Capturing Meaningful Change

The Influence of Measurement Decisions on Evaluations of Intervention Effectiveness

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Measurement decisions that can influence our perception of intervention effectiveness

<table>
<thead>
<tr>
<th>Boundedness</th>
<th>Proximity</th>
<th>Correlated Measurement Error</th>
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<tbody>
<tr>
<td>Characterizes the extent to which an outcome is generalized</td>
<td>Characterizes the extent to which the outcome was directly taught or modeled</td>
<td>Characterizes the risk associated with training parents/teachers as interventionists and including them as assessors</td>
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How do we think about learning that extends beyond intervention?

- Near/Far Transfer
- Proximal/Distal
- Generalization

Intervention
Context and Targets
Previous Conceptions

- **Different People**
  Different interaction partners

- **Different Settings**
  Meaningfully different settings (not just different rooms, but different contexts)

- **Different Materials**
  Meaningfully different relevant items (e.g., different types of toys rather than toys that are superficially different)

- **Different Behaviors**
  Responses that were not directly targeted in the intervention

"Setting/Stimulus Generalization"  "Response Generalization"
A Continuum of Difference in Context

- **Different People**: Different interaction partners
- **Different Settings**: Meaningfully different settings (not just different rooms, but different contexts)
- **Different Materials**: Meaningfully different relevant items (e.g., different types of toys rather than toys that are superficially different)
- **Different Interaction Style**: Difference in the structure of the interaction (e.g., more naturalistic or playful versus structured and adult-led)
A Continuum of Difference in Learning

Proximal

Exact Targets

Similar Nontargets

Broad Change Within Domain

Broad Change Across Domains

Distal
The implicit assumption is that learning that extends far beyond the context and targets of intervention reflects a change in development.
Measurement Challenges When Caregivers are Agents of Change

- Ideal Agents of Generalized Change
- Natural Interaction Partners
- Present for large swaths of a child's day
Measurement Challenges When Caregivers are Agents of Change

Randomly Assign

Assess

Intervene

Assess

Time 1

Time 2
We may conclude that our intervention facilitated improvements, but in fact we have systematically biased our results in favor of the intervention group.
Measurement Challenges When Caregivers are Agents of Change

The assessment context has changed, but only for one group.

Although outcomes in both groups are being assessed in the context of a parent-child free play session, the assessment context for the intervention group is parent-child free play with a uniformly responsive caregiver, and the assessment context for the comparison group is parent-child free play with an untrained (and potentially less responsive) caregiver.
Do these measurement characteristics have a quantifiable impact on intervention effects in autism intervention research?
Project AIM: Autism Intervention Meta-analysis

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Project AIM: Autism Intervention Meta-analysis

**Comprehensive**
Identified all group design studies of interventions for all outcomes for children with autism age 0-8 which featured an intervention and comparison group.

**Systematic**
Systematically reviewed studies in terms of quality, and coded for participant, intervention, and outcome characteristics.

**Meta-analytic**
Meta-analysis allowed us to estimate the overall effect of different intervention approaches for different types of outcomes.

**Ongoing**
Now that we have estimated overall effects, we are examining the participant and intervention characteristics that influence intervention effectiveness for different outcomes.
Search Terms

Young Children (age 0-8)
- Child*
- young
- early

Autism
- Autis*
- ASD
- PDD
- Aspergers

Nonpharmacological Intervention
- Intervention
- therapy
- teach*
- treat*
- program
- package

Usual Treatments or Control
- Assign*
- "Control group"
- BAU
- "wait list"
- RCT
- Random*
- Quasi
- "treatment group"
- "intervention group"
- "group design"
- trial
PRISMA

Identification

Records identified through database searching (n = 24,005)

Screening

Records after duplicates removed (n = 12,944)

Records excluded from abstract screening (n = 12,612)

Eligibility

Full-text articles/datasets assessed for eligibility (n = 332)

Articles/datasets included in quantitative synthesis (n = 150)
- 10 dissertations
- 140 peer-reviewed reports
- 0 unpublished datasets

Full-text articles excluded, with reasons (n = 182)
- Average age of participants greater than 8 years old: 50
- Duplication of included study: 24
- No confirmed diagnosis of ASD: 14
- Effect sizes cannot be extracted from information provided: 49
- Not an RCT or quasi-experimental design: 33
- Did not include outcomes of interest: 4
- Other: 8

Included
150 reports
130 studies
87 RCTs
6,240 participants
1,615 effect sizes

http://dx.doi.org/10.26153/tsw/5683
Coding Boundedness

Is the variable measured in the context in which the treatment took place (i.e., same interaction partner, materials, setting)?
- Yes: The variable is measuring a context-bound behavior.
- No: Is the variable measured in a context that differs from the treatment on just one dimension (i.e., different interaction partner or different materials)? Or is the intervention an interaction-based intervention (Developmental, NDBI) and the variable measured with the same interaction partner and style?
  - Yes: The variable is measuring a context-bound behavior.
  - No: Is the variable measured using a standardized report form by a parent or teacher that participated in the intervention?
    - Yes: The variable is measuring a potentially context-bound behavior.
    - No: Is the variable measured in a context that differs from the treatment on two or more dimensions (i.e., different interaction partner, activity, materials) or is it measured using a standardized instrument?
      - Yes: This variable is measuring a generalized characteristic.
      - No: A question to aid decision making for difficult outcomes: If the intervention were withdrawn, would the treatment effect reverse? If yes, this is a context-bound behavior change.

This variable is measuring a context-bound behavior.
Coding Proximity

Is the variable measured via a developmentally scaled test, survey, or questionnaire (such as the ADOS, MCDI, Reynell, Mullen, etc)?

Yes: The variable is measuring a distal outcome.

No: Developmentally scaled tests are those that have been normed and have developmental benchmarks/average scores and SD for typically developing children at a given age level, etc. Remember that many standardized tests are not developmentally scaled.

Is the variable measuring a skill that was directly taught, modeled, or prompted by the intervention?

Yes: The variable is measuring a proximal outcome.

No: The variable is measuring a distal outcome.
Were parents or teachers in the intervention group alone trained in the intervention?

Did they participate in child assessment, either as interaction partners or reporters?

If yes to both, risk of parent/teacher CME is high.
Boundedness

Context-Bound 22.4%

Potentially Context-Bound 33.4%

Generalized 44.2%
Parent/Teacher Training CME

Unclear Risk
0.4%

Low Risk
51.3%

High Risk
48.2%
Do these outcome characteristics significantly moderate intervention effects?

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<th>Parent/Teacher Training CME</th>
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<td>Effects on generalized outcomes were significantly smaller than effects on context-bound or potentially context-bound outcomes.</td>
<td>Effects on proximal outcomes were significantly larger than effects on distal outcomes.</td>
<td>Effects on outcomes subject to high risk of Parent/teacher CME were smaller but not significantly different than those that were not at risk</td>
</tr>
</tbody>
</table>
Boundedness

- Context-bound: 0.39 [0.25, 0.52]
- Potentially Context-Bound: 0.27 [0.18, 0.36]
- Generalized: 0.22 [0.13, 0.31]
Proximity

Proximal: 0.40 [0.28, 0.52]
Distal: 0.25 [0.17, 0.32]

Small Sample RVE Summary Estimates