Idiographic Methods: Important Alternative Research Methods for the Behavioral Sciences

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Idiographic Methods

- Idiographic methods focus on time-dependent variation within a single individual or unit (intra-subject variability)
- Nomothetic methods focus on group-level relationships (inter-subject variability)
- Idiographic methods are widely used in other disciplines, such as engineering, business, and economics but only recently are being employed in the behavioral sciences
Advantages of Idiographic Methods

- Address different research questions & may provide more insight into the data
- May be employed in applied settings, e.g., businesses, schools, clinics and hospitals
- Ideal for investigating patterns of change over time
Advantages of Idiographic Methods (continued)

- Can be used to determine the generating function for a construct
- Can address the relationship between variables over time
- Can potentially produce larger effect sizes at the individual level
Ergodic Theorems

- Equivalent results will occur only if the two conditions specified by the Ergodic Theorems are met:
  1. Each individual trajectory has to obey the same dynamic laws
  2. Each individual trajectory must have equal mean levels and serial dependencies.

- These theorems appear unlikely to be met in practice but we have seldom had data adequate to test them

- Available examples do not provide support
Comparing Idiographic and Nomothetic: Example from Harm Reduction Study

Reference:
Introduction

- Original study focused on Harm Reduction in Smoking
- Harm Reduction Goal: Produce and sustain decreased smoking rates
- Primary Outcome Measure: Number of Cigarettes Smoked per day
- Group level analysis conclusion: Losses were successfully produced and were sustained
Primary Analysis: Identifying Individual Trajectories

- **Primary Analysis:** Pattern of change for 57 Individual Studies (Time Series Analysis)
- **Level & slope fit** for each participant
- **Secondary analysis:** Comparisons across the 57 studies (Cluster Analysis)
Time Series Analysis

Results

- Average daily smoking rate = 7.85
- 51.6% first order autoregressive parameters were significant (average $r_1=0.55$, range = -.47 to 1.09)
- 16.7% second order autoregressive parameters were significant (average $r_2 = .03$, range = -.54 to .73)
- Linear trends were significant for more than half of the sample (60.0%)
Secondary Analysis: Grouping Trajectories into Similar Patterns

- Dynamic Cluster Analysis: Input is same variable measured on multiple occasions
- Input was standardized residuals from time series analyses
- Clustering Method: Squared Euclidean Distances and Ward’s Method
- Ward’s Method emphasizes “shape”
- Three cluster solution was selected
- Clusters are called “dynatypess”
Results

Three Dynatypes were plotted to facilitate interpretation (Figure 1)

- “Decreasing” maintenance smoking pattern (40.4%)
- “Constant” maintenance smoking pattern (12.3%)
- “Increasing” maintenance smoking pattern (47.3%)
Average Number of Cigarettes Smoked per Day Relative to Maintenance Starting Point

- Cluster 1: Decreasing
- Cluster 2: Constant
- Cluster 3: Increasing
- Sample Average

Time (Days of Maintenance)
Interpretation

- Decreasing is ideal—smoker on path to abstinence, only real success
- Increasing is bad—benefit of harm reduction was temporary
- Constant rate—fits goal of harm reduction, still smoking but will produce improved longevity
New Research Question: Can Dynatypetype Membership be Predicted?

- Tested dynatypetype differences at baseline using demographic, psychological, physiological, and smoking history characteristics
  - No significant differences

- Tested dynatypetype differences using self-reported motivation and self-efficacy variables
  - Significant differences found
Ergodic Theorem Results

Theorem 1. Does the trajectory of each subject has to obey same dynamic laws  
Answer: No  
(Autocorrelations varied widely indicating different generating functions)

Theorem 2. Does each trajectory have the same statistical characteristics (i.e., equal mean level and serial dependencies)  
Answer: No
Conclusions

- Group analysis indicated misleading constant pattern
- Ergodic conditions not met
- Identifying which smokers will belong to different dynatypes is critical new research question
- Can intervention influence dynatype membership?
Overview of Idiographic Research Issues
Challenge I: Generalization

- Inductive approach: Individual to general
- Individual or subgroup level may be most appropriate for most idiographic research questions
- Subgroups should meet test of Ergodic theorems
- Generalization across time is most appropriate type of generalization
Alternative Generalization: Across Occasions

- Focus of idiographic is time
- Generalization should be across time instead of across subjects
- Autism example: Will the same set of reactions occur in future trials
- Will same reactions occur to other exemplars of stressors
- Will same reactions occur in different settings
Challenge II: Missing Data

- Missing Data inevitable in longitudinal studies
- Solutions: Automate data collection (telemetrics)
- Statistical methods for missing data (ad hoc procedures inaccurate)
  - Multiple Imputation
  - Maximum likelihood estimation

References:


Challenge III: Identifying Generating Functions

- Examine autocorrelation structure to determine appropriate generating function
- Function can guide choice of intervention
- Underdeveloped area of research

Reference:
Challenge IV: Develop Appropriate Measures

- Problems with traditional measures
  - Recall bias
  - Measure Reactivity
  - Measure pollution

- Solution: Telemetrics

Reference:
Challenge V: Ergodic Theorem Conditions

- Example presented here suggest that ergodic conditions unlikely to be met
- Challenges assumptions of group level methods (i.e., additive constant)
- May account for low effect sizes in behavioral research
- Focus on individual rather than group critical for interventions development

References:
Symposium Overview

- **Paper I (Babbin et al.)** applies idiographic methods to important issue of adherence for intervening in the area of sleep apnea.
- **Paper II (Goodwin)** describes the application of idiographic methods to telemetric data from the area of autism.
- **Paper III (Molenaar)** presents an example of a multivariate idiographic analysis for Type 1 diabetes patients.