword.

### NF keyword
The NF keyword is used to specify the number of factors for an exploratory factor analysis.

NF=<number>

where <number> denotes a nonnegative integer.

**Example**

FA NF=3

**Note**

The resulting output includes TSLS, unrotated, promax and varimax solutions.

# FI command

---

The FI command is used to modify the mode of the parameters of the LISREL model from free (FR) to fixed (FI). It is an **optional** command.

**Syntax**

FI <parameters>

where <parameters> denotes a list of one or more unknown parameters of the LISREL model. Each parameter has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row > is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space and <end> is a right parenthesis 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 corresponding VA command is required if the parameter value is fixed to a value other than zero.

# FR command

The purpose of the FR command is to modify the mode of the parameters of the LISREL model from fixed (FI) to free (FR). It is an **optional** command.

### Syntax

FR <parameters>

where <parameters> denotes a list of one or more fixed parameters of the LISREL model. Each parameter has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space and <end> is a right parenthesis 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

# IR command

The IR command is used to specify an interval restriction for a parameter of the LISREL model. It is an **optional** command.

### Syntax

IR <expression>

where <expression> has the following syntax:

<limits>

where <limits> denotes the lower and/or upper limit specification of the restriction interval and <parameter> has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space and <end> is a right parenthesis or a blank space.

**Examples**

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

# LA command

The LA command is used to specify the text file that contains the labels for the observed variables. It is an **optional** command.

### Syntax

LA=<filename> <options>

where <filename> denotes the complete file name (including drive and folder names) of a text file and <options> is one or both of FO for a fixed format and RE for rewind.

**FO option**

The purpose of the FO option is to indicate that the labels in the text file are in a fixed format.

**RE option**

The RE option is used to specify the rewinding of the text file to the first label for each repetition. By default, the file is not rewound for each repetition.

### Example

LA=variables.txt

### Notes

o   The significant length for each label is 8 characters.
o   The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
o   If the LA command or the LA paragraph is not specified, LISREL uses the default labels

VAR1, VAR2, … , VAR<n> where <n> denotes the number of observed variables specified in the NI keyword of the DA command.

o  If the complete file name includes any blank spaces, it should be specified within single quotes.

## LA paragraph

---

The LA paragraph is used to specify labels for the observed variables as part of the LISREL syntax file. It is an **optional** paragraph.

### Syntax

```
LA
<labels>
```

where <labels> denotes a list of one or more variable names in free format.

### Default

```
LA
VAR1 VAR2 . . . VAR<n>
```

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

### Example

```
LA
Age Gender Reading Spelling Math Science
```

### Note

The significant length for each label is 8 characters.

# LE command

The purpose of the LE command is to specify the text file that contains the labels for the ETA (dependent latent) variables. It is an **optional** command.

### Syntax

LE=<filename> <options>

where <filename> denotes the complete file name (including drive and folder names) of a text file and <options> is one or both of FO for a fixed format and RE for rewind.

### FO option

The purpose of the FO option is to indicate that the labels in the text file are in a fixed format.

### RE option

The RE option is used to specify the rewinding of the text file to the first label for each repetition. By default, the file is not rewinded for each repetition.

### Example

LE=latents.txt

### Notes

- o The significant length for each label is 8 characters.
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the LE command or the LE paragraph is not specified, LISREL uses the default labels ETA1, ETA2, ... , ETA<n> where <n> denotes the number of ETA variables specified in the NE keyword of the MO command.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

# LE paragraph

---

The purpose of the LE paragraph is to specify labels for the ETA (dependent latent) variables as part of the LISREL syntax file. It is an **optional** paragraph.

### Syntax

```
LE
<labels>
```

where <labels> denotes a list of one or more variable names in free format.

### Default

```
LE
ETA1 ETA2 . . . ETA<n>
```

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

### Example

```
LE
Depress Agress
```

### Note

The significant length for each label is 8 characters.


# LK command

---

The LK command is used to specify the text file that contains the labels for the KSI (independent latent) variables. It is an **optional** command.

```
LK=<filename> <options>
```

where <filename> denotes the complete file name (including drive and folder names) of a text file and <options> is one or both of FO for a fixed format and RE for rewind.

### FO option

The purpose of the FO option is to indicate that the labels in the text file are in a fixed format.

### RE option

The RE option is used to specify the rewinding of the text file to the first label for each repetition. By default, the file is not rewinded for each repetition.

**Example**

    LK=latents.txt

**Notes**

- o The significant length for each label is 8 characters.
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the LK command or the LK paragraph is not specified, LISREL uses the default labels KSI1, KSI2, … , KSI<n> where <n> denotes the number of KSI variables specified in the NK keyword of the MO command.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## LK paragraph

The LK paragraph is used to specify labels for the KSI (independent latent) variables as part of the LISREL syntax file. It is an **optional** paragraph.

**Syntax**

    LK
    <labels>

where <labels> denotes a list of one or more variable names in free format.

**Default**

    LK
    KSI1 KSI2 . . . KSI<n>

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

**Example**

    LK
    Depress Impuls

**Note**

The significant length for each label is 8 characters.


# MA command

---

The MA command is used to specify the text file that contains the values for the elements of a parameter matrix of the LISREL model. It is an **optional** command.

**Syntax**

    MA =<filename> <options> <matrix>

where <filename> denotes the complete file name (including drive and folder names) of a text file, <options> is one or both of FO for a fixed format and RE for rewind and <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA.

**<u>FO option</u>**
The purpose of the FO option is to indicate that the values in the text file are in a fixed format.

**<u>RE option</u>**
The RE option is used to specify the rewinding of the text file to the first entry for each repetition. By default, the file is not rewinded for each repetition.

**Example**

    MA= 'E:\Cancer Research Project\USA.BE' BE

**Notes**

- o One MA command may appear for each matrix.
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## MA paragraph

The MA paragraph is used to specify the values for the elements of a parameter matrix of the LISREL model as part of the LISREL syntax file. It is an **optional** paragraph.

**Syntax**

    MA <name>
    <matrix>

where <name> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA and <matrix> denotes a fully specified matrix for real numbers.

**Examples**

    MA BE
    0.00 0.00 0.00
    0.24 0.00 1.35
    0.36 0.00 0.00

    MA TE
    0.024 0.019 0.095

**Note**

One MA paragraph may appear for each matrix.

## ME command

The ME command is used to specify the text file that contains the means of the observed variables. It is an **optional** command.

**Syntax**

    ME=<filename> <options>

where <filename> denotes the complete file name (including drive and folder names) of a text file and <options> is one or both of FO for a fixed format and RE for rewind.

### FO option

The purpose of the FO option is to indicate that the values in the text file are in a fixed format.

### RE option

The RE option is used to specify the rewinding of the text file to the first entry for each repetition. By default, the file is not rewinded for each repetition.

**Example**

    ME='G:\Cancer Research Project\USA.MEA'

**Notes**

- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## ME paragraph

The ME paragraph is used to specify the means of the observed variables as part of the LISREL syntax file. It is an **optional** paragraph.

**Syntax**

    ME <option>
    <format>
    <vector>

where <option> is FO for a fixed format, <format> is an optional Fortran format statement and <vector> denotes a vector of real numbers.

### FO option

The purpose of the FO option is to indicate that the values in the LISREL syntax file are in a fixed format.

**Example**

    ME
    95.45    102.99    110.26    117.25    123.41

# MO command

The purpose of the MO command is to specify the forms and modes of the parameter matrices of the LISREL model to be fitted to the data. It is a **required** command.

### Syntax

MO <specifications>

where <specifications> is a list of model specifications. These model specifications consist of matrix specifications, variable and parameter specifications and the FI option. Each matrix specification has either the syntax:

<keyword>=<form>, <mode>

where <keyword> is one of BE, GA, LX, LY, PH, PS, TD, TE or TH, <form> is one of FU for full, ID for identity, IZ for identity, zero, SD for subdiagonal, SY for symmetric, ZE for zero and ZI for zero, identity and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant

or the syntax:

<keyword>=<mode>

where <keyword> is one of AL, KA, TX or TY and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

Each variable and parameter specification has the following syntax:

<keyword>=<number>

where <keyword> is one of AD, NE, NK, NX or NY and <number> denotes a nonnegative integer.

## AL keyword
The AL keyword is used to specify the mode of the Alpha vector for the LISREL model.

### Syntax
AL=<mode>
where <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> AL=FI

**Notes**
- o The Alpha vector refers to the intercepts of the structural model for the ETA (dependent latent) variables.
- o The Alpha vector is only used if a mean-and-covariance structure is desired.
- o The PS, SP, SS and IN modes only apply to multi-group analyses.

## AP keyword

The AP keyword is used to specify the number of additional free parameters.

**Syntax**
> AP=<number>

where <number> denotes a nonnegative integer.

**Default**
> AP=0

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

## BE keyword

The purpose of the BE keyword is to specify the form and mode of the Beta matrix of the LISREL model.

**Syntax**
> BE=<form>,<mode>

where <form> is one of FU for full, SD for subdiagonal or ZE for zero and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> BE=ZE,FI

**Notes**
- o The Beta matrix refers to the regression weights of the linear relationships among the ETA (dependent latent) variables.
- o The PS, SP, SS and IN modes only apply to multi-group analyses.

## GA keyword

The GA keyword is used to specify the form and mode of the Gamma matrix of the LISREL model.

**Syntax**

    GA=<form>,<mode>

where <form> is one of DI for diagonal, ID for identity, FU for full, ID for identity, ZE for zero and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**

    GA=FU,FR

**Notes**

  o The Gamma matrix refers to the regression weights of the linear relationships between the ETA (dependent latent) and the KSI (independent latent) variables.

  o The PS, SP, SS and IN modes only apply to multi-group analyses.

## KA keyword

The KA keyword is used to specify the mode of the Kappa vector of the LISREL model.

**Syntax**

    KA=<mode>

where <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**

    KA=FI

**Notes**

  o The Kappa vector refers to the means of the KSI (independent latent) variables.

  o The Kappa vector is only used if a mean-and-covariance structure is desired.

  o The PS, SP, SS and IN modes only apply to multi-group analyses.

## LX keyword

The LX keyword is used to specify the form and mode of the Lambda_X matrix of the LISREL model.

**Syntax**

    LX=<form>,<mode>

where <form> is one of DI for diagonal, ID for identity, FU for full, IZ for identity, zero ZI for zero, identity and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> LX=FU,FI

**Notes**
- o The Lambda_X matrix refers to the regression weights of the linear relationships between the KSI (independent latent) variables and their indicators (X variables).
- o The PS, SP, SS and IN modes only apply to multi-group analyses.

## LY keyword

The LY keyword is used to specify the form and mode of the Lambda_Y matrix of the LISREL model.

**Syntax**
> LY=<form>,<mode>

where <form> is one of DI for diagonal, ID for identity, FU for full, IZ for identity, zero ZI for zero, identity and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> LY=FU,FI

**Notes**
- o Lambda_Y refers to the regression weights of the linear relationships between the ETA (dependent latent) variables and their indicators (Y variables).
- o The PS, SP, SS and IN modes only apply to multi-group analyses.

## NE keyword

The purpose of the NE keyword is to specify the number of ETA (dependent latent) variables of the LISREL model.

**Syntax**
> NE=<number>

where <number> denotes a nonnegative integer.

**Default**
> NE=0

**Note**
ETA variables are dependent latent variables.

## NK keyword

The NK keyword is used to specify the number of KSI (independent latent) variables of the LISREL model.

**Syntax**
     NK=<number>

where <number> denotes a nonnegative integer.


**Default**
     NK=0

**Note**
KSI variables are independent latent variables.


## NX keyword

The NX keyword is used to specify the number of X (observed independent) variables of the LISREL model.


**Syntax**
     NX=<number>

where <number> denotes a nonnegative integer.


**Default**
     NX=0


**Note**
X variables are indicators of KSI (independent latent) variables or X variables are independent directly observed variables.


## NY keyword

The NY keyword is used to specify the number of Y (observed dependent) variables of the LISREL model.


**Syntax**
     NY=<number>

where <number> denotes a nonnegative integer.


**Default**
     NY=0


**Note**
Y variables are indicators of ETA (dependent latent) variables or dependent directly observed variables.

### PH keyword

The purpose of the PH keyword is to specify the form and mode of the Phi matrix of the LISREL model.

**Syntax**
> PH=<form>,<mode>

where <form> is one of DI for diagonal, ID for identity, SY for symmetric or ST for standardized symmetric and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> PH=SY,FR

**Notes**
> o  The Phi matrix refers to the variances and covariances of the KSI (independent latent) variables.
> o  The PS, SP, SS and IN modes only apply to multi-group analyses.

### PS keyword

The PS keyword is used to specify the form and mode of the Psi matrix of the LISREL model.

**Syntax**
> PS=<form>,<mode>

where <form> is one of DI for diagonal, SY for symmetric or ZE for zero and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> PS=DI,FR

**Notes**
> o  The Psi matrix refers to the variances and covariances of the error terms for the ETA (dependent latent) variables.
> o  The PS, SP, SS and IN modes only apply to multi-group analyses.

### TD keyword

The TD keyword is used to specify the form and mode of the Theta_Delta matrix of the LISREL model.

**Syntax**
> TD=<form>,<mode>

where <form> is one of DI for diagonal, SY for symmetric or ZE for zero and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting

values or IN for invariant.

**Default**
> TD=DI,FR

**Notes**
> o   The Theta_Delta matrix refers to the variances and covariances of the measurement errors of the indicators (X variables) of the KSI (independent latent) variables.
>
> o   The PS, SP, SS and IN modes only apply to multi-group analyses.

## TE keyword

The TE keyword is used to specify the form and mode of the Theta_Epsilon matrix of the LISREL model.

**Syntax**
> TE=<form>,<mode>

where <form> is one of DI for diagonal, SY for symmetric or ZE for zero and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> TE=DI,FR

**Notes**
> o   The Theta_Epsilon matrix refers to the variances and covariances of the measurement errors of the indicators (Y variables) of the ETA (dependent latent) variables.
>
> o   The PS, SP, SS and IN modes only apply to multi-group analyses.

## TH keyword

The TH keyword is used to specify the form and mode of the Theta_Delta_Epsilon matrix of the LISREL model.

**Syntax**
> TH=<form>,<mode>

where <form> is one of DI for diagonal or ZE for zero and <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
> TH=ZE,FI

**Notes**
> o   The Theta_Delta_Epsilon matrix refers to 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.

o The PS, SP, SS and IN modes only apply to multi-group analyses.

## TX keyword

The purpose of the TX keyword is to specify the mode of the Tau-X vector.

**Syntax**
>     TX=<mode>

where <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
>     TX=FI

**Notes**
o The Tau_X vector refers to the intercepts of the measurement model for the X variables (indicators) and the KSI (independent latent) variables.

o The Tau_X vector is only used if a mean-and-covariance structure is desired.

o The PS, SP, SS and IN modes only apply to multi-group analyses.

## TY keyword

The TY keyword is used to specify the mode of the Tau-Y vector.

**Syntax**
>     TY=<mode>

where <mode> is one of FI for fixed, FR for free, PS for same pattern and starting values, SP for same pattern, SS for same starting values or IN for invariant.

**Default**
>     TY=FI

**Notes**
o The Tau_Y vector refers to the intercepts of the measurement model for the Y variables (indicators) and the ETA (dependent latent) variables.

o The Tau_Y vector is only used if a mean-and-covariance structure is desired.

o The PS, SP, SS and IN modes only apply to multi-group analyses.

## FI option

The FI option is used to specify the elements of the Phi matrix to be fixed and equal to the observed variances and covariances of the X variables.

**Example**

        MO NX=6 NK=2 NY=10 NE=3 PH=ST,FR TD=SY TE=SY

# NF command

The NF command is used to specify the fixed parameters of the LISREL model for which modification indices are not desired. It is an **optional** command.

### Syntax

        NF <parameters>

where <parameters> denotes a list of one or more fixed parameters of the LISREL model and each parameter has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space and <end> is a right parenthesis 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

# OU command

The purpose of the OU command is to specify the methods to be used and to specify the results to be produced by LISREL. It is a **required** command.

### Syntax

        OU <options> <specifications>

where <options> refers to one or more of ALL, AM, EF, MI, NS, RO, RS, SC, SO, SS, WP, XA and XM and <specifications> is a list of specifications for the analysis each of which has the syntax:

```
<keyword>=<selection>
```

where <keyword> is one of AD, AL, BE, EP, GA, IT, KA, LX, LY, MA, ME, ND, NP, PH, PS, PV, RC, SI, SL, SV, TD, TE, TH, TM, TV, TX, TY or XO and <selection> denotes a number, a file name or a type.

## AD keyword

The AD keyword is used to specify the iteration number at which the admissibility of the solution should be checked. If this check fails, the iterative algorithm will terminate.

**Syntax**
```
AD=<number>
```
where <number> denotes a nonnegative integer.

**Default**
```
AD=20
```

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

## AL keyword

The AL keyword is used to specify the name of the text file for the estimated Alpha vector.

**Syntax**
```
AL=<filename>
```
where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
- The Alpha vector refers to the intercepts of the structural model for the ETA (dependent latent) variables.
- The folder and drive names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- If the complete file name includes any blank spaces, it should be specified within single quotes.

## BE keyword

The BE keyword is used to specify the name of the text file for the estimated Beta matrix.

**Syntax**
```
BE=<filename>
```
where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
- The Beta matrix refers to the regression weights of the linear relationships among the ETA

(dependent latent) variables.

o The folder and drive names the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

o If the complete file name includes any blank spaces, it should be specified within single quotes.

## EP keyword

The EP keyword is used to specify the convergence criterion for the iterative algorithm.

**Syntax**
EP=<value>

where <value> denotes a positive real number.

**Default**
EP=0.000001

## GA keyword

The purpose of the GA keyword is to specify the name of the text file for the estimated Gamma matrix.

**Syntax**
GA=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
o The Gamma matrix refers to the regression weights of the linear relationships between the ETA (dependent latent) and the KSI (independent latent) variables.

o The drive and folder names of the text file may be omitted if the text file and the LISREL text file are in the same folder.

o If the complete file name includes any blank spaces, it should be specified within single quotes.

## IT keyword

The IT keyword is used to specify the maximum number of iterations for the iterative algorithm.

**Syntax**
IT=<number>

where <number> denotes a nonnegative integer.

**Default**
IT=<5q>

where q denotes the number of unknown parameters of the LISREL model.

## KA keyword

The KA keyword is used to specify the name of the text file for the estimated Kappa vector.

### Syntax

KA=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

### Notes

- o The Kappa vector refers to the means of the KSI (independent latent) variables.
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## LX keyword

The LX keyword is used to specify the name of the text file for the estimated Lambda_X matrix.

### Syntax

LX=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

### Notes

- o The Lambda_X matrix refers to the regression weights of the linear relationships between the KSI (independent latent) variables and their indicators (X variables).
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## LY keyword

The LY keyword is used to specify the name of the text file for the estimated Lambda_Y matrix.

### Syntax

LY=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

### Notes

- o Lambda_Y refers to the regression weights of the linear relationships between the ETA (dependent latent) variables and their indicators (Y variables).
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

> o If the complete file name includes any blank spaces, it should be specified within single quotes.

## MA keyword

The MA keyword is used to specify the name of the text file for the moment matrix that was analyzed.

**Syntax**
    MA=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
> o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
> o If the complete file name includes any blank spaces, it should be specified within single quotes.

## ME keyword

The ME keyword is used to specify the method to be used to fit the LISREL model to the data.

**Syntax**
    ME=<method>

where <method> is one of DW for diagonally weighted least squares, GL for generalized least squares, IV for instrumental variables, ML for maximum likelihood, TS for two-stage least squares, UL for unweighted least squares or WL for weighted least squares

**Default**
    ME=ML

## ND keyword

The ND keyword is used to specify the number of decimals for the results in the LISREL output file.

**Syntax**
    ND=<number>

where <number> denotes a nonnegative integer.

**Default**
    ND=2

## NP keyword

The NP keyword is used to specify the number of decimals for external text files to be produced.

**Syntax**
    NP=<number>

where <number> denotes a nonnegative integer.


**Default**
    NP=3


## PH keyword

The PH keyword is used to specify the name of the text file for the estimated Phi matrix.


**Syntax**
    PH=<filename>

where <filename> denotes the complete file name (including drive and folder names) of  a text file.


**Notes**
- o The Phi matrix refers to the variances and covariances of the KSI (independent latent) variables.
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.


## PS keyword

The PS keyword is used to specify the name of the text file for the estimated Psi matrix.


**Syntax**
    PS=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.


**Notes**
- o The Psi matrix refers to the variances and covariances of the error terms for the ETA (dependent latent) variables.
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.


## PV keyword

The PV keyword is used to specify the name of the PSF or text file for the parameter estimates.


**Syntax**
    PV=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a PSF or

text file.

**Notes**
- o The drive and folder names of the PSF or text file may be omitted if the PSF or text file and the LISREL syntax file are in the same folder.
- o If the file extension .PSF is used, a PSF is produced. Otherwise, the estimates are written to a text file.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## RC keyword

The RC keyword is used to specify the ridge constant to be used if the matrix to be analyzed is not positive definite.

**Syntax**
> RC=<value>

where <value> denotes a positive real number.

**Default**
> RC=0.001

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

## SI keyword

The SI keyword is used to specify the name of the text file for the moment matrix reproduced by the LISREL model.

**Syntax**
> SI=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## SV keyword

The SV keyword is used to specify the name of the PSF or text file for the standard error estimates.

**Syntax**
> SV=<filename>

where \<filename\> denotes the complete file name (including drive and folder names) of a PSF or text file.

**Notes**
- o  The drive and folder names of the PSF or text file may be omitted if the PSF or text file and the LISREL syntax file are in the same folder.
- o  If the file extension .PSF is used, a PSF file is produced. Otherwise, the standard error estimates are written to a text file.
- o  If the complete file name includes any blank spaces, it should be specified within single quotes.

## SL keyword

The SL keyword is used to specify the significance level of the model automated modification procedure expressed as a percentage.

**Syntax**
    SL=\<number\>

where \<number\> denotes a positive integer.

**Default**
    SL=1

## TD keyword

The TD keyword is used to specify the name of the text file for the estimated Theta_Delta matrix.

**Syntax**
    TD=\<filename\>

where \<filename\> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
- o  The Theta_Delta matrix refers to the variances and covariances of the measurement errors of the indicators (X variables) of the KSI (independent latent) variables.
- o  The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o  If the complete file name includes any blank spaces, it should be specified within single quotes.

## TE keyword

The TE keyword is used to specify the name of the text file for the estimated Theta_Epsilon matrix.

**Syntax**
    TE=\<filename\>

where \<filename\> denotes the complete file name (including drive and folder names) of a text file.

- o The Theta_Epsilon matrix refers to the variances and covariances of the measurement errors of the indicators (Y variables) of the ETA (dependent latent) variables.

- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## TH keyword

The TH keyword is used to specify the name of the text file for the estimated Theta_Epsilon_Delta matrix.

**Syntax**
> TH=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**

- o The Theta_Delta_Epsilon matrix refers to 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.

- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## TM keyword

The TM keyword is used to specify the maximum number of CPU seconds allowed for the current analysis.

**Syntax**
> TM=<number>

where <number> denotes a positive integer.

**Default**
> TM=172800

## TV keyword

The TV keyword is used to specify the name of the PSF or text file for the t values of the parameters.

**Syntax**
> TV=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a PSF or text file.

**Notes**
- o  The drive and folder names of the PSF or text file may be omitted if the PSF or text file and the LISREL syntax file are in the same folder.
- o  If the file extension .PSF is used, a PSF is produced. Otherwise, the t values are written to a text file.
- o  If the complete file name includes any blank spaces, it should be specified within single quotes.

## TX keyword

The TX keyword is used to specify the name of the text file for the estimated Tau_X vector.

**Syntax**
    TX=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
- o  The Tau_X vector refers to the intercepts of the measurement model for the X variables (indicators) and the KSI (independent latent) variables.
- o  The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o  If the complete file name includes any blank spaces, it should be specified within single quotes.

## TY keyword

The TY keyword is used to specify the name of the text file for the estimated Tau_Y vector.

**Syntax**
    TY=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

**Notes**
- o  The Tau_Y vector refers to the intercepts of the measurement model for the Y variables (indicators) and the ETA (dependent latent) variables.
- o  The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o  If the complete file name includes any blank spaces, it should be specified within single quotes.

## XO keyword

The XO keyword is used to specify the number of repetitions for which results should be written to

the output file.

**Syntax**

    XO=<number>

where <number> denotes a positive integer.

**Default**

    XO=<r>

where <r> denotes the number of repetitions specified in the RP keyword of the DA command.

## ALL option

The ALL option is used to invoke the printing of all the results in the output file.

## AM option

The AM option is used to invoke the automatic model modification procedure.

**Notes**
- o 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 significance level specified in the SL keyword.
- o The NF command is used to exclude specific parameters from the automatic modification procedure.

## EF option

The EF option is used to invoke the printing of the estimated total, direct and indirect effects in the output file.

## MI option

The MI option is used to invoke the printing of the model modification indices in the output file.

## NS option

The NS option is used to suppress the computation of starting values.

**Note**

The user must supply starting values by using the ST or VA commands if the NS option is specified.

## RO option

The RO option is used to invoke the use of the ridge constant for the moment matrix to be analyzed.

**Note**

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

### RS option

The RS option is used to invoke the printing of the residuals, standardized residuals, QQ-plot, and fitted covariance (or correlation, or moment) matrix in the output file.

### SC option

The SC option is used to invoke the printing of the completely standardized solution in the output file.

### SO option

The SO option is used to suppress the automated checking of the scale setting for each latent variable.

**Note**

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

### SS option

The SS option is used to invoke the printing of the standardized solution in the output file.

### WP option

The WP option is used to specify a column width of 132 for the output file.

### XA option

The XA option is used to suppress the computation and printing of the additional Chi-square test statistic values.

**Notes**

- o Only C1 (Minimum Fit Function Chi-Square value) will be computed.
- o Standard error estimates are not affected.
- o C1 is still an asymptotically correct chi-square for the GLS, ML, and WLS methods, but not for the ULS and DWLS methods.
- o 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.

### XM option

The XM option is used to suppress the computation and printing of the modification indices.

**Note**

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


**Examples**

> OU ND=3 SC AD=OFF
> OU ND=4 ME=DW LX=LX.TXT PH=PH.TXT TD=TD.TXT


# PA command

---

The purpose of the PA command is to specify the text file that contains the LISREL model matrix pattern consisting of ones and zeros. It is an **optional** command.


**Syntax**

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


where <filename> denotes the complete file name (including drive and folder names) of a text file, <options> is one or both of FO for a fixed format and RE for rewind, <name> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA.


**FO option**

The purpose of the FO option is to indicate that the values in the text file are in a fixed format.


**RE option**

The RE option is used to specify the rewinding of the text file to the first entry for each repetition. By default, the file is not rewinded for each repetition.


**Example**

> PA= 'E:\Cancer Research Project\USA.LX' LX


**Notes**

o   A one indicates a free parameter and a zero indicates a fixed parameter.

o   One PA command may appear for each matrix.

o   If the matrix pattern is in free format and the number of elements is less than the number of elements in the corresponding parameter matrix, the pattern must end with a forward slash (/). The elements after the slash default to zeros.

o   The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## PA paragraph

---

The purpose of the PA paragraph is to specify elements of a parameter matrix of the LISREL model as fixed or free by using a matrix pattern consisting of ones and zeros as part of the LISREL syntax file. It is an **optional** paragraph.

**Syntax**

PA <name>
<matrix>

where <name> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA and <matrix> denotes a fully specified matrix pattern.

**Examples**

PA LX
1 0
1 0
1 0
0 1
0 1
0 1

PA PH
1
0 1
0 0 1
0 0 0 1

**Notes**

- o A one indicates a free parameter and a zero indicates a fixed parameter.
- o One PA paragraph may appear for each matrix.
- o If the matrix pattern is in free format and the number of elements is less than the number of elements in the corresponding parameter matrix, the pattern must end with a forward slash (/). The elements after the slash default to zeros.

## PC command

The PC command is used to specify a principal component analysis. It is an **optional** command.

### Syntax

PC <keyword>

where <keyword> is NC.

### NC keyword

Then NC keyword is used to specify the number of principal components for a principal component analysis.

### Syntax
NC=<number>

where <number> denotes a positive integer.

### Example

PC NC=4

## PSFfile command

The purpose of the PSFfile command is to specify the name of the PSF to which the columns consisting of the latent variable scores of the latent variables of the model should be appended. It is an **optional** command.

### Syntax

PSFfile <filename>.PSF

where <filename> denotes the complete file name (including drive and folder names) of a PSF.

### Example

PSFfile Satisfaction.PSF

- o The drive and folder names of PSF may be omitted if the PSF and the and the LISREL syntax file are in the same folder.
- o If the complete PSF name contains any blank spaces, the PSF name must be specified within two single quotes.

# PD command

The PD command is used to specify the creation of a PTH (path diagram) file. It is an **optional** command.

### Syntax

PD

# PL command

The PL command is used to specify a plot for the fit function against any parameter. It is an **optional** command.

### Syntax

PL < parameter > FROM <lower> <upper>

where <lower> and <upper> denote real numbers and <parameter> has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space, <end> is a right parenthesis or a blank space.

### Examples

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

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

# RA command

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The RA command is used to specify the raw data file to be processed. It is an **optional** command.

### Syntax

RA=<filename> <options>

where <filename> denotes the complete file name (including drive and folder names) of a PSF or a text to be processed and <options> is one or both of the FO for a fixed format and RE for rewind.

### FO option

The purpose of the FO option is to indicate that the data values in the data file are in a fixed format.

### RE option

The RE option is used to specify the rewinding of the raw data file to the first data entry for each repetition. By default, the raw data file is not rewinded for each repetition.

### Example

RA=TurnOver.PSF

### Notes

- o The drive and folder names of the PSF or text file may be omitted if the PSF or text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## RA paragraph

The RA paragraph is used to specify the raw data to be analyzed as part of the LISREL syntax file. It is an **optional** paragraph.

### Syntax

    RA <option>
    <format>
    <matrix>

where <option> is FO for a fixed format, <format> denotes an optional Fortran format statement and <matrix> denotes a rectangular matrix of real numbers.

### FO option

The purpose of the FO option is to indicate that the data values in the LISREL syntax file are in a fixed format.

## RG command

The purpose of the RG command is to specify a univariate or a multivariate multiple linear regression analysis or a two stage least squares regression with instrumental variables. It is an **optional** command.

### Syntax

    RG <labels> ON <labels> [WITH <labels>]

where <labels> denotes a list of one or more variable names in free format.

or

    RG <numbers> ON < numbers > [WITH < numbers >]

where <numbers> denotes a list of one or more positive integers in free format.

**Examples**

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


# SD command

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The SD command is used to specify the name of the text file that contains the the sample standard deviations of the observed variables. It is an **optional** command.

### Syntax

> SD=<filename> <options>

where <filename> denotes the complete file name (including drive and folder names) of a text file and <options> is one or both of FO for a fixed format and RE for rewind.

### FO option
The purpose of the FO option is to indicate that the values in the text file are in a fixed format.

### RE option
The RE option is used to specify the rewinding of the text file to the first entry for each repetition. By default, the file is not rewinded for each repetition.

### Example

> SD='E:\Cancer Research Project\USA.STD'

### Notes

- o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.
- o If the complete file name includes any blank spaces, it should be specified within single quotes.

## SD paragraph

The SD paragraph is used to specify the sample standard deviations of the observed variables as part of the LISREL syntax file. It is an **optional** paragraph.

### Syntax

SD <options>
<format>
<vector>

where <options> is FO for a fixed format, <format> is an optional Fortran format statement and <vector> denotes a vector of real numbers.

### FO option

The purpose of the FO option is to indicate that the values in the LISREL syntax file are in a fixed format.

### Example

SD
95.45    102.99    110.26    117.25    123.41

## SE command

The SE command is used to select any number of variables in any order from the input variables. It is an **optional** command.

### Syntax

SE
<labels> /

or

SE
<numbers> /

where <labels> denotes a list of one or more variable names in free format and <numbers> denotes a list of one or more positive integers in free format.

**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 specified first, followed by the X-variables (indicators of independent latent variables or independent observed variables).

# SY command

The purpose of the SY command is to specify the Data System File (DSF) to be processed. It is an **optional** command.

**Syntax**

SY=<filename>.DSF

where <filename> denotes the complete file name (including drive and folder names) of a DSF.

**Example**

SY='G:\Cancer Research Project\USA.DSF'

**Notes**

- o The drive and folder names of the DSF may be omitted if the DSF and the LISREL syntax file are in the same folder.
- o If the complete DSF name includes any blank spaces, it should be specified within single quotes.

## ST command

The ST command is used to specify starting values for the unknown parameters of the LISREL model.

**Syntax**

ST <value> <parameters>

where <value> denotes a real number and <parameters> is a list of one or more parameters each of which has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space, <end> is a right parenthesis 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

## TI command

The TI command is used to specify a descriptive title for the analysis. It is an **optional** command.

**Syntax**

TI
<string>

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

**Notes**

o   The contents of the LISREL syntax file before the DA command will be regarded as title lines.

o 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.

**Example**

TI
A model for Job Satisfaction and Organizational Commitment

# VA command

The VA command is used to specify the values for the fixed parameters of the LISREL model. It is an **optional** command.

**Syntax**

VA <value> <parameters>

where <value> refers to a real number and <parameters> is a list of one or more parameters each of which has the following syntax:

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

where <matrix> is one of LY, LX, BE, GA, PH, TE, TD, AP, TH, PS, TY, TX, AL or KA, <row> is a positive integer, <start> is a left parenthesis or a blank space, <column> is a positive integer, <delimiter> is a comma or a blank space, <end> is a right parenthesis 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

# WM command

The WM command is used to specify the text file with the user-supplied estimated asymptotic covariance matrix of the elements of the moment matrix to be analyzed. It is an **optional** command.

### Syntax

WM=<filename>

where <filename> denotes the complete file name (including drive and folder names) of a text file.

### Example

WM=USA.WM

### Notes

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

o The drive and folder names of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

o If the complete file name includes any blank spaces, it should be specified within single quotes.