Using paradata to monitor interviewers' instrument navigation behavior and inform instrument technical design: A case study from a national household survey in Ghana

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Chicago
July 25-29, 2016
The 2nd International Conference on Survey Methods in Multinational, Multiregional and Multicultural Contexts (3MC)
Overview

- Background and instrument

- How does the instrument design affect instrument navigation by the interviewers?

- How does instrument navigation affect interview length?

- Some observations & next steps
Ghana Socioeconomic Panel Study

- Revisit panel households at 3-4 year intervals for 20 years.
  - Sponsored by Economic Growth Center (EGC) at Yale University
  - Carried out by the Institute for Statistical, Social and Economic Research (ISSER) at the University of Ghana.

- First wave (baseline) was completed on paper between October 2009 and February 2010.

- Second wave was conducted on **Computer-Assisted Personal Interviewing (CAPI)** between March-December 2014.
  - Collaborated with Survey Research Center (SRC) at University of Michigan.

- 334 enumeration areas country-wide. Sample size of 5009 households, with approximately 18,000 individuals. Also sample size of 500 split-off households were tracked and interviewed between January-June 2015.

- Interviews are **NOT digital recorded** for quality monitor purpose.
Challenges from Paper to CAI

- **Transition** from complex grid designs on paper to a computer assisted interview (CAI) instrument.

- Need to have total **flexibility** to jump in/out from different sections of the instrument (depending on the availability of the respondents)

- Need to track **real-time status** of interviewing progress on multiple respondents within the same instrument.
### Section 1: Household Information

#### Part B2: Household Roster

<table>
<thead>
<tr>
<th>Member ID</th>
<th>6a. Name</th>
<th>6b. Nicknames, Other Names</th>
<th>7. Sex (M/F)</th>
<th>8. Age (If age less &lt;1, record 0)</th>
<th>9. Relationship to HH Head (see codes to the right of the page)</th>
<th>10. Marital Status (see codes)</th>
<th>11. Current Cell Phone Number</th>
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<tbody>
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<tr>
<td>Section</td>
<td>2. members of the HH</td>
<td>3. HH assets</td>
<td>4. HH production</td>
<td>5. non-farm enterprise</td>
<td>11. consumption module</td>
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<tr>
<td>1. Who in the household is most knowledgeable about?</td>
<td>family history, relatives and spouses that don't live in household</td>
<td>land holdings, farm tools, animals, financial assets, household durables</td>
<td>plots, crops, interaction with village officials/organizations</td>
<td>non-farm business ventures, costs, revenues, employees, assets</td>
<td>how much food the family eats, household bills</td>
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<td>2. Name</td>
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<td>4. Date &amp; time for Individual Interview: dd.mm / time</td>
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<td>5. Checkpoint: Interview Complete?</td>
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<td>1. Yes 2. No</td>
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</tbody>
</table>

(i.) Limited respondent Modules Enumerator: each of the following sections must be asked to the head of the household, the spouse, and one person RANDOMLY chosen. Please schedule an interview date with these selected household members. Record your initials date and when the interview was completed.

1. Write the names on pieces of papers for the household head to select:

<table>
<thead>
<tr>
<th>Section 10. Psych/Psychology</th>
<th>Head</th>
<th>Spouse</th>
<th>Randomly chosen individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. ID number</td>
<td>ID __</td>
<td>ID __</td>
<td>ID __</td>
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<tr>
<td>7. Name</td>
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<tr>
<td>8. Date &amp; time for Individual Interview: dd.mm/time</td>
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</tr>
<tr>
<td>9. Checkpoint: Section 10, Psychology/Psychology complete?</td>
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</tr>
<tr>
<td>1. Yes 2. No</td>
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</tr>
</tbody>
</table>

Initials and date when the interview was completed:
Instrument Sections*

*Definition: there are four sections (household, personal, agriculture, enterprise) with multiple blocks within each instrument.
Consent Has Completed

Survey Status

**S0Consent Forms**
- **S01A: Consent** - **Done**

**Rosters**
- **S01B2: Household Roster** - **Not Started**

*Not all sections have been completed! Please select a section and continue the survey.*
Household Roster Has Completed
## Survey Status

### S0 Consent Forms
- **S01A: Consent**
  - **Done**
  - **S01B3: Consent for Under 26**
    - Not Started

### Rosters
- **S01B2: Household Roster**
  - Done
- **S04: Plot Roster**
  - Not Started
- **S05: Non-Farm Enterprise Roster**
  - Not Started

### Household Level Sections
- **S02B: Non-Resident Spouses**
  - Not Started
- **S02A: Non-Resident Relatives**
  - Not Started
- **S10C: Social Networking**
  - Not Started
- **S10D: Information Seeking**
  - Not Started
- **S11: Household Consumption**
  - Not Started
- **S12: Housing Characteristics**
  - Not Started
- **S04NN: Gathering**
  - Not Started

---

Not all sections have been completed! Please select a section and continue the survey.
Instrument types:
(1) Personal + Household
(2) Personal + Household + Plot
(3) Personal + Household + Enterprise
(4) Personal + Household + Plot + Enterprise
# Survey Status

**S0 Consent Forms**
- S01A: Consent: **Done**
- S01B3: Consent for Under 26: **Not Started**

**Rosters**
- S01B2: Household Roster: **Done**
- Person Sections: **Not Started**
- S04: Plot Roster: **Done**
- Plot Sections: **Not Started**
- S05: Non-Farm Enterprise Roster: **Done**
- Non-Farm Enterprise Sections: **Not Started**

**Household Level Sections**
- S02B: Non-Resident Spouses: **Not Started**
- S03Ai: Animals: **Not Started**
- S02A: Non-Resident Relatives: **Not Started**
- S03Aii: Tools: **Not Started**
- S10C: Social Networking: **Not Started**
- S03Aiii: Durable Goods: **Not Started**
- S10D: Information Seeking: **Not Started**
- S03Bi: Borrowing: **Not Started**
- S11: Household Consumption: **Not Started**
- S03Bii: Lending: **Not Started**
- S12: Housing Characteristics: **Not Started**
- S03Biii: Out-Transfers: **Not Started**
- S04NN: Gathering: **Not Started**
- S03Biv: In-Transfers: **Not Started**
- S03Bv: Savings: **Not Started**

*Not all sections have been completed! Please select a section and continue the survey.*
Parallel Block Instrument

Instrument types:
1. Personal + Household
2. Personal + Household + Plot
3. Personal + Household + Enterprise
4. Personal + Household + Plot + Enterprise
Survey Status

**S0 Consent Forms**
- S01A: Consent: Done
- S01B3: Consent for Under 26: Not Started

**Rosters**
- S01B2: Household Roster: Done
- S04: Plot Roster: Done
- S05: Non-Farm Enterprise Roster: Not Started

**Household Level Sections**
- S02B: Non-Resident Spouses: Not Started
- S02A: Non-Resident Relatives: Not Started
- S10C: Social Networking: Not Started
- S10D: Information Seeking: Not Started
- S11: Household Consumption: Not Started
- S12: Housing Characteristics: Not Started
- S04NN: Gathering: Not Started

S03Ai: Animals: Not Started
S03Aii: Tools: Not Started
S03Aiii: Durable Goods: Not Started
S03Bi: Borrowing: Not Started
S03Bii: Lending: Not Started
S03Biii: Out-Transfers: Not Started
S03Biv: In-Transfers: Not Started
S03Bv: Savings: Not Started

Not all sections have been completed! Please select a section and continue the survey.
Parallel Block Instrument

Instrument types:
(1) Personal + Household
(2) Personal + Household + Plot
(3) Personal + Household + Enterprise (Highlighted)
(4) Personal + Household + Plot + Enterprise
<table>
<thead>
<tr>
<th>Enterprise Name</th>
<th>Basic Info</th>
<th>Assets</th>
<th>All Employees</th>
<th>Four Important Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>Not Started</td>
<td>Not Started</td>
<td>Not Started</td>
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<tr>
<td>EFG</td>
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<td>Not Started</td>
</tr>
</tbody>
</table>

**Survey Status**

**SOC consent forms**
- S01A: Consent: Done
- S01B3: Consent for Under 26: Not Started

**Rosters**
- S01B2: Household Roster: Done
- S04: Plot Roster: Done
- S05: Non-Farm Enterprise Roster: Done

**Household Section**
- S02B: Non-Resident Spouses: Not Started
- S02A: Non-Resident Relatives: Not Started
- S10C: Social Networking: Not Started
- S10D: Information Seeking: Not Started
- S11: Household Consumption: Not Started
- S12: Housing Characteristics: Not Started
- S04NN: Gathering: Not Started
- S03Ai: Animals: Not Started
- S03Aii: Tools: Not Started
- S03Aiii: Durable Goods: Not Started
- S03Bii: Borrowing: Not Started
- S03Bii: Lending: Not Started
- S03Biiv: In-transfers: Not Started
- S03Biv: Savings: Not Started

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Not all sections have been completed! Please select a section and continue the survey.

---

Case Complete: 

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Parallel Block Instrument

Instrument types:
(1) Personal + Household
(2) Personal + Household + Plot
(3) Personal + Household + Enterprise
(4) Personal + Household + Plot + Enterprise
# Survey Status

## SocConsent Forms
- **S01A: Consent**: Done
- **S01B3: Consent for Under 26**: Done

## Rosters
- **S01B2: Household Roster**: Done
- **Person Sections**: Started
- **Plot Roster**: Done
- **Plot Sections**: Done
- **S05: Non-Farm Enterprise Roster**: Done
- **Non-Farm Enterprise Sections**: Not Started

## Household Level Sections
- **S02B: Non-Resident Spouses**: Not Started
- **S02A: Non-Resident Relatives**: Not Started
- **S10C: Social Networking**: Started
- **S10D: Information Seeking**: Done
- **S11: Household Consumption**: Not Started
- **S12: Housing Characteristics**: Not Started
- **S04NN: Gathering**: Done
- **S03A: Animals**: Done
- **S03Aii: Tools**: Started
- **S03Aiii: Durable Goods**: Started
- **S03B: Borrowing**: Not Started
- **S03Bii: Lending**: Done
- **S03Biii: Out-Transfers**: ---n/a---
- **S03Biv: In-Transfers**: ---n/a---
- **S03Bv: Savings**: Done
### Survey Status

**S0 Consent Forms**
- S01A: Consent: Done
- S01B3: Consent for Under 26: Not Started

**Rosters**
- S01B2: Household Roster: Done
- S04: Plot Roster: Done
- S05: Non-Farm Enterprise Roster: Done

**Household Level Sections**
- S02B: Non-Resident Spouses: Not Started
- S02A: Non-Resident Relatives: Not Started
- S10C: Social Networking: Not Started
- S10D: Information Seeking: Not Started
- S11: Household Consumption: Not Started
- S12: Housing Characteristics: Not Started
- S04NN: Gathering: Not Started
- S03Ai: Animals: Not Started
- S03Aii: Tools: Not Started
- S03Aiii: Durable Goods: Not Started
- S03Bi: Borrowing: Not Started
- S03Bii: Lending: Not Started
- S03Biii: Out-Transfers: ----n/a----
- S03Biv: In-Transfers: ----n/a----
- S03Bv: Savings: Not Started

Not all sections have been completed! Please select a section and continue the survey.
“Benefits” of this design

- Iwers have a high-level of autonomy with respect to interview navigation.

- Iwers are able to:
  - switch respondents easily.
  - jump to any section of questionnaire quickly.

- Development of a questionnaire “Dashboard” to show the status of all the questionnaire sections and all the respondents within the household.
Questions for the design...

- How does instrument design affect instrument navigation?
  - Instrument parallel blocks: four instruments (household, personal, agriculture, enterprise) with multiple sections/blocks within each instrument.

- How does instrument navigation affect interview length?
  - Order of interview initiation
  - Movements between blocks

By using keystroke data (Paradata)
The ADT File as Paradata

- Timestamps: Hours:Minutes:Seconds:Thousands of a second
- Case ID in Blaise database

Sample ID:
- 1/17/2012 9:00:06:304 AM
- "Enter Form:1",
- "Key:3975053020"  

Start IW:
- "Metafile name:C: \blproj\HRS2012\work\HRS12.bmi"
- "Metafile timestamp:Friday, January 06, 2012 1:08:04 PM"

Audit trail file information:
- "WinUserName:14554015"
- "DictionaryVersionInfo:0.0.0.0"

Interviewer ID:
- 1/17/2012 9:00:12:702 AM
- "Enter Field:SecA.StartInterview.A007TRAlive_A",
- "Status:Normal",
- "Value:

Time of first keystroke:
- 1/17/2012 9:00:13:965 AM
- "(KEY:)1[ENTR]"

Question:
- "Action:Store Field Data",
- "Field:SecA.StartInterview.A007TRAlive_A"
- "1/17/2012 9:00:14:276 AM"
- "Leave Field:SecA.StartInterview.A007TRAlive_A",
- "Cause:Next Field",
- "Status:Normal",
- "Value:1"

Question with change answer:
- "1/17/2012 9:02:51:681 AM"
- "Enter Field:SecJ.WORKSTATUS.J005MCurrEmpStatus[1]",
- "Status:Normal",
- "Value:
- "1/17/2012 9:02:55:971 AM"
- "(KEY:)15[BACK][BACK]5[ENTR]"
- "1/17/2012 9:03:03:209 AM"
- "Action:Store Field Data",
- "Field:SecJ.WORKSTATUS.J005MCurrEmpStatus[1]"
- "1/17/2012 9:03:03:256 AM"
- "Leave Field:SecJ.WORKSTATUS.J005MCurrEmpStatus[1]",
- "Cause:Next Field",
- "Status:Normal",
- "Value:5"

Complete IW:
- "1/17/2012 9:13:24:923 AM"
- "Enter Field:IWComplete",
- "Status:Normal",
- "Value:
- "1/17/2012 9:13:28:480 AM"
- "(KEY:)1[ENTR]"
- "1/17/2012 9:13:29:650 AM"
- "Action:Store Field Data",
- "Field:IWComplete"
- "1/17/2012 9:13:29:728 AM"
- "Leave Field:IWComplete",
- "Cause:Next Field",
- "Status:Normal",
- "Value:1"
- "1/17/2012 9:13:30:056 AM"
- "Leave Field:IWComplete",
- "Cause:Exit",
- "Status:Normal",
- "Value:1"
- "1/17/2012 9:13:30:056 AM"
- "Leave Form:1",
- "Key:3975053020"
Most Common Block Moves All Types

- Edge Weight (number of times a move occurred) $\geq 500$
- Movement within sections dominates
- Exceptions are rosters and Personal to Household
Most Common Block Moves All Types

- Tendency to move laterally or within the same questionnaire content
- Optional sections introduce multiple, common paths
Most Common Block Moves All Types

- Tendency to work down the columns
- Non-resident Relatives and Consumption introduce multiple common paths
Moving Out of a Section

- Type 4 interviews showing moves out of the Enterprise section
- “fourImportant” block has most exit moves
Instrument Parallel Blocks

- We should have some instructions about the **optimal interviewing paths** for the desired navigation.
  - The parallel blocks **programming** needs to match with the optimal navigation design.
  - The **interviewer training** needs to emphasize the design and avoid “jump around too much”.

- How does instrument **navigation** affect interview **length**?
  - Order of interview initiation
  - Movements between blocks
N = 4223 interviews

- Type 1) Personal + Household
- Type 2) Personal + Household + Plot
- Type 3) Personal + Household + Enterprise
- Type 4) Personal + Household + Plot + Enterprise

Interview Length

- Adjusted mean 290 (+/- 156) minutes
- Ranged from ~30 minutes to 22 hours
- Type 4 longer than all others (P<0.05)
- Type 1 shorter than all others (P<0.05)
- Type 2 & 3 not different
Order of Section Entry

• Split sample into two groups:
  • **Completed rosters first**
  • Others
• T-test comparison of IW length

• Rosters-first group showed significantly lower interview lengths
  • Ave **Roster First**: 257.3
  • Ave Others: 280.3
  • $P < .0001$
Some Observations (Roster-First)

- **Region (10):**
  - Only 2 regions; no significant differences in four regions.

- **HH Type (1-4):**
  - Only HH without any or with both agriculture/enterprises sections.

- **HH size (1-17):**
  - Single-person HH; no significant differences in HH size = 2 or 3.

- **Team leadership (23):**
  - Only in 8 teams; no significant differences in 4 teams.
Number of Block Moves Per Block

- On a per household basis
- Average 52 blocks per household
- Average Block Moves per Block is 1.21
- Min = 1, Max = 2.82 (for all types)

Differences by Interview Type

- Less movement in Type 2 (Plot only, P<.05)
- Type 3 (Enterprise only) more movement than Type 1/2 (P < 0.05), trending toward more than Type 4
Interview Length & Number Block Moves Per Block

- Interview length increases with increasing movement between blocks
- IW Length = 80.6 * MovesPerBlock + 216
- \( P = .028; R^2 = 0.302; \text{Adj } R^2 = 0.255 \)
- Non-linear relationship?
Interview Length & Number of Block Moves Per Section

Number interviews ranges from N = 1277 to 2

Interviews are clustered under 1.5 Block Moves Per Section
Interview Length & Number Block Moves Per Block By Type

**Type 1: Personal + Household**

IW Length = 31 * MovesPerBlock + 159
P = .16, Adj R² = .09

**Type 2) Personal + Household + Plot**

IW Length = 141 * MovesPerBlock + 147
P < .005, Adj R² = .64

**Type 3) Personal + Household + Enterprise**

IW Length = 108 * MovesPerBlock + 133
P = .007, Adj R² = .40

**Type 4) Personal + Household + Enterprise + Plot**

IW Length = 190 * MovesPerBlock + 144
P < .0001, Adj R² = .70
Some Observations (Block Moves)

- Movement between blocks are with a cost

- Interview length increases with increasing movement between blocks

- Some movements are explainable with the instrument design but others are unsure --- why
What else we look into?

Other paradata usage examples:
- By block
- By Iwer
- By question
- By respondent
- By time/Iw order
Midblock Exits (by block)

Midblock exits divided by total exits (ratio_midblk_exits_by_blk) for specific blocks. Data represent blocks with > 75 total exits and a mid-block exit rate >= 25%.
Midblock Exits (by block by person)

Midblock exits divided by total exits (ratio_midblk_exits_by_blk) for specific, enumerated blocks. Larger bubbles indicate more exit events.
Midblock Exits – Overall (by Iwer)
Midblock Exits (by Iwer) - Consumption

Midblock exits divided by total exits (ratio_midblk_exit_iwer_blk) per IWER for the s11_consumption block
Data represent IWERs with > 20 total exits

Iwer 1021
Iwer 1089
Midblock Exits (by Iwer) - Health

Midblock exits divided by total exits (ratio_midblk_exit_iwer_blk) per IWER for the s06_health[1] block.
Data represent IWERS with > 20 total exits.
Midblock Exits (by Iwer) - Housing

Midblock exits divided by total exits (ratio_midblk_exit_iwer_blk) per IWER for the s12_housing block. Data represent IWERs with > 20 total exits.
Midblock Exits (by Iwer) – HH Roster

Midblock exits divided by total exits (ratio_midblk_exit_iwer_blk) per IWER for the s01b2_householdroster block.

Data represent IWERs with > 20 total exits.
Midblock Exits (by Iwer) – Non Resident Relatives

Midblock exits divided by total exits (ratio_midblk_exit_iwer_blk) per IWER for the s02a_nr_relatives block
Data represent IWERS with > 20 total exits

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Average # of Questions Read < 1 second by the Iw Order
QC – Response Changes

Response changes divided by total responses (ratio_resp_chg_by_blk) for specific blocks.
Data represent blocks with > 100 responses and a response change rate >= 3%.
Average # of Response Changes by the Iw Order
Next Steps

- Link the block movement data with interviewer level.
- Identify “sensitive” QC indicators (e.g., data discrepancies).
- Who answered the Iw.
- Interviewers debriefing.
- Apply all the lessons we learned in this wave to next wave instrument design.
Acknowledgements

Contributors from Yale University and Institute for Statistical, Social and Economic Research (ISSER) at the University of Ghana

University of Michigan

Project staff: Beth-Ellen Pennell, Gina-Qian Cheung, Yu-Chieh (Jay) Lin, Lisa Wood, Joel Devonshire, Jennie Williams, Xuetao (Brant) Zhang, Kyle S. Kwaiser

Analysis funding: U-M Survey Research Operations
Thank You!

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