

## Development of a Psychometric Testing Instrument Using Algorithms and Combinatorics to Yield Coupled Parameters and Multiple Geometric Arrays in Large Information Grids

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**Abstract :** The undertaking to develop a psychometric instrument is monumental. Understanding the relationship between variables and events is important in structural and exploratory design of psychometric instruments. Considering this, we describe a method used to group, pair and combine multiple Philosophical Assumption statements that assisted in development of a 13 item psychometric screening instrument. We abbreviated our Philosophical Assumptions (PA)s and added parameters, which were then condensed and mathematically modeled in a specific process. This model produced clusters of combinatorics which was utilized in design and development for 1) information retrieval and categorization 2) item development and 3) estimation of interactions among variables and likelihood of events. The psychometric screening instrument measured Knowledge, Assessment (education) and Beliefs (KAB) of New Addictions Research (NAR), which we called KABNAR. We obtained an overall internal consistency for the seven Likert belief items as measured by Cronbach's  $\alpha$  of .81 in the final study of 40 Clinicians, calculated by SPSS 14.0.1 for Windows. We constructed the instrument to begin with demographic items (degree/addictions certifications) for identification of target populations that practiced within Outpatient Substance Abuse Counseling (OSAC) settings. We then devised education items, beliefs items (seven items) and a modifiable "barrier from learning" item that consisted of six "choose any" choices. We also conceptualized a close relationship between identifying various degrees and certifications held by Outpatient Substance Abuse Therapists (OSAT) (the demographics domain) and all aspects of their education related to EB-NAR (past and present education and desired future training). We placed a descriptive (PA)1tx in both demographic and education domains to trace relationships of therapist education within these two domains. The two perceptions domains B1/b1 and B2/b2 represented different but interrelated perceptions from the therapist perspective. The belief items measured therapist perceptions concerning EB-NAR and therapist perceptions using EB-NAR during the beginning of outpatient addictions counseling. The (PA)s were written in simple words and descriptively accurate and concise. We then devised a list of parameters and appropriately matched them to each PA and devised descriptive parametric (PA)s in a domain categorized information grid. Descriptive parametric (PA)s were reduced to simple mathematical symbols. This made it easy to utilize parametric (PA)s into algorithms, combinatorics and clusters to develop larger information grids. By using matching combinatorics we took paired demographic and education domains with a subscript of 1 and matched them to the column with each B domain with subscript 1. Our algorithmic matching formed larger information grids with organized clusters in columns and rows. We repeated the process using different demographic, education and belief domains and devised multiple information grids with different parametric clusters and geometric arrays. We found benefit combining clusters by different geometric arrays, which enabled us to trace parametric variables and concepts. We were able to understand potential differences between dependent and independent variables and trace relationships of maximum likelihoods.

**Keywords :** psychometric, parametric, domains, grids, therapists

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