Partial least squares (PLS) regression
and
alternative methods
for
the analysis of multi-way data tables.

Hervé Abdi
The University of Texas at Dallas
http://www.utdallas.edu/~herve/

PLS regression is a recent technique that generalizes and combines features from principal component analysis and multiple regression. It is particularly useful when we need to predict a set of dependent variables from a (very) large set of independent variables (i.e., predictors). It originated in the social sciences (specifically economy, Herman Wold 1966) but became popular first in chemometrics (i.e., computational chemistry) due in part to Herman’s son Svante, (see, e.g., Geladi & Kowalski, 1986) and in sensory evaluation (Martens & Naes, 1989). But PLS regression is also becoming a tool of choice in the social sciences as a multivariate technique for non-experimental and experimental data alike (e.g., neuroimaging, see McIntosh, Bookstein, Haxby, & Grady, 1996). It was first presented as an algorithm akin to the power method (used for computing eigenvectors) but was rapidly interpreted in a statistical framework. (Frank, & Friedman, 1993; Helland, 1990; Höskuldsson, 1988; Tenenhaus, 1998).

I will present an intuitive approach to PLS regression using face images. I will also contrast PLS regression with some of its competitors such as multiple factor analysis, multiple correspondence analysis, STATIS (a variation over Tucker 3), and canonical analysis.