

# Item Non-response Differences Between Web and Mail Surveys of the General Public

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# Background

- In three recent general public household surveys using addressed-based samples (Smyth et al. 2010, Messer & Dillman, 2010), we have shown that:
  - Mail-only panels obtained response rates of 71%, 56% and 68%
  - Web preference panels [withholding the offer of mail until the last mailing] obtained response rates of 54%, 46% and 52%, with 2/3 of responses coming over the web
- These results suggest that mail alone outperforms ‘web+mail’ with respect to response rates.
- However, both approaches achieve higher response rates from a more comprehensive household sample frame (USPS DSF) than we would expect with an RDD telephone survey.

# Item Nonresponse

- In general, we expect that item-nonresponse, another indicator of data quality, would be worse for mail than web surveys.
- However, previous research has typically used different construction methods for mail and web surveys, which may influence the results.
- Considerable research now suggests that different visual layouts may affect item-nonresponse rates (Dillman, Smyth and Christian, 2009).

# Our Purpose

- Compare mail vs. web item-nonresponse rates in each of three general public surveys, for which nearly identical wording and visual layouts were used in both survey modes.
- Evaluate the item-nonresponse rates obtained for these questionnaires against those obtained from two surveys of a “highly Internet literate population” (undergraduate student samples).
- Examine the effects of 1) question format and type, 2) respondent characteristics, and 3) the use of incentives on item nonresponse in the general public surveys.

# The Three ABS Studies (1)

- **2007 Lewiston and Clarkston Quality of Life Survey (LCS)**
  - Conducted in the summer of 2007 in a rural region of about 50,000 households in the Pacific Northwest
  - Questionnaire about respondents' quality of life as well as Internet and cell-phone usage and demographics
  - 51 numbered questions on 12 pages requiring up to 92 responses.
  - Methods tested: four treatment groups to test mail and web mixed-mode combinations

# The Three ABS Studies (2)

- **2008 Washington Community Survey (WES)**
  - Conducted in the summer and fall of 2008 in the state of Washington
  - Questionnaire about respondents' community quality of life as well as Internet and cell-phone usage and demographics
  - 52 numbered questions on 12 pages requiring up to 110 responses.
  - Methods tested: 9 treatment groups to test mail and web mixed-mode combinations, inclusion of a \$5 incentive, and a web card sent to web respondents

# The Three ABS Studies (3)

- **2009 Washington Economic Survey (WES)**
  - Conducted in the fall of 2009 in the state of Washington
  - Questionnaire about the effects of economic decline on households as well as Internet and cell-phone usage and demographics
  - 57 numbered questions on 12 pages requiring up to 96 responses.
  - Methods tested: six treatment groups to test mail and web mixed-mode combinations, usage of a Priority Mail envelope, and inclusion of a second \$5 incentive

# The Student Comparisons (1)

- **Spring 2009 WSU Student Experience Survey (SES7)**
  - Conducted in the spring of 2009 at the main campus of Washington State University in Pullman, WA
  - Questionnaire about a variety of educational experiences and opinions on the quality of education at WSU
  - 36 numbered questions on 8 pages requiring up to 100 responses.
  - Methods tested: four treatment groups to test mail and web mixed-mode combinations, and supportive email contacts, with a \$2 incentive.

# The Student Comparisons (2)

- **Fall 2009 WSU Student Experience Survey (SES8)**
  - Conducted in the fall of 2009 at the main campus of Washington State University in Pullman, WA
  - Questionnaire focused on how students have been affected by recent changes in the economy and the resulting budget cuts at WSU
  - 33 numbered questions on 8 pages requiring up to 78 responses.
  - Methods tested: seven treatment groups to test mail and web mixed-mode combinations, mixed-mode contact strategies, and inclusion of a \$2 incentive

# Minimizing Differences in Mail/Web Construction

- Nearly identical wording and visual layout (e.g. colors, symbols, fonts, pictures, spacing, etc.), with the exception of screened questions.
- Questions in the mail version were in black print on color stand-alone regions to emulate the single question per page in the web version, and to encourage one question at a time processing (Dillman, Gertseva, & Mahon-Haft, 2005).
- Web respondents could move through the survey without providing answers, same as in mail.
- Web relied on cascading style sheets to maintain common layout across different Internet browsers.



# Web Questionnaire Example



**Are You Better or Worse Off Than A Year Ago?**

Thank you for responding to this survey about how Washington households have been affected by changes in the economy during the last year.

Your participation in this research study will help us to better understand how the lives of people in every county of our state may have changed during the past year. It will also help determine whether national efforts to stimulate the economy have benefited the lives of Washington residents. We hope the results will help state leaders understand the concerns of Washington's households.

The person who should complete this survey is an adult at your residence who can best answer questions about changes in your household's economic situation that may or may not have occurred since September 2008.

Results will be available in December and we greatly appreciate your help with this study.

Sincerely,  
 Don A. Dillman  
 Regents Professor  
 Social and Economic Sciences Research Center  
 Washington State University



Please enter your Access Code listed in the letter we sent to you:

Question 1 of 46

**Do you consider your household's current quality of life to be:**

- Excellent
- Good
- Fair
- Poor
- Don't know

|

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Question 10 of 46

**Thinking about your household's daily activities and expenditures, have each of the following increased, stayed about the same, or decreased during the past year?**

	Increased a lot	Increased a little	Stayed the same	Decreased a little	Decreased a lot	Does not apply
Eating out at a restaurant	<input type="radio"/>					
Traveling or vacationing	<input type="radio"/>					
Going out for entertainment	<input type="radio"/>					
Using public transportation	<input type="radio"/>					
Driving a car	<input type="radio"/>					
Money spent on household utilities	<input type="radio"/>					
Money spent on household groceries	<input type="radio"/>					
Money spent on child care	<input type="radio"/>					
Money spent on health care	<input type="radio"/>					

|

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# Intended Design Effects

- Our goal was to maintain as much similarity as possible between mail and web so that our item nonresponse comparisons would not be confounded by visual differences.
- The contour lines that separated items was an important part of this effort—people tend to stay within boundaries when reading (Dillman et al. 2009)

# A Caveat

- Each of these studies contained from 4 to 7 implementation groups, such as:
  - Incentives vs. no incentives
  - Whether and how respondents were offered a choice of modes
  - Different mailing techniques
- In the reported results, we combine respondents for a particular mode across treatment groups. This possible limitation of the analysis should be recognized.

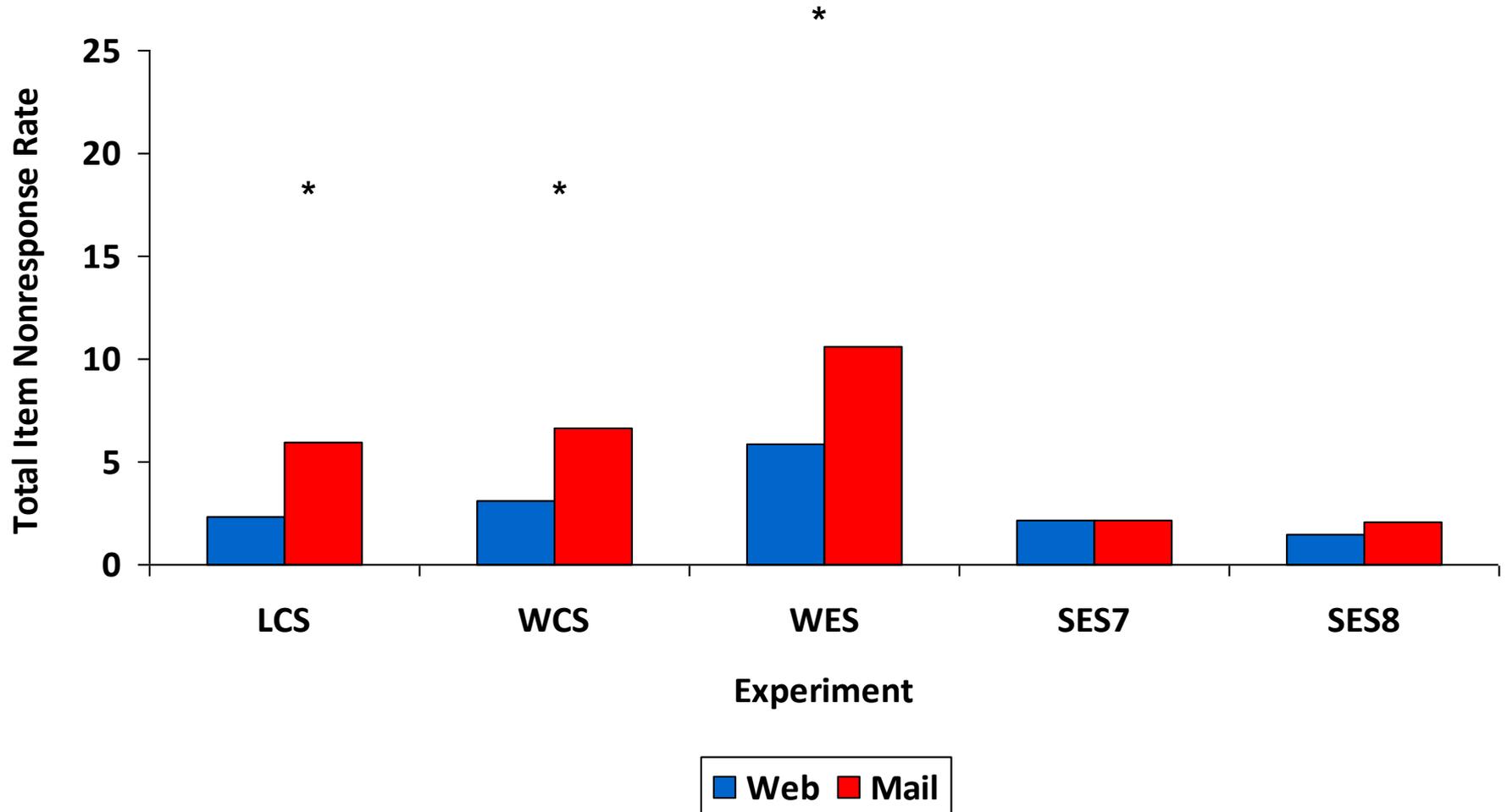
# Calculation of Item Nonresponse

- Only unanswered items were counted as item nonresponses.
  - Nonsubstantive, invalid, or incorrect responses were counted as responses
- Item nonresponse rates were calculated the same way in each experiment.
  - The number of missing responses was divided by the total number of complete responses for mail and web modes in each experiment
- Partial completes were excluded from this analysis.
  - “Partial completes” are mail surveys with less than  $\frac{1}{4}$  of items answers and web surveys in which the respondent did not click the “Submit” button

# Web and Mail Total Item Nonresponse Rates

- In **ABS** studies, item nonresponse rates range from:
  - 2-6% for web respondents and
  - 6-11% for mail respondents
- In **SES** studies, item nonresponse rates range from:
  - 1.5-2.1% for web respondents and
  - 2.1-2.2% for mail respondents
- Thus, mode differences are more salient and respectively higher in the general public households than in university student surveys.
  - Web obtained significantly lower item nonresponse rates in the ABS experiments

# Total Web vs. Mail Rates by Experiment



\* indicates significant difference at .05 level.

# Why Consider Question Format and Type?

- Overall rates mask web vs. mail disparities in item nonresponse for different question formats and types.

## Range of Item Nonresponse Within Each Experiment\*

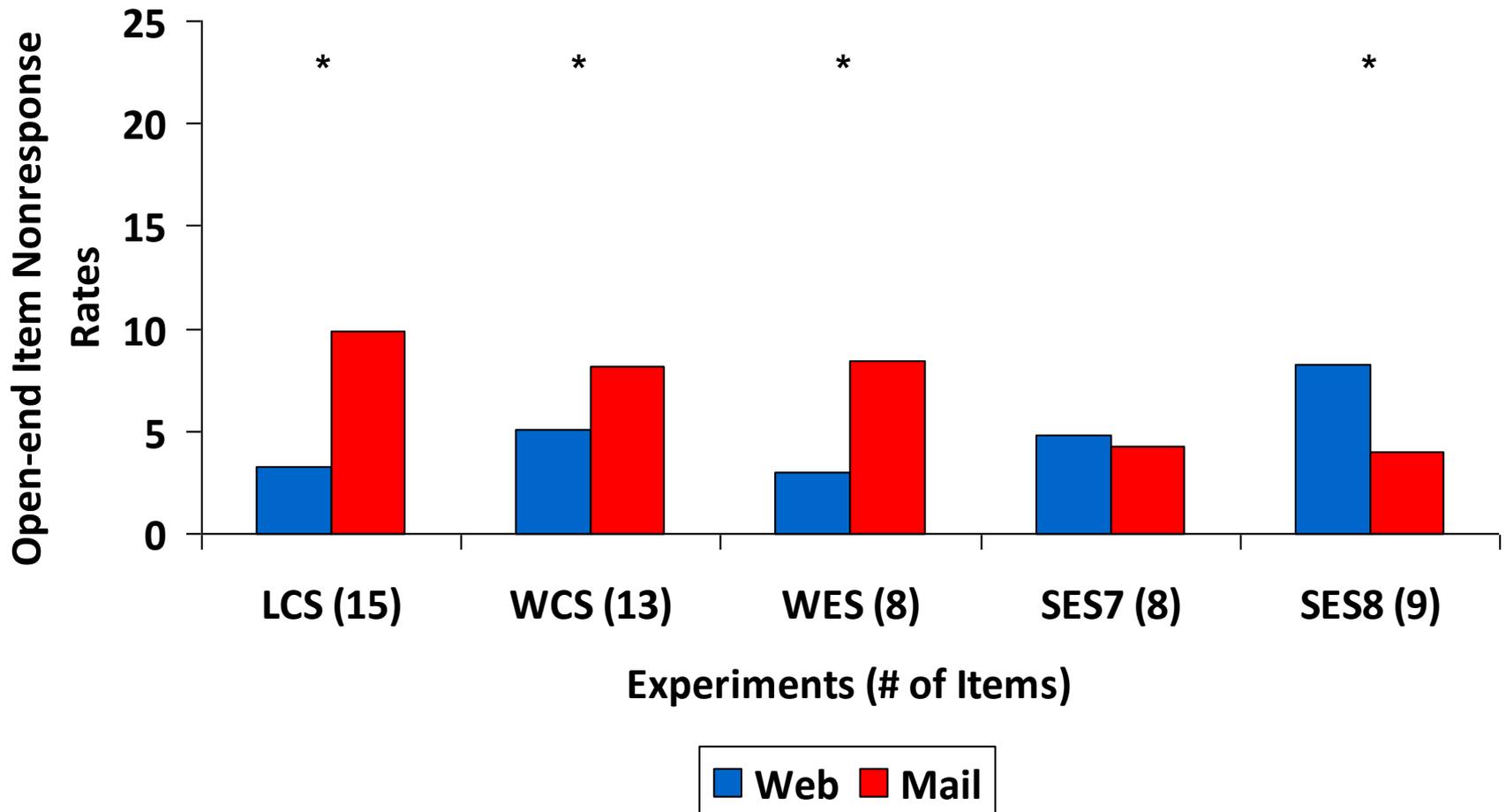
Experiment	Web	Mail
LCS	0.00-19.07%	1.05-34.40%
WCS	0.28-23.32%	2.24-33.66%
WES	0.35-18.77%	1.67-29.48%

\*These rates are based on calculations of item nonresponse for different question types and formats.

# Question Format

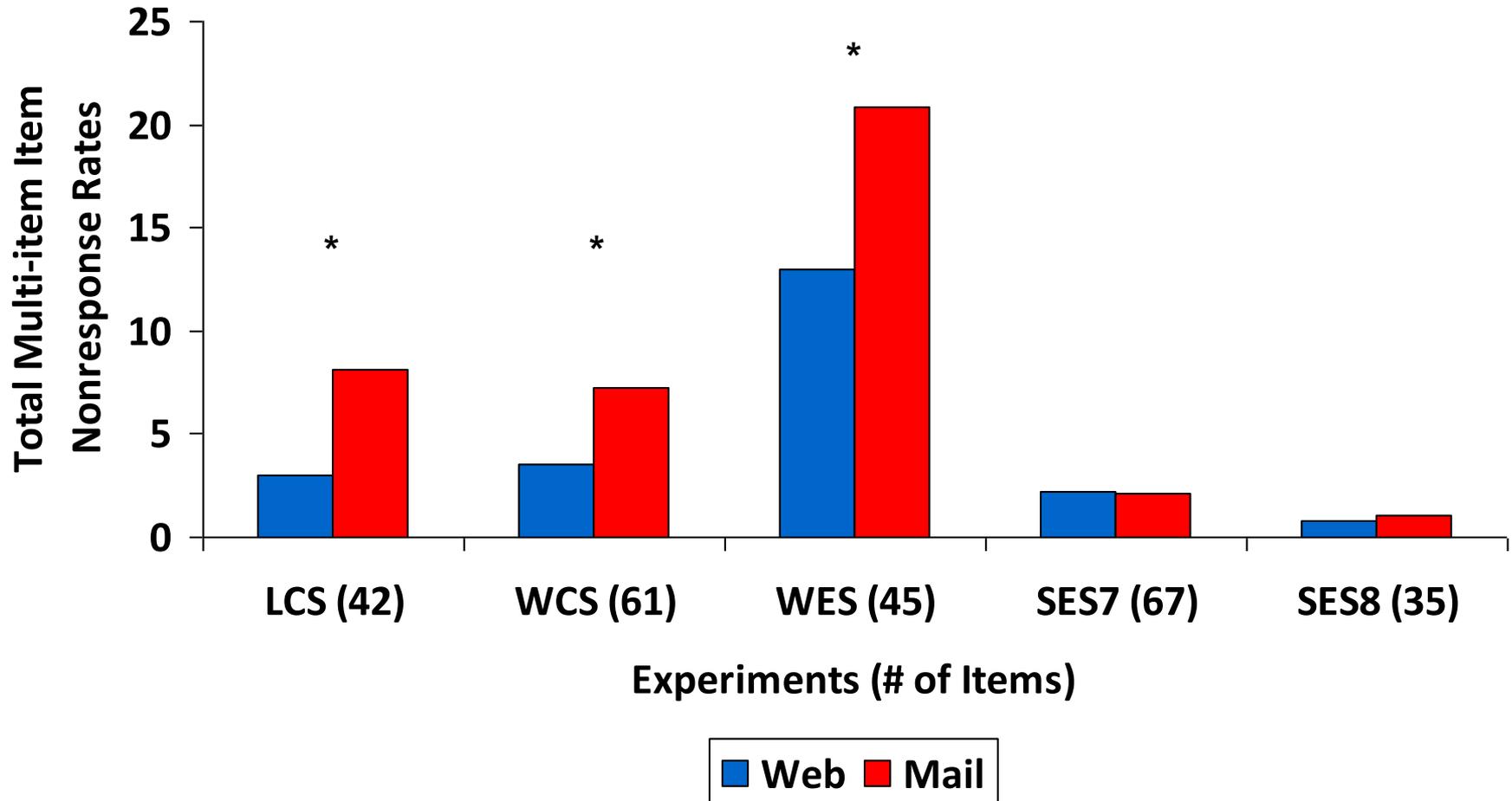
- We divide questions into two broad question formats:
  - **Open-end**: requires respondents to write or enter their answer in a blank space
  - **Close-end**: requires respondents to select the best answer category from a list
    - **Multi-item questions** (require answers for multiple items in the same question on same screen)
    - **Ordinal scale questions** (e.g. “very good” to “very poor”)
    - **Nominal scale questions** (e.g. yes/no)

# Web vs. Mail Open-end Question Rates by Experiment



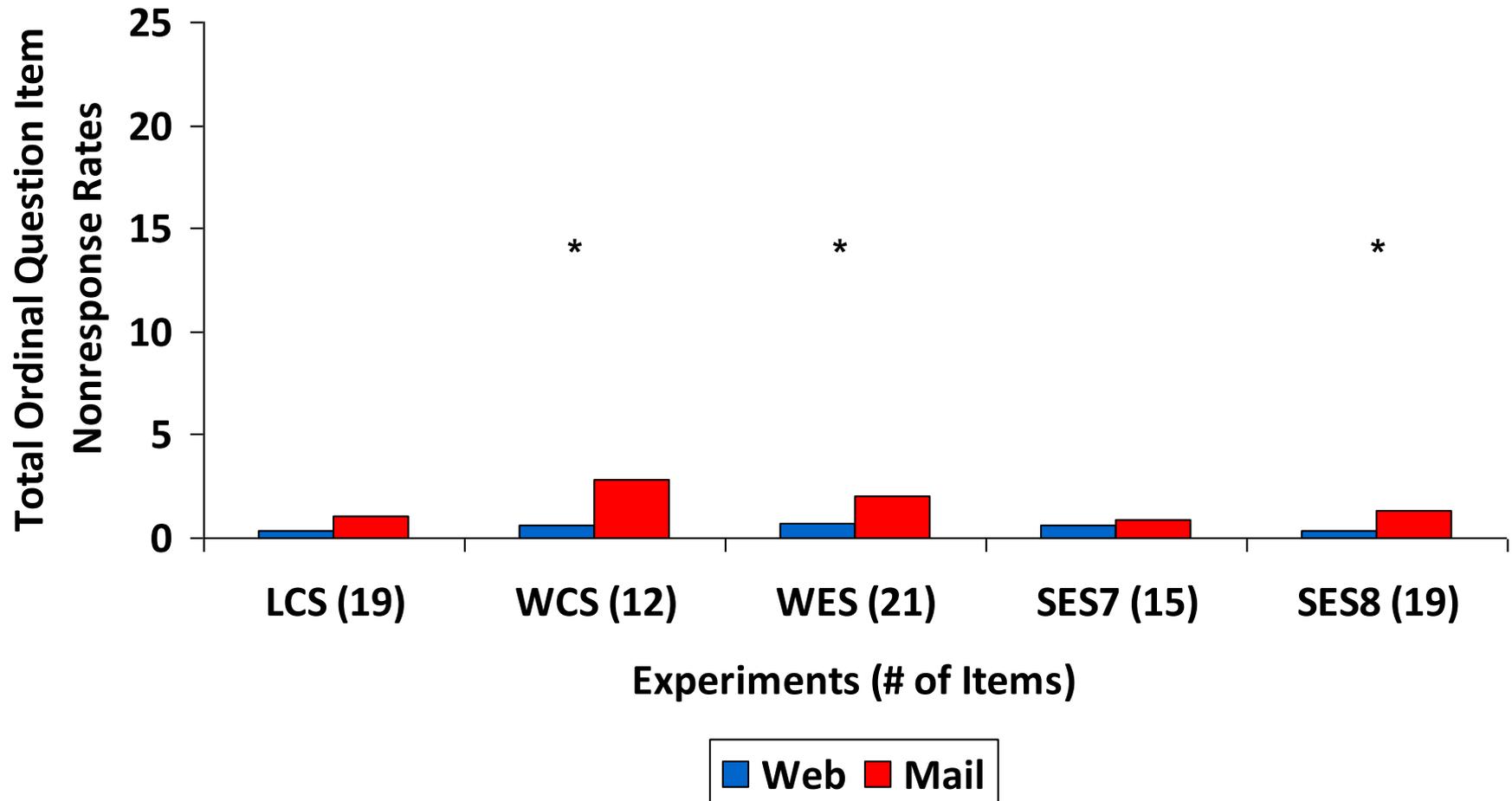
\* indicates significant difference at .05 level.

# Web vs. Mail Multi-item Question Rates by Experiment



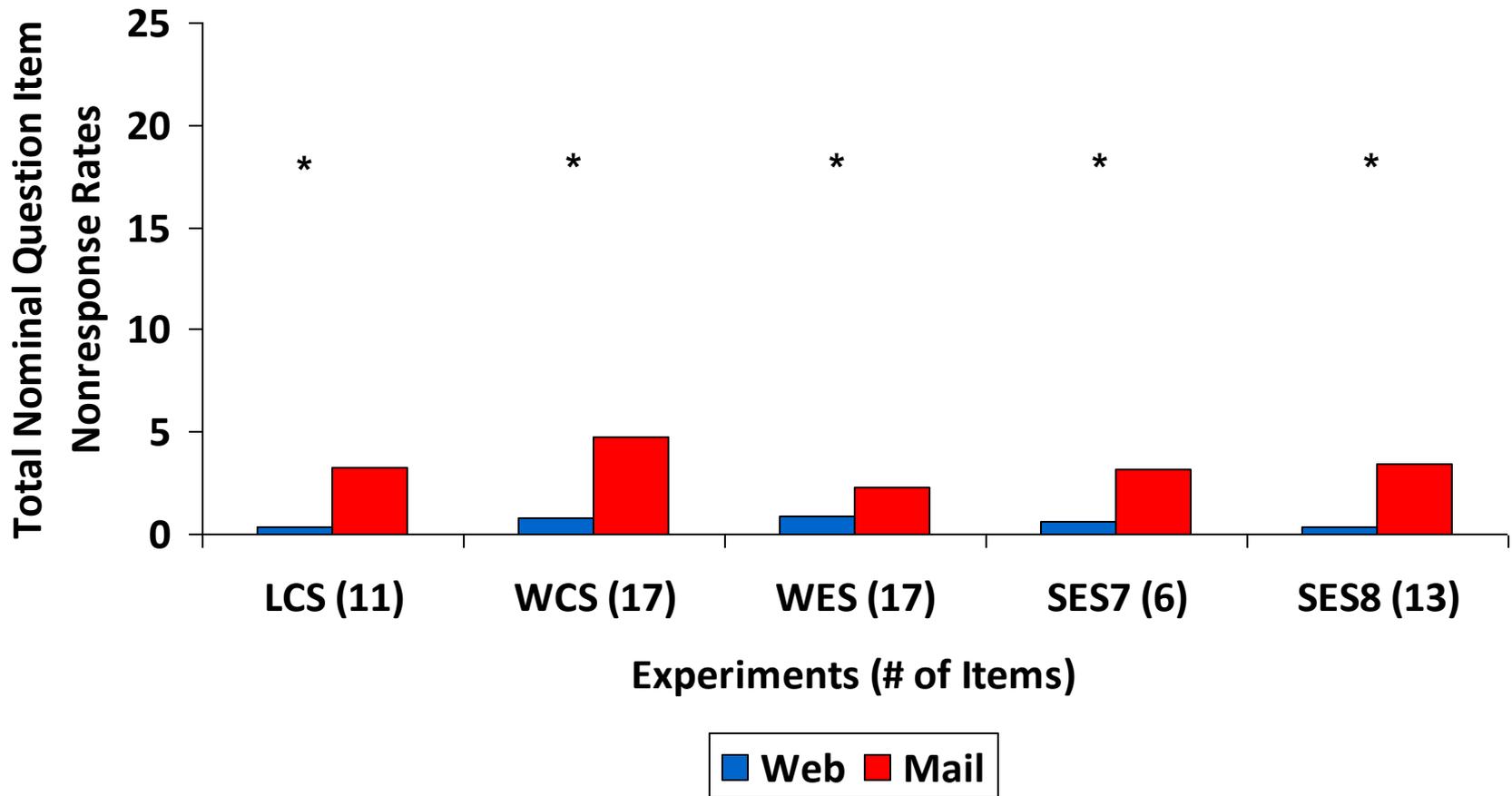
\* indicates significant difference at .05 level.

# Web vs. Mail Ordinal Scale Question Rates by Experiment



\* indicates significant difference at .05 level.

# Web vs. Mail Nominal Scale Question Rates by Experiment



\* indicates significant difference at .05 level.

# Screened Questions

- Each experiment contained screened questions of different formats to direct respondents to different questions based on their answer
  - Web respondents are automatically skipped to the next question
  - Mail respondents had to follow visual cues directing them to the next question

# Example: WES Mail

## Washington Economic Survey

Q14. How long has your household lived at your current residence?

- <sub>1</sub> Over five years → Skip to Q15
- <sub>2</sub> Over one year to five years → Skip to Q15
- <sub>3</sub> One year or less

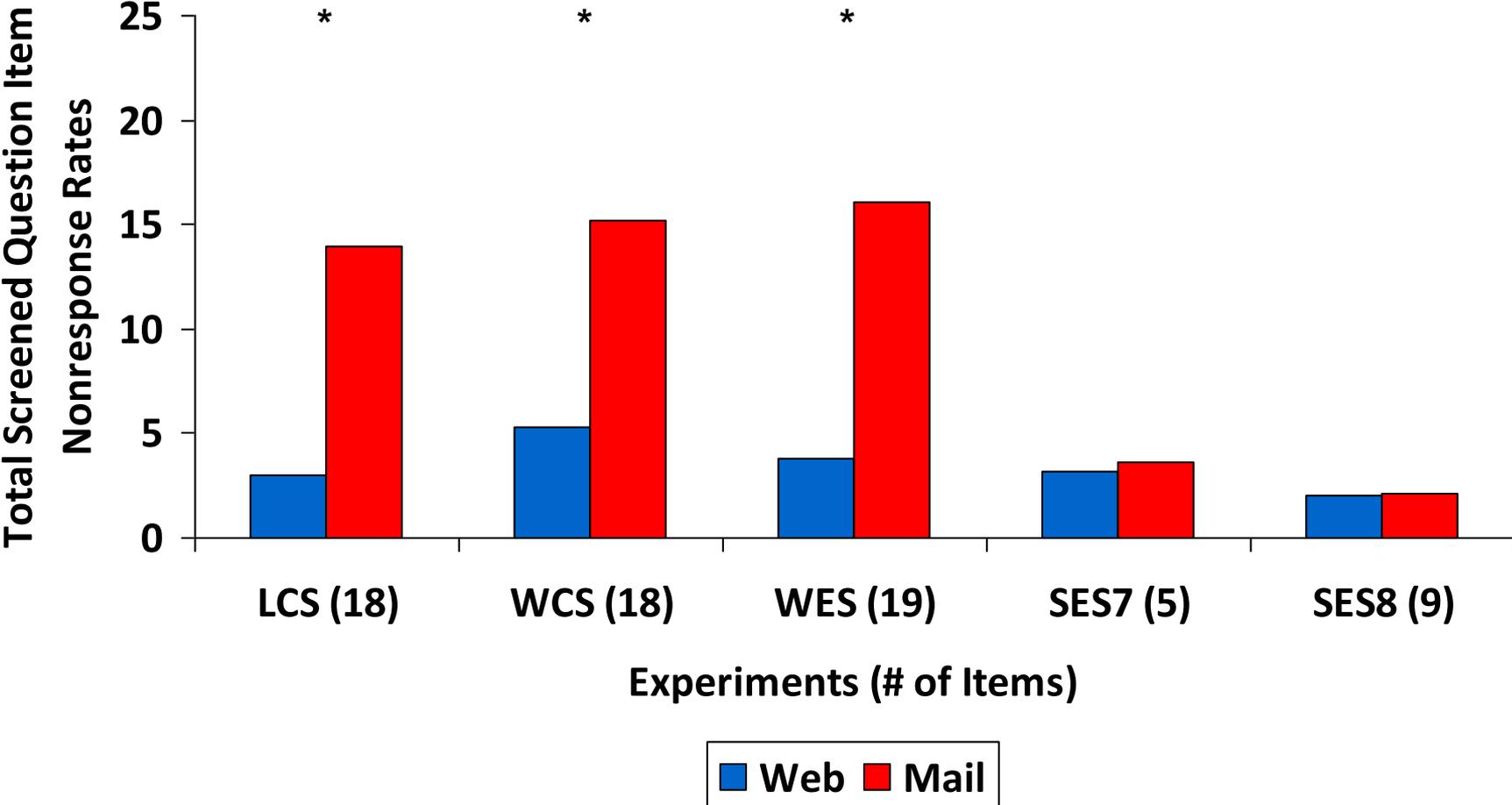
Q14a. (If one year or less) were each of the following a reason for moving to your current residence during the past year?

- |   | No                                 | Yes                                |
|---|------------------------------------|------------------------------------|
| A. Purchased your current residence                             | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> |
| B. A foreclosure on your previous residence                     | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> |
| C. Could not afford rent or mortgage at your previous residence | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> |

Q15. Do you think that your household's overall total income during 2009 will be:

- <sub>1</sub> A lot more than in 2008
- <sub>2</sub> A little more than in 2008
- <sub>3</sub> About the same as in 2008
- <sub>4</sub> A little less than in 2008
- <sub>5</sub> A lot less than in 2008

# Web vs. Mail Screened Question Rates by Experiment



\* indicates significant difference at .05 level.

# Question Format Results

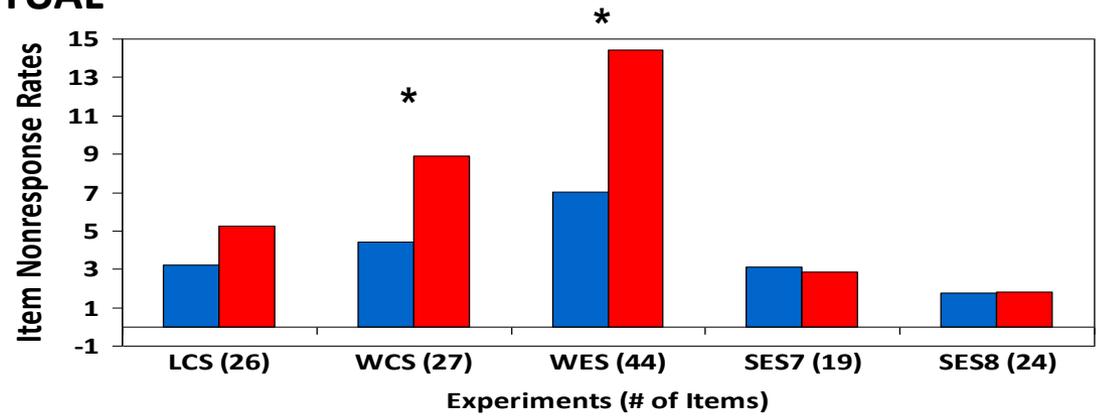
- All question formats in the ABS studies demonstrated significant web vs. mail disparities, but open-ended, multi-item, and branching questions obtained the highest item nonresponse rates and produced the largest web vs. mail mode differences.
- Closed-ended ordinal and nominal questions achieved relatively low web and mail rates in all surveys, although web rates were generally lower.

# Question Type

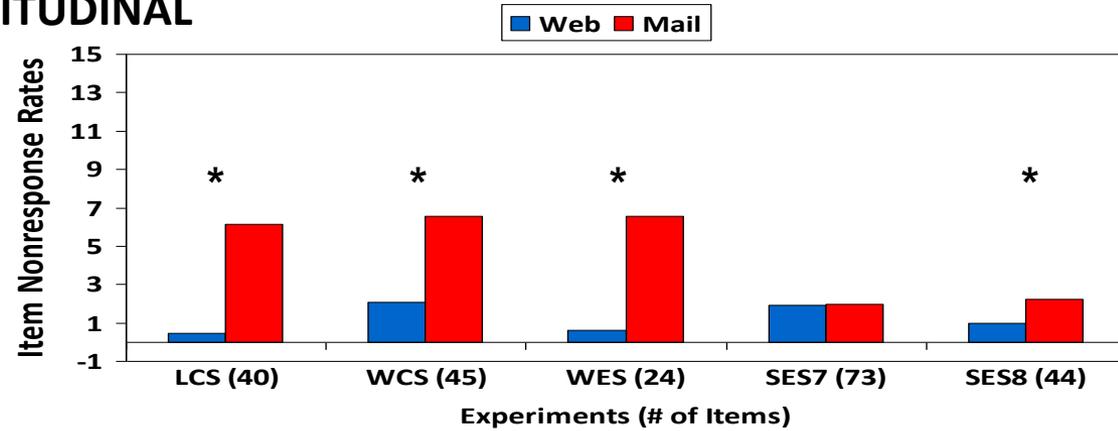
- We also categorized questions by type, based on what the question asked about:
  - **Factual:** asks about respondent characteristics (e.g. age, employment status, income)
  - **Attitudinal:** asks about respondents' attitude, opinion, or preference (e.g. "Do you feel/consider/think/believe/etc....?")
  - **Behavioral:** asks about a respondent's behavior (e.g. Internet or cell phone use, etc.)

# Web vs. Mail Rates by Question Type and Experiment

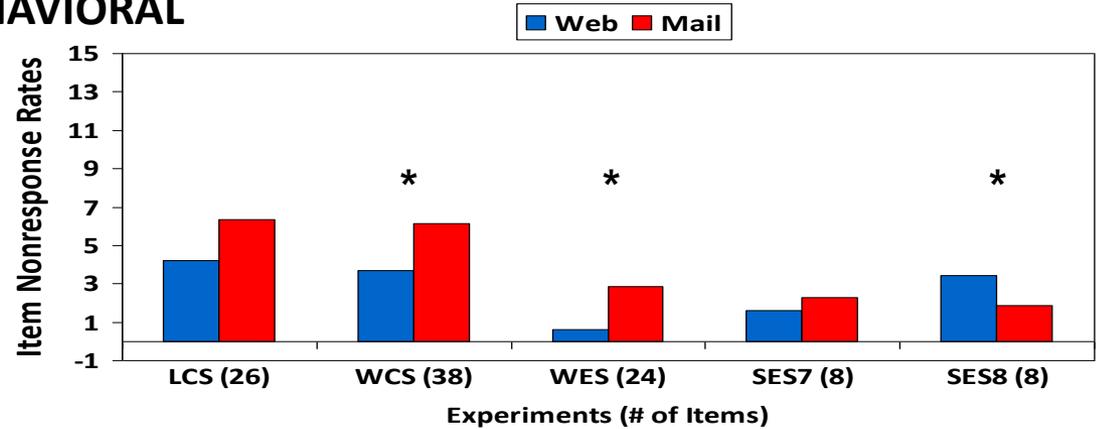
## FACTUAL



## ATTITUDINAL



## BEHAVIORAL



\* indicates significant difference at .05 level.

# Question Type Results

- Factual type questions produced the highest rates overall while attitudinal question types resulted in the largest web vs. mail disparities, particularly in the ABS experiments.
  - Question type was not very salient in the SES experiments

# Item Nonresponse by Survey Topic and Length

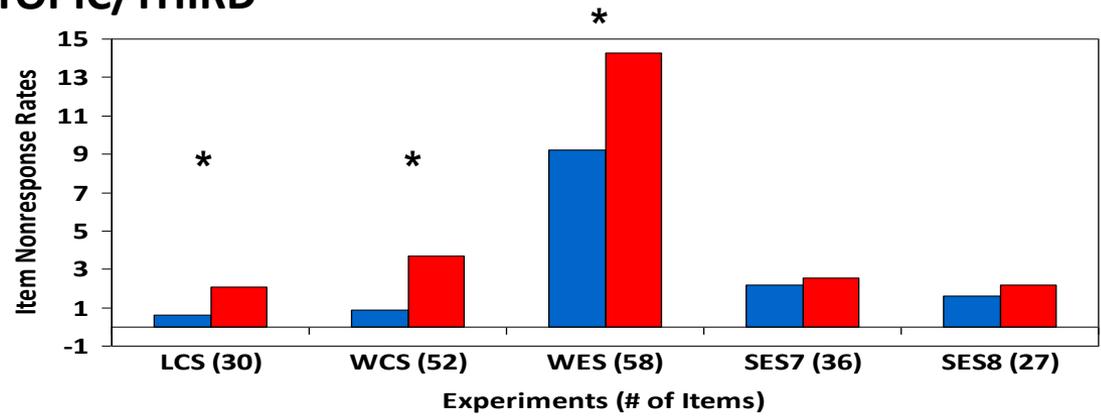
- We analyze web vs. mail differences by topic and length
  - The ABS surveys were organized around three topics, presented consecutively in the questionnaire.
  - The SES experiments focused on several topics so we divided the questionnaire into thirds to determine if survey length had an effect on web vs. mail rates

# ABS Survey Topics

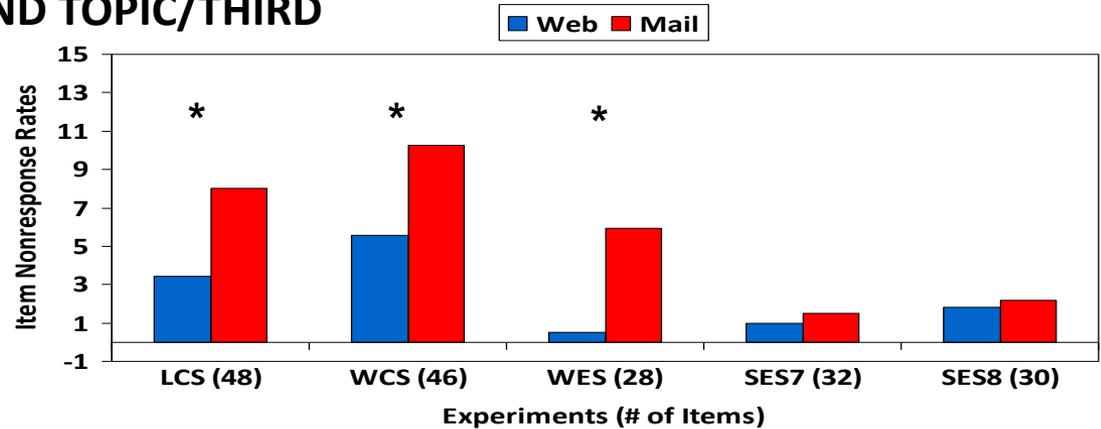
	<b>First Topic</b>	<b>Second Topic</b>	<b>Third Topic</b>
<b>LCS</b>	Community satisfaction	Internet and cell phone characteristics	Demographic characteristics
<b>WCS</b>	Community satisfaction	Internet and cell phone characteristics	Demographic characteristics
<b>WES</b>	How changes in the economy affected households	Internet and cell phone characteristics	Demographic characteristics

# Web vs. Mail Item Nonresponse by Survey Topic/Length and Experiment

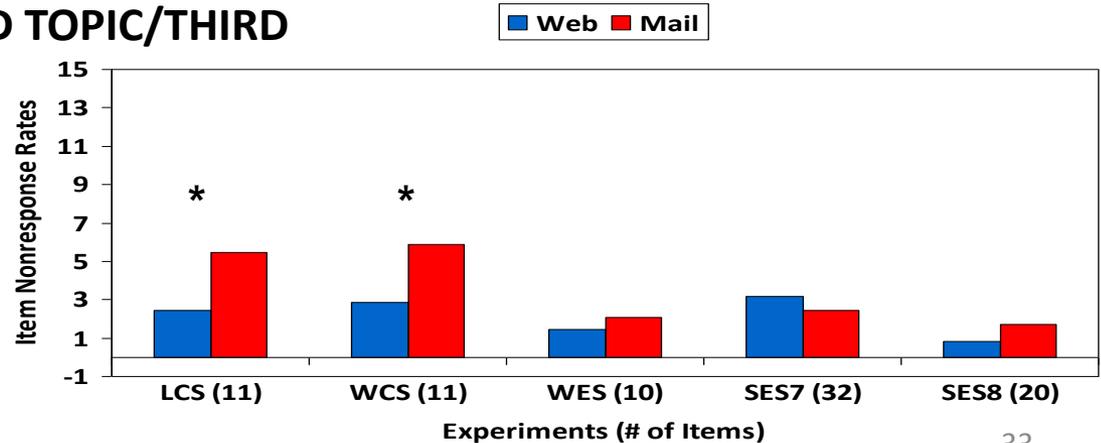
## FIRST TOPIC/THIRD



## SECOND TOPIC/THIRD



## THIRD TOPIC/THIRD



# Survey Topic/Length Results

- The lowest web and mail rates in the LCS and WCS occur in the first topic and the highest rates occur in the second topic
- The highest rates in the WES occur in the first topic
- The largest web and mail differences occur in the second topic in the questionnaire in all three ABS surveys
- Mail and web rates are relatively low and fairly consistent in the SES experiments

# Incentive Effects

- Including an incentive (or a second incentive) does not significantly affect item nonresponse rates in either web preference or mail preference (-only) groups.
- (However, incentives improve overall response rates dramatically).

# Bivariate and Multivariate OLS Regression Models<sup>1</sup>

## Predicting Item Nonresponse by Survey Mode and Respondent Demographic Characteristics

	LCS		WCS		WES	
	<u>Model: 1</u>	<u>Model: 2</u>	<u>Model: 3</u>	<u>Model: 4</u>	<u>Model: 5</u>	<u>Model: 6</u>
<b>Survey Mode (Hi: web)</b>	-1.82*** (.379)	-0.62* (.312)	-2.48*** (.316)	-0.96*** (.279)	-2.49*** (.336)	-1.16*** (.312)
<i>Demographics</i>						
<b>Gender (Hi: female)</b>	--	-0.43 (.284)	--	0.54* (.266)	--	-0.21 (.288)
<b>Age</b>	--	0.08*** (.008)	--	0.10*** (.008)	--	0.12*** (.009)
<b>Education</b>	--	-0.30** (.111)	--	-0.56*** (.100)	--	-0.44*** (.108)
<b>Income</b>	--	-0.12 (.119)	--	-0.26*** (.101)	--	-0.34** (.106)
<b>R2</b>	0.02***	0.14***	0.03***	0.14***	0.03***	0.14***
<b>N</b>	1031	885	2217	1825	1980	1734

Notes: \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ; <sup>1</sup> Standardized coefficients reported (standard errors in parentheses).

# Prediction of Item Nonresponse by Survey Mode and Demographic Characteristics

- Bivariate analyses show that survey mode significantly predicts item nonresponse, in which web obtains lower rates of item nonresponse.
- Multivariate analyses show that survey mode significantly predicts item nonresponse, controlling for demographics.
- Older respondents, respondents with less education, and respondents with lower incomes all are significantly more likely to miss or skip more items.

# Summary of Results

- For ABS experiments, web surveys obtained significantly lower rates than mail surveys.
- Question format, question type, and survey topic are important sources of item nonresponse variation within and between modes, particularly in the ABS experiments.
- Survey mode, age, education, and income are important predictors of the number of item nonresponses per respondent.

# Conclusions

- Web obtains higher quality data from those who do respond, while mail elicits more respondents (but lower overall data quality from them).
- Web and mail modes obtained relatively low overall item non-response rates, with web surveys obtaining significantly lower rates than mail surveys in the ABS experiments.

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# Next Steps

- We are at an early stage of analysis of these data, and would welcome your thoughts on appropriate next steps.
- Our goal remains to develop the most effective methods possible for producing viable mail-only and web plus mail procedures using addressed-based samples as a potential replacement for RDD telephone surveys.