MULTIDIMENSIONAL SCALING:
Using SPSS/PROXSCAL

- SPSS 10 offers PROXSCAL (PROXimity SCALing) as an alternative to ALSCAL for multidimensional scaling: **USE IT** !! ALSCAL has been shown to be sub-optimal (Ramsay).

- PROXSCAL performs most Distance Model scaling (for scalar products/vector models, see SPSS Categories). *(Pre-SPSS PROXSCAL .pdf Documentation by Busing is available).*

- Data for basic MDS in SPSS10 can be <u>either</u>

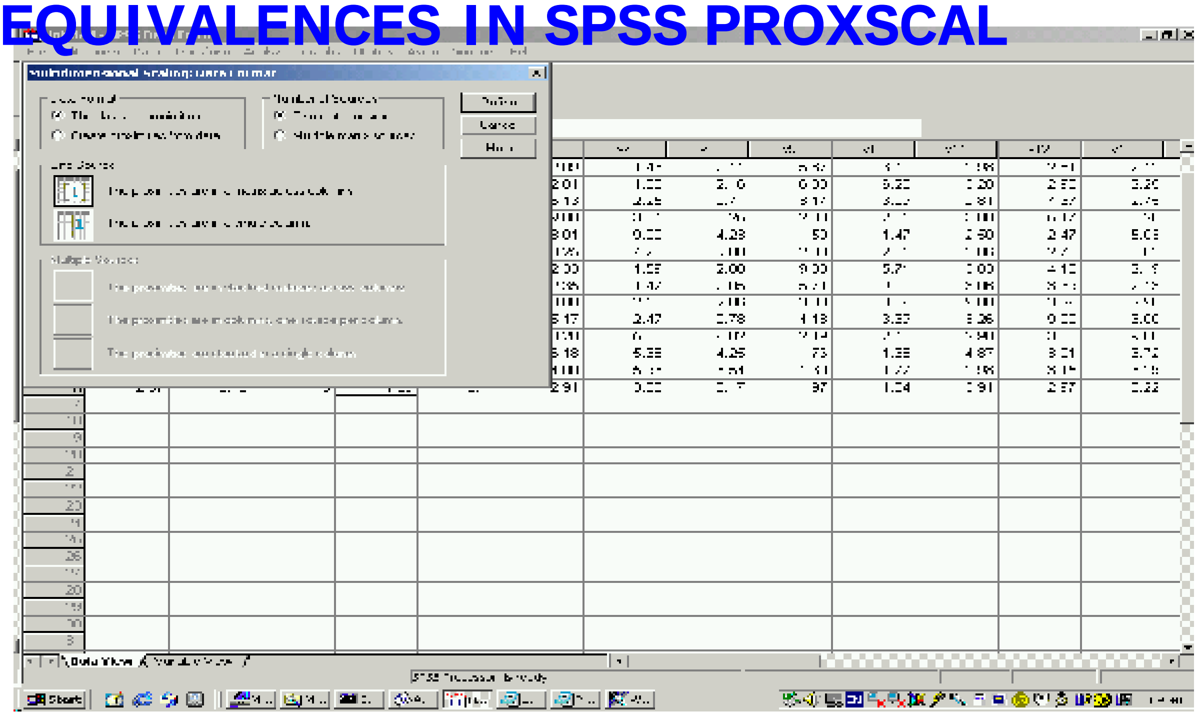
  1. input *directly* as a full SSM (*square symmetric matrix*) of proximities=dis/similarities into SPSS editor.
  2. *calculate measure within SPSS* from a raw datafile (separate procedure)
  3. OR (in PROXSCAL only) *matrix can be imported as a SSM*. ***SPSS will <u>not</u> accept LT matrices directly***, (n.b. universal use of LT matrices in other programs; confusing SPSS documentation suggesting otherwise).
  4. procedures for changing a LT into a SSM for SPSS are contorted but possible

(subject of a separate handout).

SETTING UP

data-transformation-model

EQUIVALENCES IN SPSS PROXSCAL



- n.b. Use Right Click for supplementary information in SPSS10
- PROXSCAL “proximities” = dis/similarities
- PROXSCAL “Transformed proximities” = disparities.

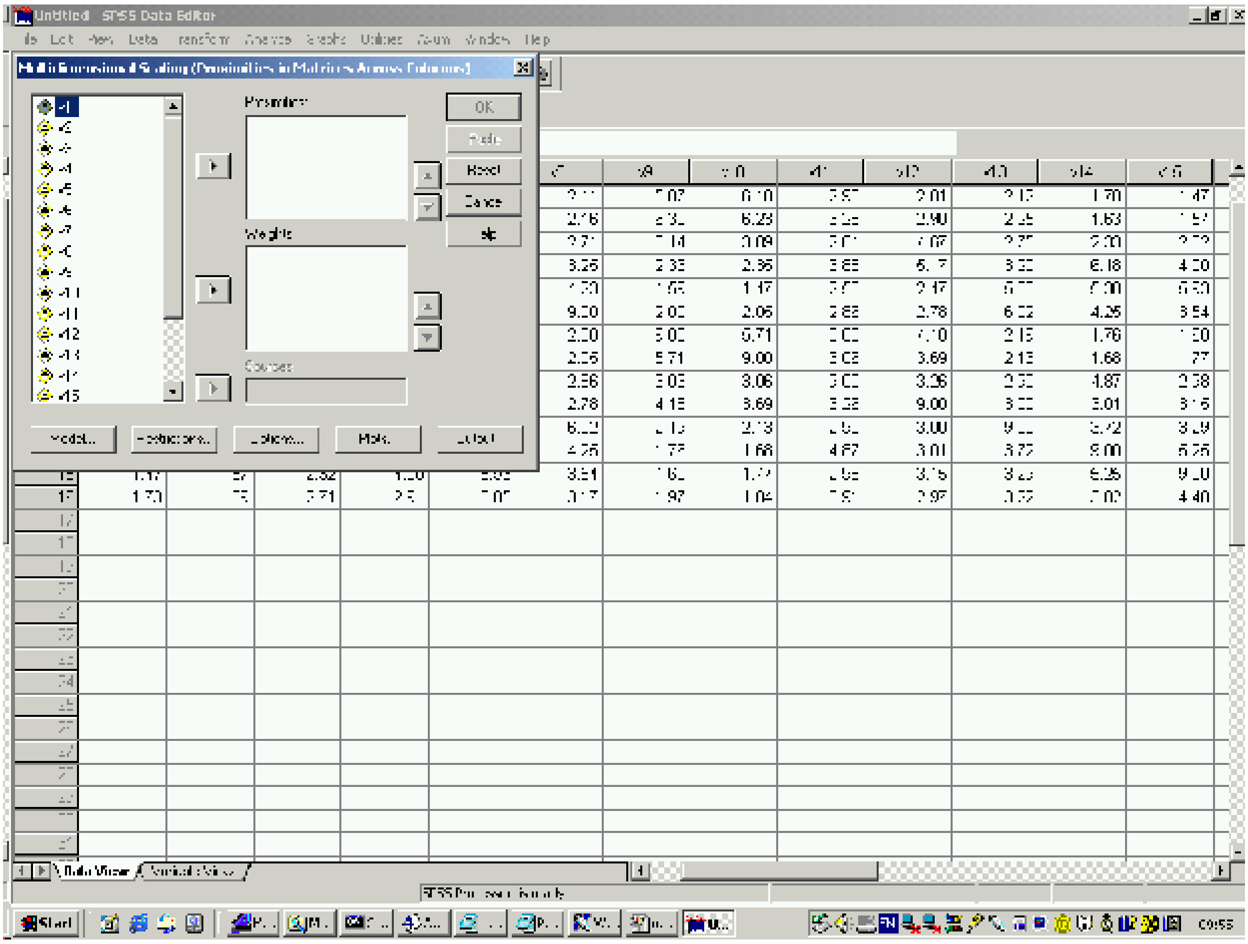
1. DATA

Analyze Y Scale Y Multidimensional scaling (PROXSCAL)

First Window (Data Format)

- Data Format: (**T**data are proximities (or create from raw data – initiates “Create proximities from data” procedure)
- Number of sources: (**T**One for 2W1M data; Multiple for INDSCAL etc)

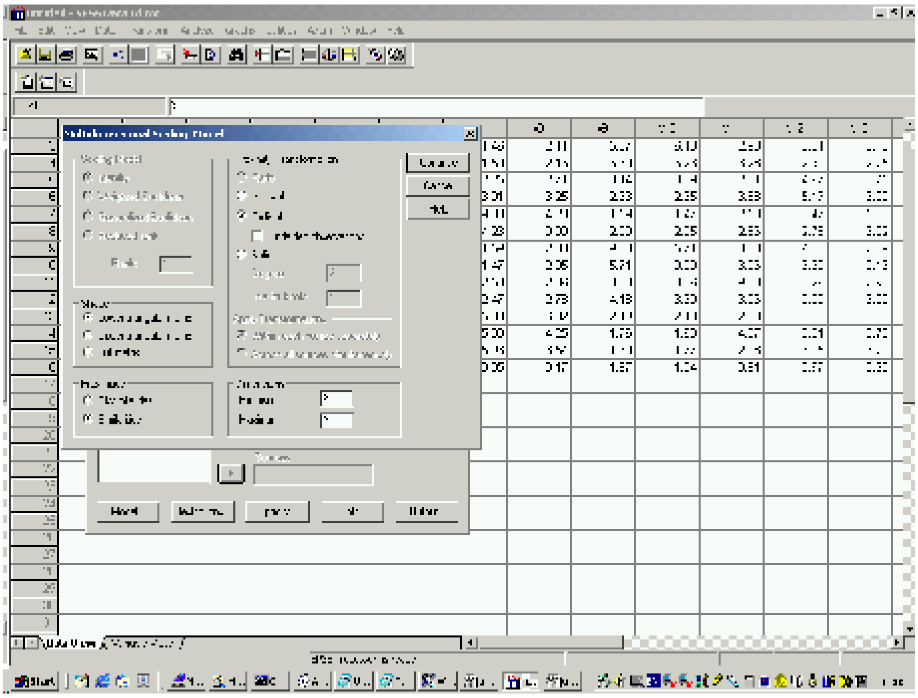
Second Window:



- Transfer Matrix (v1 - v16) across.
  (Best to keep variables name short at this stage, to avoid over-printing at graphing stage; they can be selectively lengthened later in plotting routine)
- Note the crucial buttons at the foot of the Transfer Window:

MODEL- RESTRICTIONS-OPTIONS-PLOTS-OUTPUTS

these are the ones which set the detail of the analysis and run parameters.



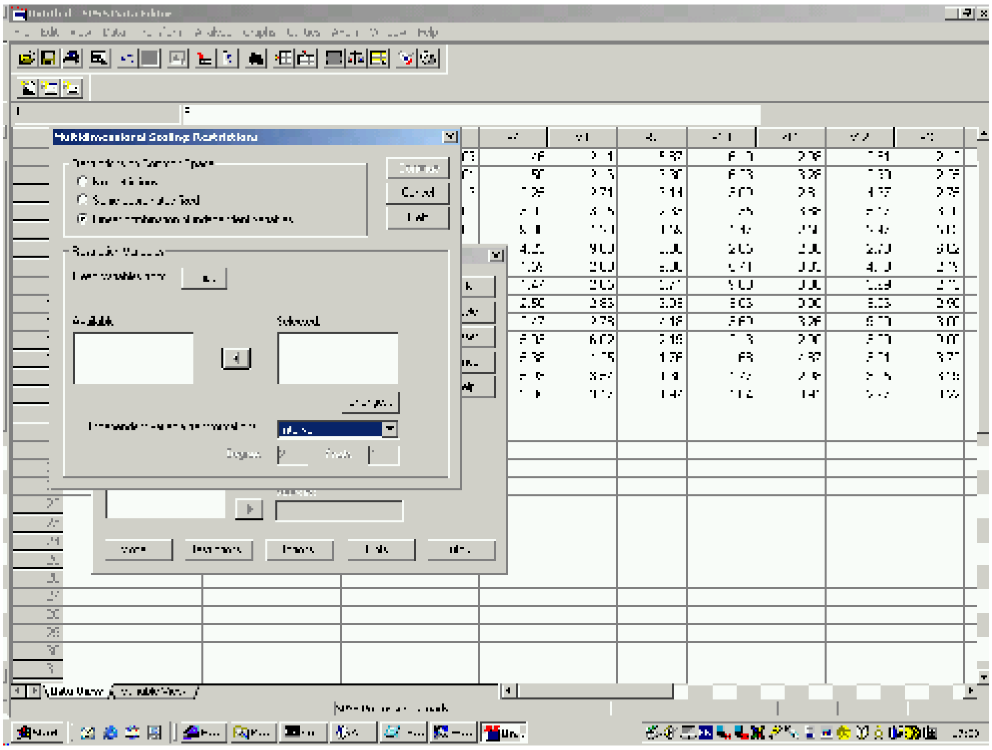
- **SCALING MODEL:**
  - < Identity means simple Euclidean
  - < Weighted Euclidean means INDSCAL
  - < Generalised Euclidean means IDIOSCAL (individual rotation and then weighting)
  - < Reduced Rank means IDIOSCAL with minimal rank of matrix
- **SHAPE:** *does not refer to input matrix ...which must be SSM*
  - < Lower triangular means “only the lower triangular data are analysed” i.e. symmetric
  - < Upper triangular: ditto, upper
  - < Full matrix: data may be asymmetric, but are symmetrised
- **PROXIMITIES (data)**
  - < Similarity data (hi means more similar)
  - < Dissimilarity (hi means more dissimilar)

  n.b. this option is default: beware!
- **DIMENSIONS**

  MDS solutions proceed from max (-1) min

PROXSCAL MODEL PARAMETERS (cont.)

- **Proximity TRANSFORMATIONS**
  - < Ratio (LoM) – implies metric analysis
  - < **Interval** (LoM) – metric
  - < **Ordinal** (LoM) – non-metric. Default is secondary approach to ties, unless ...
    - **T** Untie tied values (=primary)
  - < **Spline** (cf Ramsay & MULTISCALE): piece-wise polynomial transformation of the original data. “Pieces” and shape of transformation are specified by:
    - **T** degree (1=linear; 2= quadratic ...), and
    - **T** Number of internal knots.
- **APPLY TRANSFORMATIONS** (applies only to INDSCAL and higher models; in effect local versus global application).



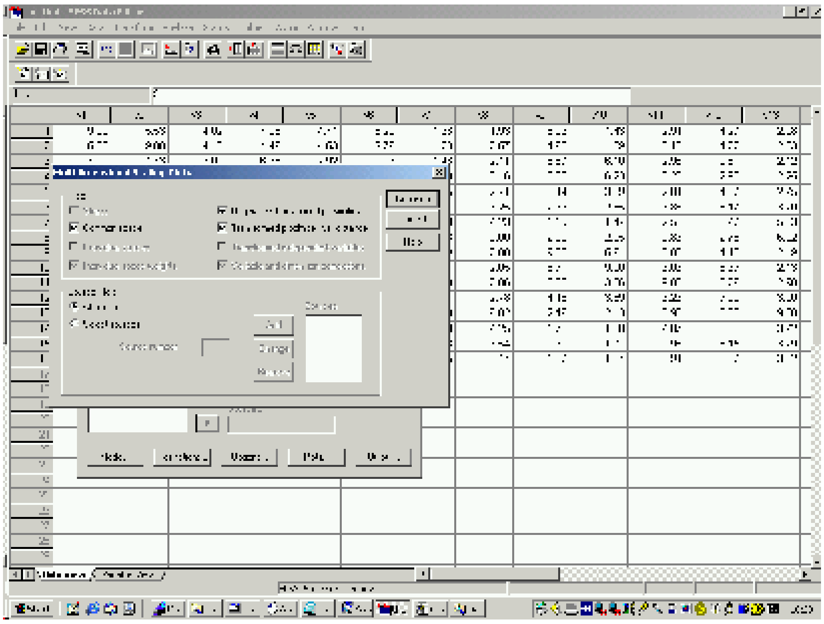
RESTRICTIONS = EXTERNAL or CONSTRAINED / CONFIRMATORY ANALYSIS (cf Borg and Groenen 1997, pp181-199).

These options allow for:

- Fixing some (known?) points in a configuration, and estimating the others (**T**Some co-ordinates fixed)
- Fitting (regressing) external properties (PRO-FIT)
  (**T** Linear combinations ...)

Additional information is contained in an separate (or integral) SPSS file

PLOTS

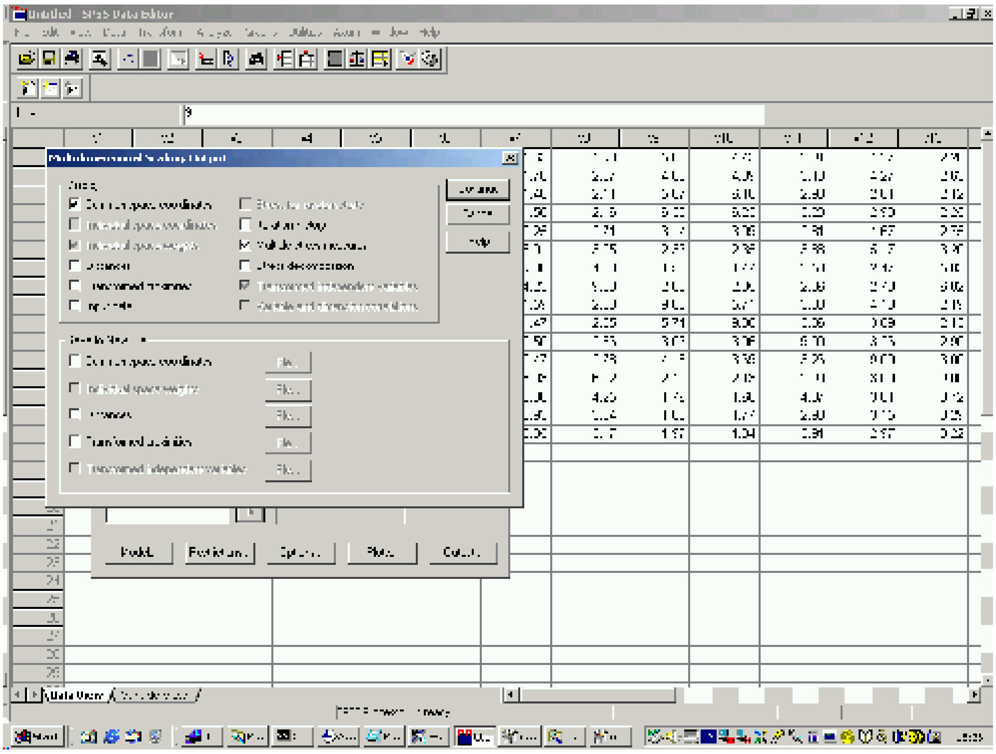


- “Common Space” = Group or Stimulus Configuration.

n.b. The Shepard Diagram is not immediately available in PROXSCAL; it combines (and can in principle be reconstructed from)

- original vs transformed proximities= disparities (* *vs d-hat* – Monotonic Fit)
- transformed proximities vs distances of solution (*d-hat vs d* – OLS fit)

OUTPUT



- **DISPLAY**

  < Common Space (=Stimulus Configuration)

  < Distances (of solution)

  < Transformed proximities (=disparities)

  < Input data (ALWAYS recommended, to ensure the program is working on the data YOU think it is …)

  < Iteration history (for diagnosis of stress minimization)

  < Multiple stress measures (use Stress1 for comparison with other solutions; <u>not</u> S-STRESS. Note: *normalised* raw stress … raw stress)

  < Stress decomposition = point contribution to stress

  < “Save to new file” is equivalent of MDSX’s “PUNCH”. Useful for graphic output.