A Comparison of Fully Labeled and Top Labeled Grid Question Formats

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Acknowledgments

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Traditional, Top Labeled Grid Format

- The grid question format is common in mail and web surveys
- However, grids are recognized as a complex question format
  - Respondents have to visually connect information from multiple places
  - They have to locate the answer space that aligns horizontally with the item of interest and vertically with the response option
- As a result, grids result in higher rates of item nonresponse, straightlining, and breakoff (Couper et al., 2013; Tourangeau et al., 2004)
In the web dynamic features can be used to assist respondents.

- Greying out answered rows – decreases item nonresponse (Kaczmirek 2008; 2011)

- Hover shading of rows and columns to show where the mouse is – increases item nonresponse (Kaczmirek 2008; 2011)

- Greying out inapplicable or already answered items in a matrix design – decreases item nonresponse and response time (Couper et al. 2013).
But mail surveys don’t have these dynamic features. So what can we do?

- Fully labeled grid

Response option labels are provided in every row.

Puts all necessary information in a row, reducing the need to connect disparate pieces of information.

Should allow the respondent to process only horizontally and eliminate or reduce vertical processing.
Gestalt Psychologist Principles of Continuity:

Items that appear to continue smoothly will be more easily perceived as belonging together.

In a fully-labeled grid, items and labels appear in the same straight horizontal line. Items continue smoothly to labels.

Labels appear within the foveal view.
But its really ugly!
Will people really answer that thing?

21. In the past 12 months, how often did you experience each of the following?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>You had exciting new ideas or thoughts occurring to you one after the other.</td>
<td>❌</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You felt so confident, nothing would stop you.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You got much less sleep than usual but didn’t really miss it.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You were so easily distracted that you had trouble staying on track.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You tended to show poor judgment (e.g., spending spree, sexual indiscretions, or impulsively quitting a job).</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You thought you were being talked against.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You were sure that everyone was against you.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You thought negative comments were being circulated about you.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>You felt people were trying to make you upset.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>
• A preliminary test in a mail survey of Nebraskans found the fully-labeled grid:
  – Reduced item nonresponse rates compared to a top labeled grid
  – Did not result in more respondents skipping the grid entirely
  – (Smyth et al., 2014)

• But this was only tested on 1 grid.

14. Please indicate how satisfied or dissatisfied you are with the availability of each of the following in your community.

<table>
<thead>
<tr>
<th></th>
<th>Very Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neither Satisfied nor Dissatisfied</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle paths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor areas to hunt, fish, or hike</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sporting events</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restaurants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine arts (museums and theatres)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell phone service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet access</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Libraries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research Questions

• Compared to a top-labeled grid format, does a fully-labeled format impact…
  – Percent of respondents skipping the grid altogether?
    • Hypothesis: Higher rates of skipping entire grid in fully labeled version
  – Mean responses?
    • Hypothesis: No difference
  – Correlations among items?
    • Hypothesis: Lower correlations between items in the fully labeled version
  – Percent of respondents straightlining?
    • Hypothesis: Lower rates of straightlining in the fully labeled version
  – Percent of respondents skipping items within the grid?
    • Hypothesis: Lower rates of item nonresponse within the grid in the fully labeled version
Research Questions

– How do respondents visually process the grid?
  • Hypotheses:
    – Respondents in the fully labeled version will spend less time looking (i.e., fixating) at the response option labels at the top of the grid columns and more time fixating on areas internal to the grid.
    – Respondents will look at the top row of labels fewer times in the fully labeled than the top labeled version
    – No difference in the amount of time or number of gaze entries into the item prompts
We test these hypotheses in three different experiments with a variety of item types.

- Attitude and behavior items
- A variety of topics
- A variety of types of response scales
- A variety of number of items in the grid (5-17)
- Mail and web (with eye tracking) modes
Experiment #1

- 2015 National Health, Wellbeing, and Perspectives Study (NHWPS)
- 12 page mail survey with 77 questions
- Sampled 6,000 addresses from the Computerized Delivery Sequence File
- 4 contacts → Invitation, post card, and two reminders
- n=1,002 (AAPOR RR1: 16.7%)
  - Version 1: n=522
  - Version 2: n=488
- Contained 7 grid comparisons
Experiment #2

• 2011 Getting Along Survey

• 4 page paper and pencil survey with 23 questions about satisfaction with the university and diversity on campus

• Administered in classes

• Convenience sample of 512 undergraduate students

• Contained 3 grid questions
Experiment #3

- Tourism and Recreation in Nebraska
- Measurements:
  - Brief in-person survey and literacy assessment
  - Eye tracked web survey with 50 questions displayed across 44 web pages
- 2 rounds of data collection
  - Spring 2013, n=47 university students
  - December 2013-April 2014, n=120 general population members
- 28 cases had technical difficulties so analytic sample size is n=139
- Recruitment used flyers, Craigslist ads, and word of mouth.
- Eligibility – born in the U.S., English as first language, no bifocals
- Contained 2 grid questions
Eye Tracker

- Applied Science Laboratory (ASL) D6 high-speed eye tracker
  - Unobtrusive camera located below the computer monitor
  - Collects 120 measurements per second (120 Hz)
Eye Tracker

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  - Interest areas aggregate data for specified areas
  - For each interest area, export:
    - Duration of time spent fixating in area
    - Number of gaze entries into area

15. Please indicate your overall satisfaction level with each of the following venues in Lincoln.

<table>
<thead>
<tr>
<th>Venue</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Neither Satisfied or Dissatisfied</th>
<th>Dissatisfied</th>
<th>Very Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bars</td>
<td>○</td>
<td></td>
<td>○</td>
<td></td>
<td>○</td>
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<tr>
<td>Shopping Centers</td>
<td>○</td>
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<tr>
<td>Museums</td>
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<tr>
<td>Movie Theaters</td>
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<td>Hotels</td>
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Full headings area

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- Full headings area
- Individual headings areas

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<td>Museums</td>
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<td></td>
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<td>Movie Theaters</td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>Hotels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Full headings area
- Individual headings areas
- Full response option area with headings
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    - Number of gaze entries into area

![Image of satisfaction levels table]

- Full headings area
- Individual headings areas
- Full response option area with headings
- Individual response columns
Eye Tracker

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    • Number of gaze entries into area

• Full headings area
• Individual headings areas
• Full response option area with headings
• Individual response columns
• Item Prompts
Findings
The grid format had little effect on the rate of respondents skipping the entire grid.

Percent of Respondents Skipping Entire Grid by Labeling Treatment

- Top-Labeled
- Fully-Labeled

* p ≤ 0.050, ** p ≤ 0.010, *** p ≤ 0.001
The grid format had little effect on mean ratings for individual items within the grids

- Across the three surveys, there were 111 individual items total, all with five-point scales.

- Absolute value of the difference between means
  - Range: 0.001 to 0.19
  - Mean: 0.06

- Only 3 of 111 differences in means were statistically significantly different from zero.

- There was no pattern to the direction of differences. The mean was higher in…
  - Fully labeled version in 41% of items
  - Top labeled version in 51% of items
  - No difference in 8% of items
The two labeling formats did seem to produce different correlation matrix structures.

- The overall correlation structure differed across formats in 8 of the 12 grids.

- Tested for differences across treatments in correlations between each possible pair of items within each grid (i.e., 560 tests!!!)
  - 8% of pairs were significantly different (46).
  - No clear pattern among significant correlations
    - ~50% were more highly correlated each grid format

- The grid formats did produce different correlation structures, but the fully labeled grid format did not necessarily decrease correlations as expected.
  - We have more work to do here.
The fully-labeled grid does not reduce straightlining vis-à-vis the top-labeled grid.
The fully-labeled grid does not reduce item-nonresponse within the grid compared to the top-labeled grid.
Summary for response distribution and data quality outcomes

• The fully labeled grid had very little impact.
  – No effect on item means, item-nonresponse to the entire grid, item-nonresponse within the grid, or straightlining.
  – Age, education, and literacy did not moderate these effects.

• The fully labeled grid did produce different correlation structures among items, but we have more work to do to figure out why.
But did the fully-labeling affect how respondents processed the grid?

• To assess this, we look at eye tracking findings
  – A couple visuals
  – Duration of fixations in interest areas
  – Number of gaze entries into interest areas
Heat maps (n=1 in each condition)

Top labeled

Fully labeled
Spotlight maps (n=1 in each condition)

Top-labeled

Fully labeled
And now, aggregated over all respondents…
Respondents spent less time fixating on the response option headings in the fully labeled version on Q15.
The pattern in heading fixation duration is similar in Q29

Headings Fixation Duration in Q29

- **Top-Labeled**
- **Fully-Labeled**

+ $p \leq 0.100$, * $p \leq 0.050$, ** $p \leq 0.010$, *** $p \leq 0.001$
• Fixation duration in the response area did not differ by grid form.

• Fixation duration in the individual response columns did not differ by grid form.

• Fixation duration in the item prompt area did not differ by grid form.
Respondents looked into the heading areas fewer times on the fully labeled version on Q15.

Number of Entries into Headings, Q15

- **Top-Labeled**
- **Fully-Labeled**

<table>
<thead>
<tr>
<th>Full Heading Area</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Neither</th>
<th>Dissatisfied</th>
<th>Very Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top-Labeled</strong></td>
<td>14</td>
<td>8</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Fully-Labeled</strong></td>
<td>11</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

+ p≤0.100, * p≤0.050, ** p≤0.010, *** p≤0.001

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</thead>
<tbody>
<tr>
<td>Restaurants</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Bars</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<td>Museums</td>
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<tr>
<td>Movie Theaters</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hotels</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>

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The pattern in number of entries is similar in Q29

Number of Entries into Headings, Q29

- Top-Labeled
- Fully-Labeled

+ p≤0.100, * p≤0.050, ** p≤0.010, *** p≤0.001
• The number of entries into the response area did not differ by grid form.

• The number of entries into individual response columns did not differ by grid form.

• The number of entries into the item prompt area did not differ by grid form.
Summary

• While the fully labeled grid format did not seem to impact responses and data quality, it did appear to reduce the number of times and duration of time respondents spent looking at the heading labels.

• The fully labeled grid format did not impact processing of other features of the grid.

• This suggests the full labeling may have made processing a bit more efficient.
THANK YOU