Single Case Research Designs in Early Childhood Contexts

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Introduction to Single Case

- Differences in focus and use:
  - RCTs
  - Case studies
- Experimental
  - Alternative explanations are ruled out, thus causal relations can be established
  - Rather than random assignment, AEs are ruled out via condition ordering
Four Characteristics of SCR
Three Categories

- Sequential introduction and withdrawal
- Rapid iterative alternation
- Time lagged introduction
## Types of Designs

<table>
<thead>
<tr>
<th>Demonstration</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reversible</td>
<td>Multiple Probe</td>
</tr>
<tr>
<td>Withdrawal (A-B-A-B)</td>
<td>Multitreatment (A-B-C-B-C) Multielement Simultaneous Treatments</td>
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<tr>
<td>Multiple Baseline</td>
<td>ATD</td>
</tr>
<tr>
<td>Changing Criterion</td>
<td>PTD</td>
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<td></td>
<td>Repeated Acquisition</td>
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<tr>
<td>Not Readily Reversible</td>
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- Demonstration: Demonstration of the effects of interventions
- Comparison: Comparison of different interventions
## Characterizing Single Case Designs

Adapted from Lane, Ledford, & Gast (in press)

<table>
<thead>
<tr>
<th>Design Type</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B-A-B (withdrawal)</td>
<td><strong>Demonstrates</strong> the effectiveness of an intervention on <em>reversible</em> behaviors by <em>alternating two conditions</em></td>
</tr>
<tr>
<td>A-B-C-B-C (multitreatment)</td>
<td><strong>Compares</strong> the effectiveness of two interventions on <em>reversible</em> behaviors by <em>alternating two conditions</em></td>
</tr>
<tr>
<td>Multiple Baseline</td>
<td><strong>Demonstrates</strong> the effectiveness of an intervention on <em>reversible</em> behaviors by <em>introducing the intervention in a time-lagged fashion</em> across at least three participants, behaviors, or contexts</td>
</tr>
<tr>
<td>Multiple Probe</td>
<td><strong>Demonstrates</strong> the effectiveness of an intervention on <em>non-reversible</em> behaviors by <em>introducing the intervention in a time-lagged fashion</em> across at least three participants, behaviors, or contexts</td>
</tr>
<tr>
<td>Changing Criterion</td>
<td><strong>Demonstrates</strong> the effectiveness of an intervention on <em>reversible</em> behaviors by <em>introducing stepwise intervention requirements in a time-lagged fashion</em> generally used for reinforcement-based interventions to increase responding for behaviors already in a learner’s repertoire</td>
</tr>
<tr>
<td>Alternating Treatments</td>
<td><strong>Compares</strong> the effectiveness of two interventions on <em>reversible</em> behaviors by <em>rapidly alternating sessions</em></td>
</tr>
<tr>
<td>Adapted Alternating Treatments</td>
<td><strong>Compares</strong> the effectiveness of two interventions on <em>non-reversible</em> behaviors by <em>rapidly alternating sessions</em></td>
</tr>
</tbody>
</table>

**Bold text indicates purpose, italic text indicates behavior type, underlined text indicates condition ordering**
Sequential Introduction and Withdrawal

A-B-A-B, withdrawal, reversal, multitreatment
Examples of Use

- Does use of a visual schedule improves engagement in preschool activities for young children with problem behavior?
- Does use of a “stay-play-talk” intervention with contingencies improves peer proximity, play, and interactions for young children with ASD?
Alternating treatments, adapted alternating treatments, multielement
Examples of Use

- Does moderate-to-vigorous physical activity before a large group activity improve engagement, compared with seated activities?
- Does the use of headphones result in increased engagement in small group activities, compared with no headphones?
- Does the use of an OT-designed sensory break result in increased engagement in small group activities, compared with a structured playground activity?
Time Lagged Introduction

Multiple baseline or multiple probe \textit{across} participants or behaviors or contexts
Examples of Use

- Does training and coaching improve paraprofessionals use of intervention strategies related to improving small group engagement for young children with autism?
- Does teacher responsiveness and praise result in increased complexity of block play?
Multiple Probe Designs

- The *only* difference between MP and MB designs are that MB designs include continuous measurement during the *pre-intervention baseline conditions* while MP designs included *planned* intermittent measurement only during the *pre-intervention baseline conditions*
- Measurement during intervention conditions are continuous
Current Rigor and Quality Standards

- At least 3 potential demonstrations of effect
- Data from an independent second observer (IOA)
- Data showing that all conditions were implemented as expected (fidelity)
- Each condition has at least three data points (some say 5 is preferred; WWC)
More Standards

- Adequate descriptions
  - baseline,
  - participants,
  - dependent variables
  - setting
- Social validity data
- Indicators of ecological validity
- 3-5-20 rule
Rigorous MB/MP Designs

- **Concurrent Measurement**
  - Including concurrent (or near-concurrent) start dates
- Sufficiently separate start points
  - Minimally: when change between conditions has been established
- Data that correspond to pre-intervention and post-intervention starts in previous tiers
Data Analysis

- Visual analysis ➔ functional relation
  - Consistency + replication > size
- Description of changes and consistency in level, trend, and variability in both conditions and in overlap, consistency, and immediacy of effect.
Synthesis across Studies

- Numerous proposed
  - Many based on percentage of non-overlapping data points (PND)
    - Some based on means
- Institute of Education Sciences

No currently used ES are comparable to those used in group research
Questions?