

SPM.mat Cheat Sheet

LEVEL 1

<u>xY</u>	<u>data structure</u>
xBF	basis function structure
nscan	1 x nsess array indicating number of scans per session
Sess	1 x nrun session structure
xGX	global variate structure
<u>xX</u>	<u>Design matrix structure</u>
xVi	Non-sphericity structure
SPMid	String identifying SPM and program versions
xM	Masking structure
xsDes	Design description structure
xVol	Image volume structure
Vbeta	Beta images structure
VResMS	Residual image structure
VM	Resultant analysis mask structure
<u>xCon</u>	<u>Contrasts structure</u>
swd	String identifying analysis directory

LEVEL 2

xY	P: [n x ?char] – all image filenames including path VY: [nScan x 1 structure] – mapped image volumes (filehandles) RT: repetition time (TR)
Sess	U 1 x nPredictors structure (inputs to design specification) U.name 1 x nMainEffects array U.ons onsets U.dur durations U.P parametric modulators
	row row indices of each session in the design matrix col column indices of each session in the design matrix
xX	X: design matrix (raw, not temporally filtered) xKXs: the filtered and whitened design matrix (see spm_sp.m) [SPM.xX.xKXs.X] nKX: filtered design matrix (scaled for display) name: cellstr of parameter names corresponding to columns of design matrix K: cell of session-specific structures (see spm_filter). Design and data are pre-multiplied by K ($K*Y = K*X*beta + K*e$). K should not smooth across runs. W: optional whitening matrix used to give weighted least squares estimates iC: vector of C partition (covariates of interest) indices iB: vector of B partition (block effects) indices iG: vector of G partition (nuisance variables) indices
xVol	M 4x4 voxel → mm transformation matrix iM 4x4 mm → voxel transformation matrix DIM image dimensions (column vector in voxels) XYZ 3 x S vector of in-mask voxel coordinates S Lebesgue measure of volume (in voxels) R vector of resel counts (in resels)

FWHM Smoothness of components – FWHM, (in voxels)

xCon

name	Name of contrast
STAT	'F', 'T' or 'P' – for F/T-contrast ('P' for PPMs)
c	(F) Contrast weights
X0	Reduced design matrix (spans design space under Ho)
iX0	Indicates how contrast was specified
X1o	Remaining design space (orthogonal to X0)
eidf	Effective interest degrees of freedom (numerator df)

After SPM.mat estimation, the following images are written to file:

mask.{img,hdr} -- analysis mask image

Image of zeroes & ones indicating which voxels were included in the analysis. This mask image is the intersection of the explicit, implicit and threshold masks specified in the xM argument. The XYZ matrix contains the voxel coordinates of all voxels in the analysis mask. The mask image is included for reference, but is not explicitly used by the results section.

beta_????.{img,hdr} -- parameter images

Images of the parameter estimates. The image files are numbered according to the corresponding column of the design matrix. Voxels outside the analysis mask (mask.img) are given value NaN.

ResMS.{img,hdr} -- estimated residual variance image

Image of the residual variance estimate. Voxels outside the analysis mask are given value NaN.

RPV.{img,hdr} -- estimated resels per voxel image

Image of the RESELS per voxel estimate. Voxels outside the analysis mask are given value 0. These images reflect the nonstationary aspects of the spatial autocorrelations.

Contrast manager operations write these images to file:

con_????.{img,hdr} -- contrast image

Images of the simple contrasts among parameter estimates. The image files are numbered according to the order in which contrasts are specified. These contrast images (for appropriate contrasts) are suitable summary images of an effect at this level, and can be used as input at a higher level when effecting a random effects analysis. See `spm_RandFX.man` for further details.

ess_????.{img,hdr} -- F-contrast image (extra sum-of-squares)

Images of the extra sum-of-squares (the difference in the residual sums of squares for the full and reduced model).