

Dear reader,

it may not seem possible to you, but a part some very rare exceptions, modern human scientific endeavours only use „variable-centred“ statistics, giving away huge areas of knowledge, albeit there is no necessity to do so. As to the reasons for this you might be interested in psychologists who say that humans by nature try to make chunks whenever they face more than 3 or 4 dimensions (Graeme Halford 1989, 2005)



Why one shouldn't always plug the data off the proband in the variable-centered way:



CF_(r)A:

person-centered!

prejudices: CFA means "[Confirmatory factor analysis](#)" or common factor analysis modo Rasch: HERE IT DOESN'T!! / CFA is outdated // making discrete out of continuous data brings about more loss than

gain (eminent statisticians, like D.R. COX, seem to have shown, that many untoward assumption of underlying distributions may harm data much more than transforming it into discrete n-tuple categories//

XXXXXXXXXXXXXXXXX CONFIGURAL FREQUENCY ANALYSIS XXXXXXXXXXXXXXXXXXXXXXX

You too should profit greatly from a "person-centered" statistical approach to your data. I presume this, because there is that fundamental idea, that the person-centered so-to-speak "connective" information of several variables in its original pattern belonging to a "person"(entity) in statistics should not be destroyed by „plugging“ without true need - mathematicians put this in the following way (the answer is NO):

We now will answer our basic question, namely: can results obtained in analyses of inter-individual variation be validly generalized to the participant-specific level of intra-individual variation in time? Our answer is based on a set of general mathematical-statistical theorems, the so-called classical ergodic theorems. The first theorem in this set was proven by eminent algebraist Birkhoff in 1931 (2).

(VON EYE [p.17 \(2007\)](#)). von Eye, A., & Mair, P. (2008). Functional configural frequency analysis II: Explaining types and antitypes. Bulletin de la Societe des Sciences Medicales du Grand-Duche de Luxembourg, 01/08, p. 35-52.

In psychology the conservation of patterns obviously reflects respect for the proband's individuality.

CFrA more than some rival methods (grade of membership e.g., a discrete factor analysis extension of latent class analysis which assumes normalcy as a response item theory spin-off) can circumvent eventual obstacles in achieving this: by offering very clear concepts and at the very end... also synergistic alternances with variable-centered MANOVAs and the like: i.e. what you receive by stepwise regression e.g. as likely "components" for a fit can become a scaffold for patterns you might want to look at, which in turn usually produces some types and anti-types *exactly* (!) where the model does not fit the "real" patterns.

If my "perfect" research model predicts d, \dots according to some $\text{FUNCTION}(X, Y, Z, \dots)$, this function can e.g. be closely approximated by a linear regression function $d = C + aX + bY + cZ + dXY + eYZ + fXZ + gXYZ$, and this for a $F(x,y,z)$ will yield d . If I cast the y, \dots into k categories a $k \times k \times k$ contingency cube will come out of this, and for each cell (c) o fit an expected frequency summing the values of $F(x(c),y(c),z(c))$ s of each cell.

In the generalized linear model $F(\text{dependent})=I*(\text{MATRIX of IndependentVs } X,Y,Z)*\text{beta}(\text{the weights } a,b,c,d,e,f,g)$ may be a $\ln(d)=$ etc.. This GLM can be used either to estimate a frequency distribution via individual (continuous) data from ANOVA (where the pattern gets lost), or a pattern via discrete data (where some quantitative precision gets lost through the parsing into categories).

My "imperfect" sample will load some cells with more or less "tenants." CFA of different ascending "order" will eventually show at which level of interaction of X,Y,Z types or anti-types emerge in greater or smaller number than predicted, whereby effects NOT covered by the "base model" will emerge.

What CFA offers too are direct predictions of patterns from patterns. Albeit there are - like everywhere in statistics, I guess - quite tricky problems with significance levels especially if one looks for antitypes in small sample tables (<http://gseis.ucla.edu/faculty/muthen/alka2cfa.pdf>).

Overall the risk e.g. of having mutually "zeroing" neutralizations of nevertheless often relevant (!) "mirroring" pathways is much reduced by running such techniques. When the problems at hand are equally distributed over several dimensions – like in anxio-affective psychopathology – this risk is maximal.

What follows is a little annotated bibliography on Configural Frequency Analysis.

XXXXXXXXXXXXXXXXXXXXsourcesXX

A windows program is to be found here: <http://www.dgps.de/fachgruppen/methoden/mpr-online/issue14/art1/article.html>

Configural Frequency Analysis (Konfigurations-frequenz Analyse) was conceived by Gustav Lienert (1920–2001) a leading distribution-free biostatistician of his time

- see

in ENGLISH: <http://www.dgps.de/fachgruppen/methoden/mpr-online/issue14/obituary/lienertn.html>

in GERMAN: http://de.wikipedia.org/wiki/Gustav_A._Lienert

Gustav Lienert was also involved in neuroscience: e.g. he installed an EEG machine in 1961 when he was appointed professor of psychology at the Psychology Department of the University of Hamburg.

Alexander von Eye: This developmental psychologist (prof. at East Lansing / Ann Arbor Mich Univ. then until June 2015 University of Vienna) is one of today's leaders in the field of CFA

Configural frequency analysis (CFA) and other non-parametrical statistical methods : Gustav A. Lienert memorial issue / M. Stemmler ... [et al.] (eds.). Lengerich : Pabst Science Publishers ; 2008.. 134 S. : Ill., graph. Darst.. [005923345] is a book on person-centered methods which gives an up-to-date account by one of its main developers: [Mark Stemmler](#) which uses: [Confreq R package](#) (derived from Configural Frequencies) that is available on [CRAN](#) allows any researcher with the proper data to perform CFA with the [cfa package](#) by Funke (w/von Eye, Mair) and [confreq](#).

<http://www.springer.com/us/book/9781441900517> putting R on Excel...

The following paper deals with iterative fitting of the underlying function to even out CFA-retrieved deviations in R: "[functional CFA](#)" which gives a good idea of where CFA stands at present - as far as a not sufficiently knowledgeable person like myself can imagine...

Configural Frequency Analysis. (cumbersome stump)

http://en.wikipedia.org/wiki/Configural_frequency_analysis

very readable instead, even for myself:

[Configural Frequency Analysis. Methods, Models, and Applications \(browse in amazon\)](#)

Alexander von Eye 2002

[Von Eye, A; Mair, P; Mun, Eun-Young ADVANCES in Configural Frequency Analysis](#) 2010 New York: Guilford Press. ISBN: 1606237195 | 306 pages | combines fancy e.g. longitudinal advances with recipes to clear bugs, like what to do with "structural zeros".

von Eye, A., Mun, E. Y., Mair, P., & von Weber, S. (2013). Configural frequency analysis. In T. D. Little (ed.), *The Oxford Handbook of Quantitative Methods, Vol II*. New York: Oxford University Press.

von Eye, A., & Mair, P. (2008). Evaluating cluster solutions with reference to data generation processes: A simulation study. In E. E. Barragan, A. F. M. Martinez, R. H. M. Chavez, & L. E. N. Barajas (eds.), *Memorias del XXII Foro Nacional de Estadística*, pp. 123-131. Aguascalientes, Mexico: Instituto Nacional de Estadística, Geografía e Informática.

Second thought: there is much to be learned from psychometrics. <http://www.jstatsoft.org/v20/i01/> OR <http://statmath.wu.ac.at/~mair/publikationen.html> (WITH R programs) - but not methods like the much used response item theory, of which the "added value" seems to be built on assumptions rarely ever fulfilled (like normalcy).

Mair, P., & von Eye, A. (2005). Information Theory. In B.S. Everitt, D. Howell (eds.), *Encyclopedia of Behavioral Statistics*, pp. 924-927. Chichester, UK: Wiley.

Also maybe have a look at [SLEIPNER software](#) from swedish developmental psychologists (w/o R).

Dear reader you ought to know about the gap between my little stolen intuitions and the expertise you probably are surrounded by! Therefore there is little more than this which I can contribute for the moment, besides maybe helping your staff to tackle German sources, which I would be prepared to do.