Specialized Tools for Measuring Past Events

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National Science Foundation
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Contrast of Quantitative Interviewing Methods

- Conventional Interviewing
  - Goals
    - Measure only variance in respondent reports
    - Minimize interviewer effects
  - Method
    - Standardized stimuli

- Calendar and Time Diary Interviewing
  - Goal is to maximize quality of recall in retrospective reports
  - Strategies
    - Use cues that are available in the structure of autobiographical memory to improve recall
    - Recognize need to tailor questions/probes to respondents’ circumstances
    - Use benefits of conversation to clarify meanings
  - Temporal emphases in methods
    - Calendar employs domain timelines
    - Time diary employs daily temporal entries
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**Relationship History**

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8. Relationship Category (A-F)

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10. Relationship Category (A-F)

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11. Pregnancies (1-3)

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**II. D.V.**

1. Threatened to hit you?

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2. Thrown anything at you?

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3. Pushed, grabbed, or shoved?

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4. Slapped you?

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5. Kicked you

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6. Hit you with his fist?

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7. Hit you with an object?

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8. Slammed you against a wall?

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9. Beat you?

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10. Choked you?

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11. Threatened to use a knife?

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<th>11</th>
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12. Used a knife or gun?

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13. Used force to make you have sex?

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14. Insist on sex, but not force?

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15. Threatened to take children?

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16. Threatened to harm family?

| 16 | 16 | 16 | 16 | 16 | 16 | 16 |
Direct comparisons between calendar and conventional questionnaires:
Conventional + Calendar vs. Conventional Alone

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Mode/Medium</th>
<th>Ref Period</th>
<th>Results</th>
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<tr>
<td>van der Vaart 2004</td>
<td>Experiment</td>
<td>F-to-f/P&amp;P</td>
<td>8 years</td>
<td>Cal+con: more accurate reports of number, starting date, and types of educational courses</td>
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<tr>
<td>Van der Vaart &amp; Glasner 2007</td>
<td>Experiment</td>
<td>Con CATI Cal P&amp;P/SAQ</td>
<td>7 years</td>
<td>Cal+con: more accurate reports of when pairs of glasses were purchased and their price</td>
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<td>Glasner 2011</td>
<td>Experiment</td>
<td>Web/SAQ</td>
<td>Life</td>
<td>Cal+con: more reports of unemployment and family leaves, especially for more remote events</td>
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<td>Engel et al., 2001</td>
<td>Test-retest</td>
<td>F-to-f/P&amp;P</td>
<td>Life</td>
<td>Cal: reports of more jobs and work time</td>
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<td>Belli et al., 2001</td>
<td>Experiment</td>
<td>Tel/P&amp;P</td>
<td>2 years</td>
<td>Cal: more accurate reports of residential and labor histories; Conv: more accurate reports of entitlements</td>
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<td>Yoshihama et al., 2005</td>
<td>Quasi-Experiment</td>
<td>F-to-f/P&amp;P</td>
<td>Since age 12</td>
<td>Cal: more reports of intimate partner violence; more reasonable pattern of results</td>
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<tr>
<td>Belli et al, 2007; Belli et al, 2012</td>
<td>Experiment</td>
<td>CATI</td>
<td>Life</td>
<td>Cal: more accurate reports of cohabitation, labor, disability, and health histories; Conv: more accurate reports of marital history</td>
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What your child did from 7 in the morning until 12 noon

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<tr>
<th>TIME</th>
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<tr>
<td></td>
<td>What did your child do?</td>
<td>Time Began</td>
<td>Time End</td>
<td>IF WATCHING TV, was that a video tape or TV program?</td>
<td>IF TV, VIDEO, COMPUTER GAMES, what was the name of the (program/video/game) child was (watching/playing)?</td>
<td>Where was child?</td>
<td>Who was doing the activity with child?</td>
<td>Who (else) was there but not directly involved in the activity?</td>
<td>What else was child doing at the same time?</td>
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Time Diary: ATUS
Time Diary: Validity

- High correlations of activity durations with alternative sources of data
  - Beepers (Robinson, 1985)
  - Spouses (Juster, 1985)
  - Time-of-day patterns of energy use (Hill, 1985)
- Reduction in suspected overreporting from standard question form estimates
  - Work (Robinson, 1985; Robinson & Godbey, 1997)
  - Church attendance (Presser & Sinson, 1996)
Needed: Questionnaire Design Studies on Calendar and Time-Diary Methods

• Visual Design
  – Principles of Gestalt psychology apply to interviewer-administered calendar/TD designs

• Behavior Coding
  – Determine which verbal behaviors of interviewers and respondents are associated with data quality

• Paradata Analyses
  – Examine the associations between interfacing with the instrument and data quality

• Modes
  – Explore interviewer- and self-administered computerized designs
Verbal Behavior Coding

- Identifies verbal behaviors in interviews
  - Assess interviewer performance
  - Identify problematic questions
  - Examine the quality of the verbal exchanges between interviewers and respondents

- What retrieval and conversational verbal behaviors occur in calendar methods?
  - How do they differ from those in standardized interviews

- Do the observed verbal behaviors confirm theoretical predictions?
  - Associate verbal behaviors with data quality
Calendar Excerpted Example: Labor History (Stafford & Belli, 2009)

I: And how long did you stay there please?  

Duration probe

R: Until, um, October of ’92.  

Timing Response

I: Okay. And then, um, in October of ’92, did you take another job?  

Sequential probe

Duration response

R: I took another job of—but it lasted for, like, a month and then I went to work some place else – your interested in—  

Sequential response

I: Not that month one then, we’ll take the next  

Clarification
Excerpted Example (continued)

R: Okay, um. The next job was at, um, let’s see. Trying to think of the name of the place, they changed their name. Um. They used to be called employer10?

I: Employer10?

R: Yes.

I: And when did you start working for them? In ’92?

R: Um. Yes, December of ’92 until May of ’93.
Excerpted Example (continued)

I: Alright. December of ’92 until May of ’93. And then in May of ’93 did you…?

R: Um, I went to work in state3 for employer11, but I’m trying to think how long I worked there. It wasn’t—it was—it was until—let’s see. I came to state3 in August—I must have gone for a job—oh, I guess I started in January of ’94, and I only worked for 6 weeks, and then I went on disability.
Verbal Behavior Coding: Calendar and Standardized Interviewing Differences
(Bilgen & Belli, 2010)

• Calendar interviews are more prevalent in
  – Interviewer parallel and sequential retrieval probes
  – Respondent spontaneous parallel and sequential retrieval strategies
  – Interviewer conversational behaviors seeking to clarify meanings
    • Verifying and seeking clarification on what respondents have said
    • Clarifying meanings to respondents
  – Potentially biasing behaviors
    • Directive probing
    • Unacceptable feedback
Calendar Interviews: Verbal Behavior associations with Data Quality

• Higher prevalence of retrieval probes and strategies
  – Greater accuracy with experiential difficulty
  – Less accuracy with unremarkable past

• Conversational behaviors led to mixed results
  – Interviewers at times are able to assist respondents when they are expressing difficulty in a retrieval task
  – At other times, interviewer’s assistance makes matters worse.

• Rapport behaviors (digressions, laughter) also mixed
  – Socially desirable events such as employment increases motivation
    • Rapport associated with better accuracy
  – Socially undesirable events such as many marriages increases ingratiation
    • Rapport associated with poorer accuracy
Paradata in the ATUS

- Variables from Blaise audit trails
  - Reports of activity spell durations or stop times
  - Interviewing time per activity spell
  - Verbatim or precoded activity entry
  - Number of activity entries greater than public use data activity count
  - Number of prompts
  - Number of inserted activities
  - Number of reviews of already entered spells
  - Entries during interview or post-interview processing

- Data quality variables from ATUS public release files
  - Answer too vague to categorize as an activity
  - Respondent has an unfilled gap in time (‘memory gap”)
  - Rounding
  - Missing key reports of
    - Sleeping
    - Grooming
    - Eating
ATUS: Paradata Preliminary Results

• Associations among interview entries
  – Verbatim entries associated with increased duration entries

• Associations between entries and data quality
  – Verbatim entries associated with increased missing of key reports
  – Duration entries associated with decreased vagueness
  – Duration entries associated with decreased memory gap
  – Number of activity entries associated with decreased vagueness

• Associations between interviewer characteristics and data quality
  – More highly educated respondents
    • Increased vagueness
    • Decreased memory gaps
  – Employed respondents
    • Decreased rounding
Future Directions: Smart Instruments

- Respondent Characteristics
- Interviewer Characteristics
- Behavior Coding
- Paradata


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Applications of Smart Instruments, 1

• Data processing
  – Post-processing: noise filtering or removal, sanitization, feature extraction
  – Variable extraction, automation
    • Better serve research agendas
• Machine learning and pattern recognition
  – Data mining techniques
    • Large data analyses: ability to combine voluminous, diverse types of data
  – Identification of critical factors or patterns or behaviors
• Classifiers for Predicting Quality/Errors
  – Identified factors used as classifiers to predict accuracy and completeness of interviews/surveys
Applications of Smart Instruments, 2

- **Adaptive, Assistive Instrument**
  - **Assistive**: Prompt or assist interviewer during interviews/surveys with static recommendations at the right time
    - Based on interview/survey scripts, setting the sequence of steps
    - Based on missing values in data fields
  - **Adaptive**: Prompt or assist interviewer during interviews/surveys with conditioned, situated recommendations at the right time tailored to the right situation
    - Based on situations modeled by the instrument in real-time
    - Based on patterns found in data analytics
    - Based on predictors or classifiers found (trained using data sessions)
      - What combinations of values in data fields lead to likely inaccurate or incomplete entry in data field X?
      - What combinations of respondent and interviewer profiles coupled with certain data values likely lead to error Y?
Applications of Smart Instruments, 3

- Intelligent Self-Administered Instrument
  - Recognizing patterns, replacing the role of interviewers
  - Providing data entry correction and quality control measures
    - **Guiding**: Use a sequence of prompts or paths to navigate/lead respondents to likely successful outcomes
    - **Intervening**: Anticipate respondent actions and intercept, and provide alternative to respondent to prevent errors
    - **Mitigating**: Review response, recognize errors, and re-engage respondents to correct errors
  - Based on knowledge base built from data analytics (predictors/classifiers, feature extraction, pattern recognition)
  - Self-learning to improve performance over time
    - Based on feedback on quality of session, adjust weights, rules, situation-action couplings, etc.
    - Based on real-time respondent interactions with instrument (e.g., case-based learning and case-based reasoning)
Summary

• Calendars and Time-Diaries encourage
  – Using temporal information to assist remembering
  – Flexible interviewing in which what has been remembered are used as cues for additional remembering
• Behavior coding and paradata analyses provide insights on interviewing techniques that can impact data quality
• Self-administration is possible
• Smart instruments
  – Based on data quality analyses
  – Can augment interviewer-administration
  – Can become virtual interviewers
    • Tailored to respondent needs
      – Probing
      – Completeness checking