LISREL Reference Sheet

Command Syntax:

...				**Title Card(s)**. Any number of title lines are read until DA is found as the first two nun-blank characters. The first title line is printed on every section of the output.
DA				**Data Parameter Card** (Requested!)
	NG =	n	1	Number of groups
	NI =	n	0	Number of input variables
	NO =	n	0	Sample Size N
	MA =	mn	CM	Matrix to be analysed, mn={MM,AM,CM,KM,OM,PM}
mn				**Read Data Card**, always followed by fmt Card mn={LA,LK,EL,RA,MM,CM,KM,OM,PM,ME,SD,AC,AV,DM}
	FI =	filename		Read matrix from that file
	FO =			Read Fortran format from immediately following line
	RE =			Rewind file after reading
	form	..	..	On MM,CM,KM Card: Storage format
		FU		Full, i.e. all elements
		SY		Symmetric, i.e. only lower half
		..		Vectorized lower half
	XM =	r		On RA Card: Missing data value
SE	FI =	filename		**Selection of variables**: Read list of numbers or labels No format card required; terminated by "/"
MO				**Model Card** (Requested!)
	NY =	n	0	Number of y-variables
	NX =	n	0	Number of x-variables
	NE =	n	0	Number of Eta-variables
	NK =	n	0	Number of Ksi-variables
	mn =	mf,ff		Specification of parameter matrix mn={LY,LX,BE,GA,PH,PS,TE,TD,TH} mf={ZE,ID,IZ,ZI,DI,SD,SY,FU}, ff={FI,FR} special case: PH=ST
				Specification of mean parameter vector mn={TY,TX,AL,KA} mf and ff as above
	FI =			Fixed x-model
PA	mn			Read pattern for parameter matrix mn
MA	mn			Read start values for parameter matrix mn PA and MA card are followed by fmt Card
FR	p			Specify parameters to be free
FI	p			Specify parameters to be fixed
EQ	p			Specify parameters to be equal
VA	r p			Define (starting) value for parameter
ST	r p			Define starting value for parameter
PL	p			Plot fitting function for parameter
NF	p			Never Free parameter during automatic model modification
CO				Impose general linear and non-linear constraints
IR				Place interval restrictions on parameters
PD				**Path Diagram**
OU				**Output Option Card** (Requested!)
	ME=	me	ML	Estimation method
		IV		Only IV-estimates are computed
		TS		Only TSLS-estimates
		UL		Both IV- and ULS-estimates are computed
		GL		Both TSLS- and GLS-estimates are computed
		ML		Both TSLS- and ML-estimates are computed
		WL		Generalized weighted least squares
		DW		Diagonally weighted least squares
	NS			No initial estimates computed, use starting values
	IO			Initial estimates only
	RO			Use Ridge Option
	RC=	r	.001	Ridge Constant
	XM			Skip the tests of multivariate normality
	PT			Print technical output
	SE			Print standard errors (with EF also for total and ind.)
	TV			Print t-values
	PC			Print correlations of estimates
	RS			Print residuals, standardized residuals, Q-plot
	EF			Print total and indirect effects
	VA			Print variances and covariances
	MR			Equivalent to VA
	MI			Print modification indeces
	FS			Print factor score regression
	FD			Print first derivatives
	SS			Print standardized solution (latent variables)
	SC			Print completely standardized solution (all variables)
	ALL			Print all output
	TO			Print 80 chars/record (default on the PC)
	WP			Print 135 chars/record
	ND=	n	3	Number of decimals on the printed output (0-8)
	TM=	n		Maximum number of CPU-seconds allowed (two days on the PC)
	IT=	n		Maximum number of iterations allowed (default is three times the number independent parameters estimated
	SO			Scale check off
	AD	n	10	Admissibility check after n interations
		0		Admissibility check only at the beginning of iterations
		1		Admissibility check after each iteration
		OFF		Set admissibility check off
	AM			Automatic model modification
	SL=	n	1	Significance level for automatic modification
	mn =	filename		Save results for matrix mn to that ile mn={AL,BE,EC,GA,GF,KA,LX,LY,MA,PH,PS,PV, RM,SI,SV,TD,TE,TH,TV,TY,TY}

where...

filename	is a DOS file name
n	is a natural number: 0,1,2,...
r	is a real number
p	is a single parameter or a set of parameters
fmt	is a Fortran format, or a star or nothing which both indicat a free format
mn	is a LISREL matrix or vector name
me	is an estimation method
mf	is a matrix or vector form
ff	is shorthand for FIxed or FRee

mn	**is a LISREL matrix or vector name**
RA	raw data
MM	matrix of moments about zero
CM	covariance matrix
KM	korrelation matrix
AM	augmented moment matrix (last var is constant)
ME	vector of means
SD	vector of standard deviations
LA	labels for manifest variables
LK	labels for KSI variables
LE	labels for ETA variables

parameter matrices:		default
LY	Lambda-y	FU,FI
LX	Lambdy-x	FU,FI
BE	Beta	ZE,FI
GA	Gamma	FU,FR
PH	Phi	SY,FR
PS	Psi	DI,FR
TD	Theta-delta	DI,FR
TE	Theta-epsilon	DI,FR
TH	Theta-delta-epsilon	ZE,FI

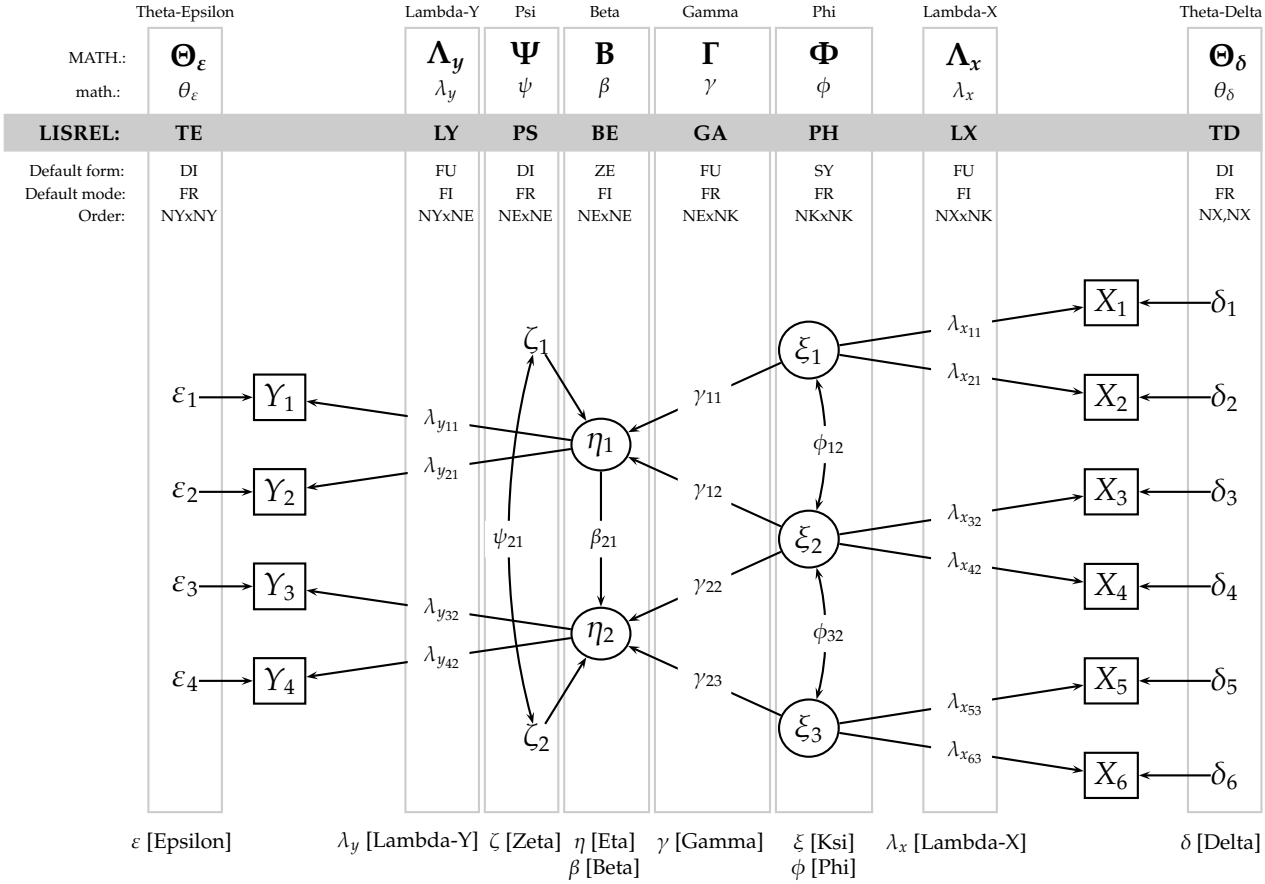
parameter vectors:		default
TY	Tau-y	FI
TX	Tau-x	FI
KA	Kappa	FI
AL	Alpha	FI

SI	fitted matrix Sigma-hat
RM	regression matrix of latent on observed variables as requested by FS
EC	covariance matrix of parameter estimates
OM	correlation matrix based on optimal scores
PM	matrix of polychoric, polyserial and product moment correlations
AC	asymptotic covariance matrix of covariances or correlation matrix
AV	asymptotic variances of the elements of the covariance or correlation matrix
DM	user-defined diagonal weight matrix
SV	vector of standard errors of the estimated parameters
GF	goodness-of-fit measures
MA	matrix analyzed after selection and/or reordering of variables
PV	estimated free parameters
SV	standard errors of the estimated free parameters
TV	t-values of the estimated free parameters

mf	**is the form of a parameter matrix or vector**
FU	Full rectangular
ZE	Zero
ID	Identity
DI	Diagonal
SD	Subdiagonal with zero diagonal
SY	Symmetric
ST	Symmetric with unit diagonal (only for PH)
SP	For 2,3,.. group: Same pattern
SS	For 2,3,.. group: Same starting values
PS	For 2,3,.. group: SP and SS
IN	For 2,3,.. group: Invariant over groups

p	**is a single parameter or a set of parameters**
	mn(group,col,row)
	mn(col,row)
	mn(row) (if mn is a vector or diagonal matrix)
	ALL
	mn(col,row)-mn(col,row)
	mn group col row - mn group col row

Path Diagram:



Parameter vectors for Means and Intercepts:

MATH.:	-	-	-	-
math.:	α	κ	τ_x	τ_y
LISREL:	**AL**	**KA**	**TX**	**TY**
Default form:	FU	FU	FU	FU
Default mode:	FI	FI	FI	FI
Order:	NEx1	NKx1	NXx1	NYx1

Theta-delta-epsilon:

MATH.:	$\Theta_{\delta\varepsilon}$
math.:	$\theta_{\delta\varepsilon}$
LISREL:	**TH**
Default form:	ZE
Default mode:	FI

Model equations:

- Measurement model for y: $\boldsymbol{y = \tau_y + \Lambda_y \eta + \varepsilon}$
- Measurement model for x: $\boldsymbol{x = \tau_x + \Lambda_x \xi + \delta}$
- Structural model: $\boldsymbol{\eta = \alpha + B\eta + \Gamma\xi + \zeta}$

Implied covariance structure:

$$\boldsymbol{\Sigma} = \begin{pmatrix} \mathbf{A}(\mathbf{\Gamma\Phi\Gamma' + \Psi})\mathbf{A'} + \mathbf{\Theta}_\varepsilon & \mathbf{A}(\mathbf{\Gamma\Phi\Lambda_x'}) \\ \mathbf{\Lambda_x\Phi\Gamma'A'} & \mathbf{\Lambda_x\Phi\Lambda_x' + \Theta}_\delta \end{pmatrix}$$

where $\mathbf{A} := \mathbf{\Lambda_y}(\mathbf{I} - \mathbf{B})^{-1}$

Implied mean structure:

- $E(\xi) := \kappa$
- $\mu_\mathbf{y} = \tau_\mathbf{y} + \mathbf{\Lambda_y}(\mathbf{I} - \mathbf{B})^{-1}(\alpha + \mathbf{\Gamma}\kappa)$
- $\mu_\mathbf{x} = \tau_\mathbf{x} + \mathbf{\Lambda_x}\kappa$
- $E(\eta) = (\mathbf{I} - \mathbf{B})^{-1}(\alpha + \mathbf{\Gamma}\kappa)$