PSYCHOPHYSIOLOGICAL STRAIN ASSESSMENT

I. VERIFICATION OF A STATISTICAL SCALING MODEL IN TWO LARGE SAMPLES

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Introduction: Using physiological parameters for strain assessment appears obvious. However, the natural considerable intraindividual variation of all potential cardiovascular and vegetative strain parameters renders any attempt of direct interindividual comparison useless.

Objective: Therefore, an attempt was made to verify a statistical scaling model applying a rough classification of individual features of vegetative parameters with 2 datasets (n_{11} = 910, n_{21} = 845). A factor-analytical model of data integration was tested in subsets (n_{12}= 502, n_{22} = 491).

Methods: Airmen candidates underwent a calibration and a flight simulator test (FST). In both tests, ECG, skin conductance and temperature and pulse transition time were continuously sampled. The calibration test, in which blood pressure was taken additionally, was used to determine the subjects' individual vegetative reaction pattern hereinafter referred to as Autonomic Outlet Pattern (AOP). It was derived from the first dataset by cluster analysis. For the ***integration*** of continuously measured psychophysiological parameters, a factor-analytical model was used. It allowed for representing different measured parameters in an orthonormal vector space. The length of the vector is termed ***Psychophysiological Arousal Value (PAV)***. Interindividual comparability could thus be obtained by grouping the basic vectors depending on the determined AOP. The mathematical models were derived from the first set of data and then tested on the second set.

Results: The AOP classification was reproducible with the second dataset. AOP-specific differences in the physiological data were also apparent in the FST data. The PAVs of the second dataset were indistinguishable between the AOP groups, whereas the changes in the load profile of FST data were significantly reflected.

Conclusions: The normalizing approach, taking individual AOPs into account, proved to be useful to compensate for interindividual differences and yet maintained essential information regarding the strain profile. The strain level of participants not being part of the AOP-defining dataset could be assessed objectively and became interindividually comparable.

EDUCATIONAL OBJECTIVES:
Psychophysiological strain assessment, non-invasive psychophysiological monitoring with the HEALTHLAB System