

Single Subject Designs

ScWk 240 Week 8 Slides

Group vs. Single Subject Designs

There are two broadly defined approaches to experimental research:

group designs & **single-subject designs**

Both approaches apply components of the scientific method to their approach to research

The difference between group and single-subject designs lies in the manner in which the principles of the scientific method are put into operation in designing studies

Single-Subject Designs

-- also called: Single Case and Single System Designs

Uses of SSD's and SCD's in Social Work

Requirements for SSD/SCD's

Target problem identification (DV)

Quantification of data

Obtaining baselines

Graphic display of data

Designs(AB, ABAB, ABC/ABCD) and Examples

Time Series Designs and Examples

External Validity of SSD/SCD's

Use of SSD/SCD's Designs in SW

- **Logic of time-series design**
- **Also called single-subject/single-system design, and N=1 studies**
- **Often the most relevant research topics for clinical practitioners**
- **Major limitations: Sample Sizes are small (usually 1) and problems with external validity**

Setting Target Problems

Target problem(s):

- Decide desired outcome (=DV) to be measured
- Positive or negative indicator?
- Should occur frequently enough

❖ *Triangulation*

Developing Measurement Strategies

Target problem(s)

- **Who will measure it?** (1) self-monitoring, (2) practitioner, (3) significant others
- **Sources of data:** (1) self-report scale, (2) direct observation, (3) available records
- ❖ ***Triangulation with multiple measures and observers are strongly preferred***

Quantification of Data

a) Frequency

b) Duration

c) Magnitude

Obtaining Baseline Phase

- **Repeated measures before the intervention (=control phase)**
- **Attributes of a good baseline:**
 - 1) Minimum of 5-10 measurements**
 - 2) Stable**
 - 3) Problem is not nearing resolution before the intervention**

Celeration Lines/Charts

- **Standardized method for charting and analyzing how frequency of behavior changes over time**
- **Various Standard Charts:
Session/Daily/Weekly/Monthly/Yearly**
- **Consistent Display of Celeration (change)**
- **Acceleration = increasing performance**
- **Deceleration = decreasing performance**

Interpreting Graphically Displayed Behavioral Data

- **Visual analysis**
 - **Did behavior change in a meaningful way?**
 - **If so, to what extent can that change in behavior be attributed to the independent variable?**
 - **Identification of**
 - **Variability**
 - **Level**
 - **Trend**

Examples of Baseline Measures

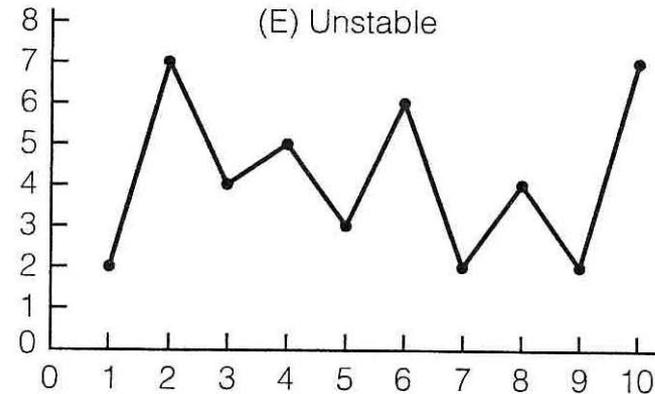
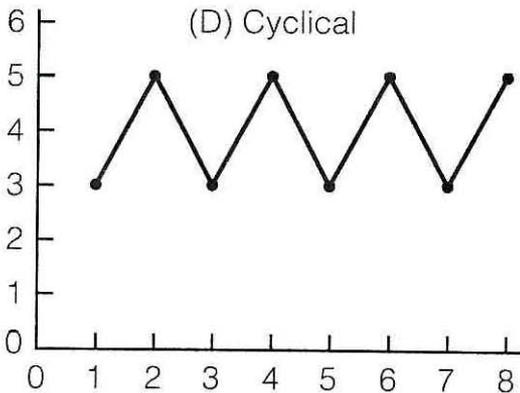
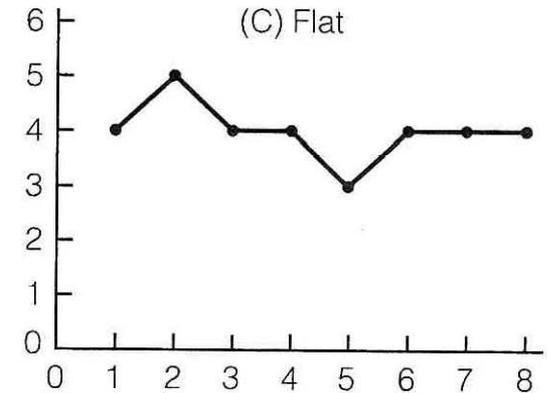
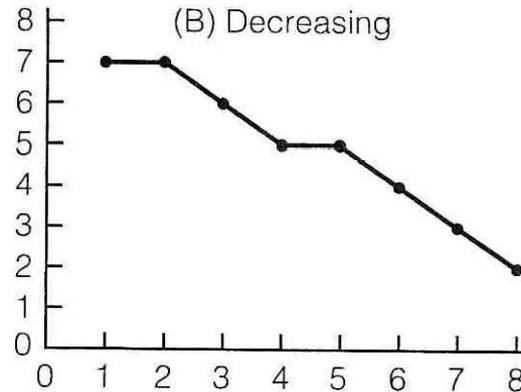
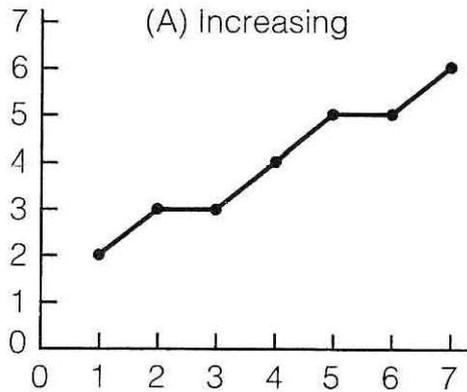


Figure 14-4 Alternative Baseline Trends

Baseline and Intervention Phases

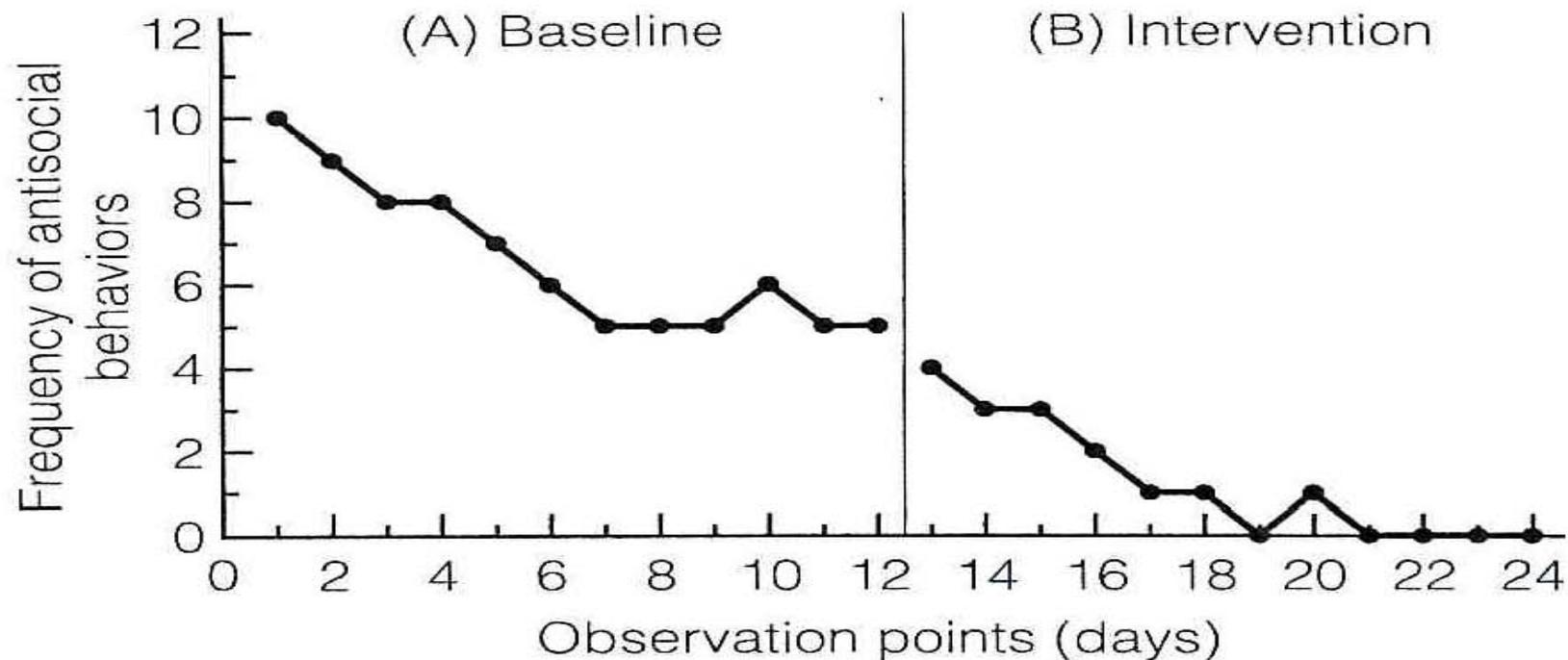


Figure 14-5 Graph of Hypothetical Outcome after Extending a Baseline with an Improving Trend (AB Design)

Baseline and Intervention Phases

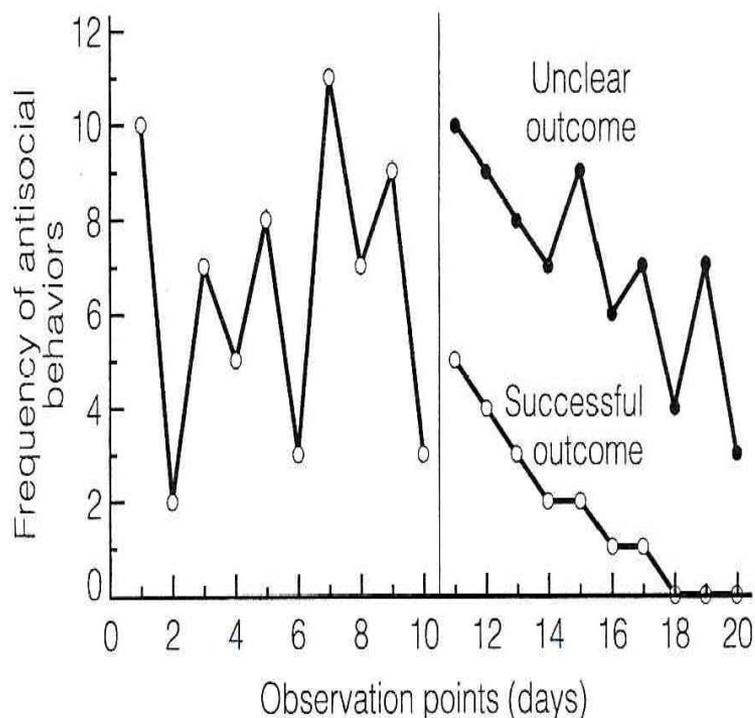


Figure 14-6 Graph of Two Hypothetical Outcomes with an Unstable Baseline (AB Design)

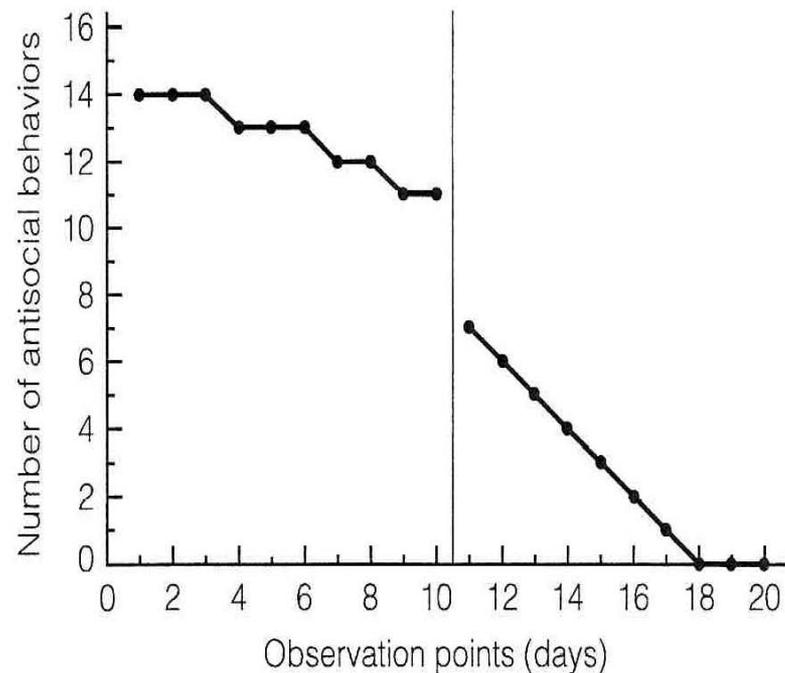


Figure 14-7 Graph of a Hypothetical Outcome Supporting Intervention Efficacy with an Improving Baseline (AB Design)

Graphic Display of Data

- **X axis: (horizontal)**
- **Y axis: (vertical)**
- **Data points**
- **Labels: Baseline/A Phase,
Intervention phase/B Phase**

Interpreting Graphically Displayed Behavioral Data

- **Read the graph:**
 - **Figure caption**
 - **Condition & axis labels**
 - **Location of numerical value & relative significance of scale breaks**
- **Visually track each data path:**
 - **Are data paths properly connected?**
 - **Is the graph distorted?**

AB Design

- **The basic and simplest design**
- **One baseline phase & one intervention phase**
- **Advantage(s):**
- **Disadvantage(s):**
- **Retrospective baseline**

ABAB Design

- **Withdrawal/reversal design**
- **Advantage(s):**
- **Disadvantage(s):**

ABAB Design (Examples)

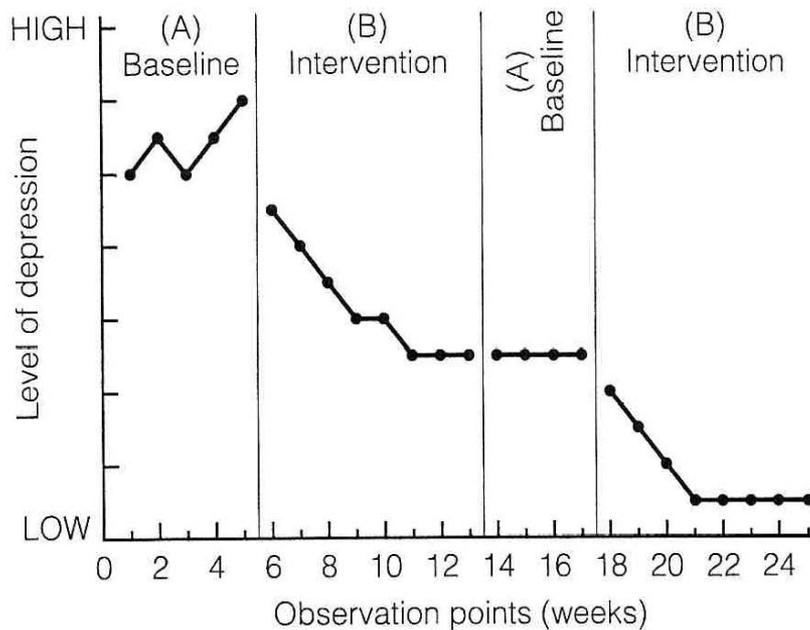


Figure 14-8 Graph of Hypothetical Outcome of ABAB Design Supporting Intervention Efficacy Despite Failure to Obtain a Reversal during Second Baseline

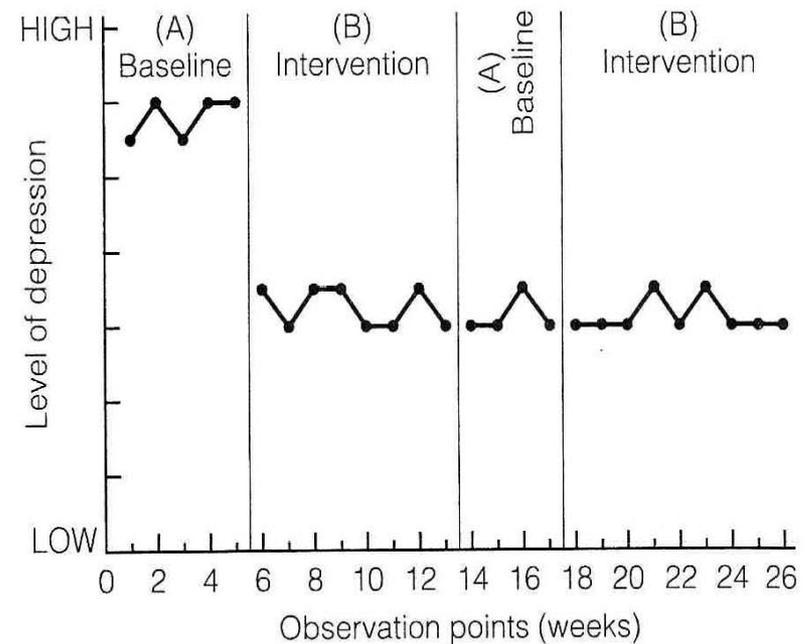


Figure 14-9 Graph of Hypothetical Outcome of ABAB Design with Unclear Results

Multiple-Component Designs (ABC, ABCD)

- **Add a third or fourth type of intervention**
- **Caution: carryover effect, order effect, irreversibility effect, history**

Example of Multiple Component Design

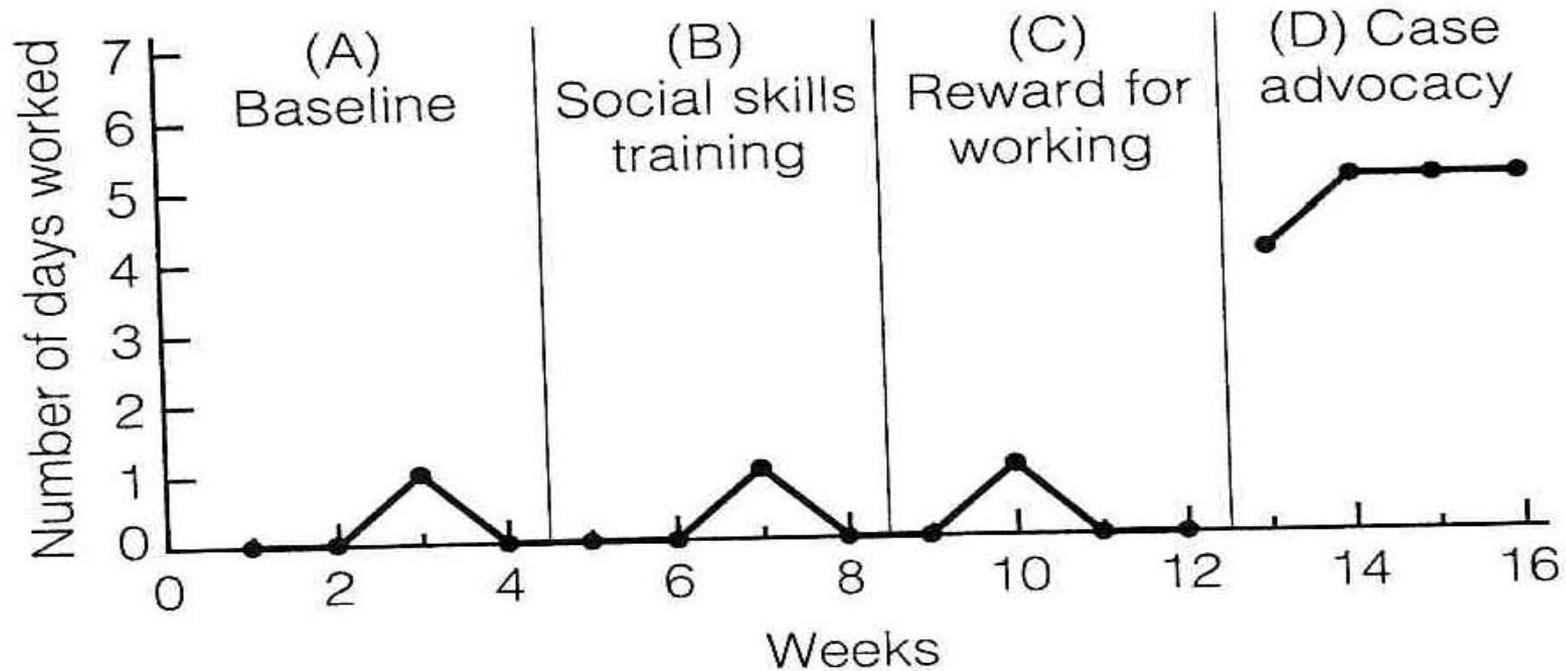


Figure 14-14 Graph of Hypothetical Outcome of Multiple-Component (ABCD) Design, with Unclear Results

Replication

- *Replication* can enhance both internal and external validity.

Be prepared for practical obstacles

Time Series and Related Designs

Notations:

X = introduction of stimulus,
intervention, or treatment

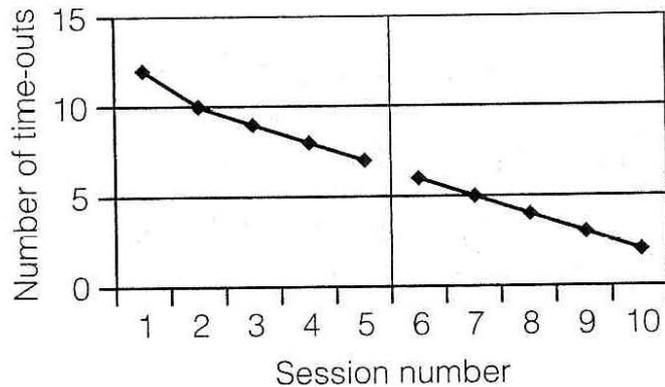
O = observation/measurement

Time-series design

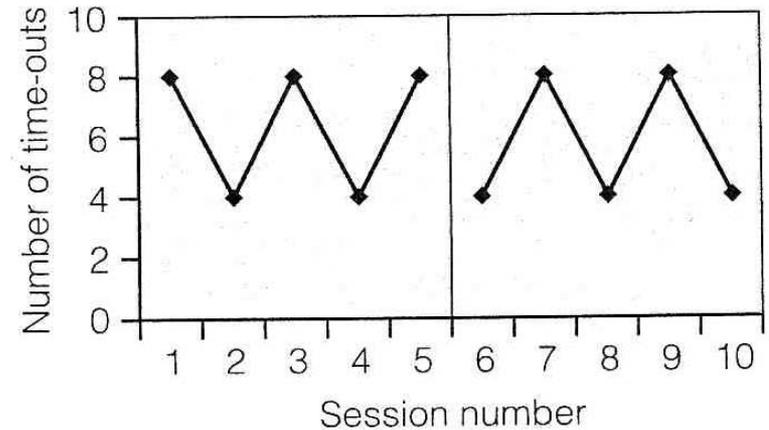
O O O O O X O O O O

Examples of Time Series Projects

Pattern 1



Pattern 2



Pattern 3

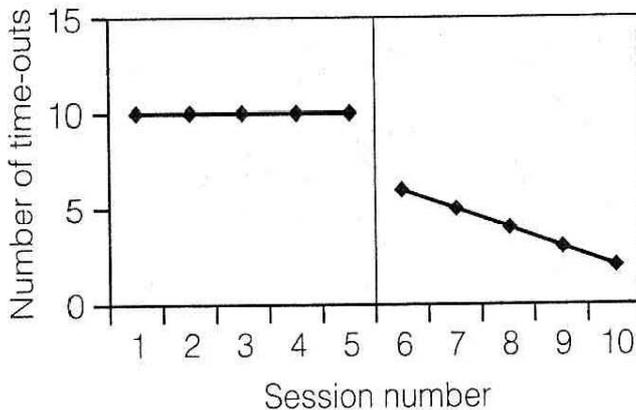


Figure 12-3 Three Patterns of Number of Time-Outs in a Longer Time-Series Perspective

External Validity

- **Generalizability**
- **Representativeness of sample, setting and procedures**
- **Sampling and survey research**