A Comparison of Fully Labeled and Top Labeled Grid Question Formats

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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)

A28. Thinking about your principal job held during the week of February 1, please rate your satisfaction with that job's...

Mark one answer for each item.

		Very satisfied	Somewhat satisfied	Somewhat dissatisfied	Very dissatisfied
		Ļ	¥	¥	\downarrow
1	Salary	.1	2	3	4
2	Benefits	.1	2	3	4
3	Job security	.1	2	3	4
4	Job location	.1	2	3	4
5	Opportunities for advancement	. 1 🗌	2	3	4
6	Intellectual challenge	.1	2	3	4
7	Level of responsibility	.1	2	3	4
8	Degree of independence.	.1	2	3	4
9	Contribution to society	.1	2	3	4

2013 National Survey of College Graduates

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).

		1	2	3	4	5	kenne ich nicht
	ar earth item balow						
	Over the past 12 months, how often did you eat	the following kinds of fruit?		Each time you ate this frui	t, how much did you use	ually eat?	
Applesauce	Neury 16 tenues per year 7 tenues per work 7-11 tenues per year 3-4 tenues per work 1 tenue per month 4-6 tenues per work 2-3 tenues per month 0 1 time per day 1 tenue per work	ik A		O Less than 1/2 cup O 1/2 to 1 cup O Mönc thun 1 cup			
Apples	Nover 16 times per year 2 times per weak 7.11 times per year 3.4 times per weak 1 time per month 5.6 times per weak 2.3 times per month 1 time per day 1 time per weak	ik ik		 ○ Less than 1 apple ○ 1 apple ○ More than 1 apple 			
Pears	tiever (16 transport year (2 transport year	ik ik er day		Less than 1 pear Topan More than 1 pear			
Bananas	Nover 16 times per year 2 times par weak 7.11 times par year 34 times per weak 1 time per month 56 times per weak 23 times per month 0 time per day 1 time per weak 0 zor more times per weak	ik ik er day		O Loss than 1 banana O 1 banana O More than 1 banana			
Dried fruit, such as prunes or raisins	O Never			O Less than 2 tablesp O 2-5 tablespoons	oons		
Netscape		0	× 0	0	0	0	0
Mozilla Suite		0	0	0	0	0	0
Konqueror		0	0	0	0	0	0
Safari		0	0	0	0	0	0
Camino		0	\odot	0	0	0	0
Lynx		0	0	0	0	0	0

But mail surveys don't have these dynamic features. So what can we do?

• Fully labeled grid

21. Ir	. In the past 12 months, how often did you experience each of the following?							
		Never	Rarely	<u>Sometimes</u>	<u>Often</u>	<u>Always</u>		
	You had exciting new ideas or thoughts occurring to you one after the other.	ONever	ORarely	OSome	Ooften	OAlway		
	You felt so confident, nothing could stop you.	ONever	ORarely	OSome	Often	OAlways		
	You got much less sleep than usual but didn't really miss it.	ONever	ORarely	OSome	Often	OAlways		
	You were so easily distracted that you had trouble staying on track.	ONever	ORarely	OSome	Ooften	OAlways		
	You tended to show poor judgment (e.g., spending spree, sexual indiscretions, or impulsively quitting a job).	ONever	ORarely	OSome	Ooften	OAlways		
	You thought you were being plotted against.	Never	ORarely	OSome	Often	OAlways		
	You were sure that everyone was against you.	ONever	ORarely	OSome	Often	OAlways		
	You thought negative comments were being circulated about you.	ONever	ORarely	OSome	Ooften	OAlways		
	You felt people were trying to make you upset.	ONever	ORarely	OSome	Ooften	OAlways		

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.



21. I	21. In the past 12 months, how often did you experience each of the following?							
	· · · · · · · · · · · · · · · · · · ·	Never	Rarely	<u>Sometimes</u>	<u>Often</u>	Always		
	You had exciting new ideas or thoughts occurring to you one after the other.	0	0		0	0		
	You felt so confident, nothing could stop you.	\bigcirc	\bigcirc	\odot	\bigcirc	0		
	You got much less sleep than usual but didn't really miss it.	0	\bigcirc	\bigcirc	\bigcirc	0		
	You were so easily distracted that you had trouble staying on track.	0	0	0	0	0		
	You tended to show poor judgment (e.g., spending spree, sexual indiscretions, or impulsively quitting a job).	0	0		0	0		
	You thought you were being plotted against.	\odot	0		\bigcirc	0		
	You were sure that everyone was against you.	\bigcirc	0	0	\bigcirc	\bigcirc		
	You thought negative comments were being circulated about you.	0	0	0	0	0		
	You felt people were trying to make you upset.	0	\bigcirc	\bigcirc	\bigcirc	0		

In a top-labeled grid, connecting Items and labels requires a 90° turn.

Gestalt Psychologist Principle of Continuity:

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

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

	<u>Never</u>	<u>Rarely</u>	<u>Sometimes</u>	<u>Often</u>	<u>Always</u>
You had exciting new ideas or thoughts occurring to you one after the other.	ONever	ORarely	OSome	Ooften	OAlways
You felt so confident, nothing could stop you.	ONever	ORarely	OSome	Often	OAlways
You got much less sleep than usual but didn't really miss it.	ONever	ORarely	OSome	Often	OAlways
You were so easily distracted that you had trouble staying on track.	\bigcirc_{Never}	ORarely	Osome	Ooften	OAlways
You tended to show poor judgment (e.g., spending spree, sexual indiscretions, or impulsively quitting a job).	ONever	ORarely	OSome	Ooften	OAlways
You thought you were being plotted against.	Ottorer	 □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	Some	Often	OAlways
You were sure that everyone was against you.	ONever	Rarely	OSome	Often	OAlways
You thought negative comments were being circulated about you.	ONever	ORarely	OSome	Ooften	OAlways
You felt people were trying to make you upset.	ONever	ORarely	OSome	Often	OAlways

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 foll	owing?			
	Never	<u>Rarely</u>	<u>Sometimes</u>	<u>Often</u>	<u>Always</u>
You had exciting new ideas or thoughts occurring to you one after the other.	ONever	ORarely	OSome	Ooften	OAlways
You felt so confident, nothing courd stop out.	ONever	ORarely	OSome	Often	OAlways
You got much less sloup than usual but didn treally miss it.	ONer	ORerely	Sorte	Often	OAlways
You were so easily estrated that bu had truble storing on track.	Dh IVE.	PR rely	Osule	Ooften	OAlways
You tended to show poor judgment (s.g., standing spree, sexual indiscretions or could were quinting a job).	ONever	ORarely	OSome	Ooften	OAlways
You thought you were an an addition of a sainst.	ONever	ORarely	OSome	Ooften	Always
You were sure that everyone was against you.	ONever	ORarely	OSome	Often	Always
You thought negative comments were being circulated about you.	ONever	ORarely	Osome	Ooften	OAlways
You felt people were trying to make you upset.	ONever	ORarely	OSome	Often	OAlways



- 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) ٠
- But this was only tested on 1 grid. ٠

			Neither					
	Very		Satisfied nor		Very			
	<u>Dissatisfied</u>	<u>Dissatisfied</u>	<u>Dissatisfied</u>	<u>Satisfied</u>	<u>Satisfied</u>	_		
Parks								
Bicycle paths								
Outdoor areas to hunt, fish, or hike Sporting events	14. Please inc	licate how sati	sfied or dissati	sfied you are	with the availa	bility of each of	the following	in your
Restaurants	commun	• • • •				Neither		
Fine arts (museums and theatres)				Verv		Satisfied nor		Verv
Cell phone service				Dissatisfied	Dissatisfied	Dissatisfied	Satisfied	Satisfie
Internet access	Parks			Very Diss.	Diss.	Neither	Sat.	□Very Sa
Libraries	Bicycle	e paths		Uvery Diss.	Diss.	□Neither	□Sat.	□Very Sa
	Outdoo	or areas to hunt,	fish, or hike	Uvery Diss.	Diss.	Neither	Sat.	Uvery Sa
	Sportin	g events		Uvery Diss.	Diss.	Neither	□Sat.	□Very Sa
	Restau	rants		□Very Diss.	Diss.	Neither	□Sat.	□Very Sa
	Fine ar	ts (museums an	d theatres)	□Very Diss.	Diss.	Neither	□Sat.	□Very Sa
	Cell ph	one service		Uvery Diss.	Diss.	Neither	□Sat.	□Very Sa
	Interne	t access		□Very Diss.	Diss.	Neither	□Sat.	□Very Sa
	Librari	es		Very Diss.	Diss.	Neither	Sat.	□Very Sa

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



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





- Applied Science Laboratory (ASL) D6 high-speed eye tracker
 - Unobtrusive camera located below the computer monitor
 - Collects 120 measurements per second (120 Hz)
 - 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 yo	our overall satisfaction	level with each of the	following venues in Lincoln.
------------------------	--------------------------	------------------------	------------------------------

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants					
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	0	0	O
Movie Theaters					
Hotels	O	O	O	O	O

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



	Very <u>Satisfied</u>	Satisfied	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants					
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	O	O	O
Movie Theaters					
Hotels	O	0	O	O	O

• Full headings area

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

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or Dissatisfied	Dissatisfied	Very Dissatisfied
Restaurants					O
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	O	O	O
Movie Theaters					
Hotels	O	O	O	O	O

- Full headings area
- Individual headings areas

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

	Very <u>Satisfied</u>	Satisfied	Neither Satisfied or Dissatisfied	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	0				
Bars	O	O	O	O	O
Shopping Centers	0				
Museums	O	O	O	O	O
Movie Theaters	0				
Hotels	O	O	O	O	O

- Full headings area
- Individual headings areas
- Full response option area with headings

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



	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	0	0	0	0	O
Bars	O	O	O	O	O
Shopping Centers	0	O	0	0	0
Museums	O	O	0	O	O
Movie Theaters	0	O	0	0	0
Hotels	O	O	\odot	O	Ø

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

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

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	O				
Bars	O	0	O	O	O
Shopping Centers	0				O
Museums	O	O	O	O	O
Movie Theaters	O				
Hotels	O	O	O	O	O

- 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



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)

Fully labeled

Top-labeled



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And now, aggregated over all respondents...



Respondents spent less time fixating on the response option headings in the fully labeled version on Q15



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

	Very <u>Satisfied</u>	Satisfied	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants					
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	O	O	O
Movie Theaters					
Hotels	O	O	O	O	O

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

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very Dissatisfied
Restaurants					O
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	O	O	O
Movie Theaters					
Hotels	O	O	O	O	O

The pattern in heading fixation duration is similar in Q29



• 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.

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	0	O	O	\odot	0
Bars	O	O	O	O	0
Shopping Centers	0				
Museums	O	O	O	O	O
Movie Theaters	0				
Hotels	O	O	O	O	O

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

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

	Maria		Neither		Maria
	very <u>Satisfied</u>	<u>Satisfied</u>	Dissatisfied or	Dissatisfied	very <u>Dissatisfied</u>
Restaurants	O	O	O	0	O
Bars	O	O	O	O	0
Shopping Centers	0	0	0	0	0
Museums	O	O	O	O	0
Movie Theaters	0	0	0	0	0
Hotels	O	O	O	O	O

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

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	O				
Bars	O	O	O	O	O
Shopping Centers	O				
Museums	O	O	O	O	O
Movie Theaters	O				
Hotels	O	O	O	O	O

Respondents looked into the heading areas fewer times on the fully labeled version on Q15



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

	Very <u>Satisfied</u>	Satisfied	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants					
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	O	O	O
Movie Theaters					
Hotels	O	Ô	O	O	O

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

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very Dissatisfied
Restaurants					O
Bars	O	O	O	O	O
Shopping Centers					
Museums	O	O	O	O	O
Movie Theaters					
Hotels	O	O	O	O	O

The pattern in number of entries is similar in Q29



• 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.

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	0	O	\odot	\odot	\odot
Bars	O	O	O	O	O
Shopping Centers	0				
Museums	O	O	O	O	O
Movie Theaters	0				
Hotels	O	O	O	O	O

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

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

	Very <u>Satisfied</u>	Satisfied	Neither Satisfied of Dissatisfied	r <u>1</u> [Dissatisfie	d	Very Dissatisfied
Restaurants	0	\odot	\odot		0		O
Bars	O	O	O		O		O
Shopping Centers	O	O			0		0
Museums	O	O	O		O		O
Movie Theaters	0	0			0		0
Hotels	O	O	O		O		O

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

	Very <u>Satisfied</u>	<u>Satisfied</u>	Neither Satisfied or <u>Dissatisfied</u>	Dissatisfied	Very <u>Dissatisfied</u>
Restaurants	O				
Bars	O	O	O	O	0
Shopping Centers	0				
Museums	O	O	O	O	0
Movie Theaters	O				0
Hotels	O	O	O	O	O

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.





