Does typographic cueing improve the processing of information from survey questions on a mobile device?

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What is Typographic Cueing?

- Reveals text content structure through changes in weight, size, case, typeface, etc. (Keyes, 1993)

- Differentiates information categories

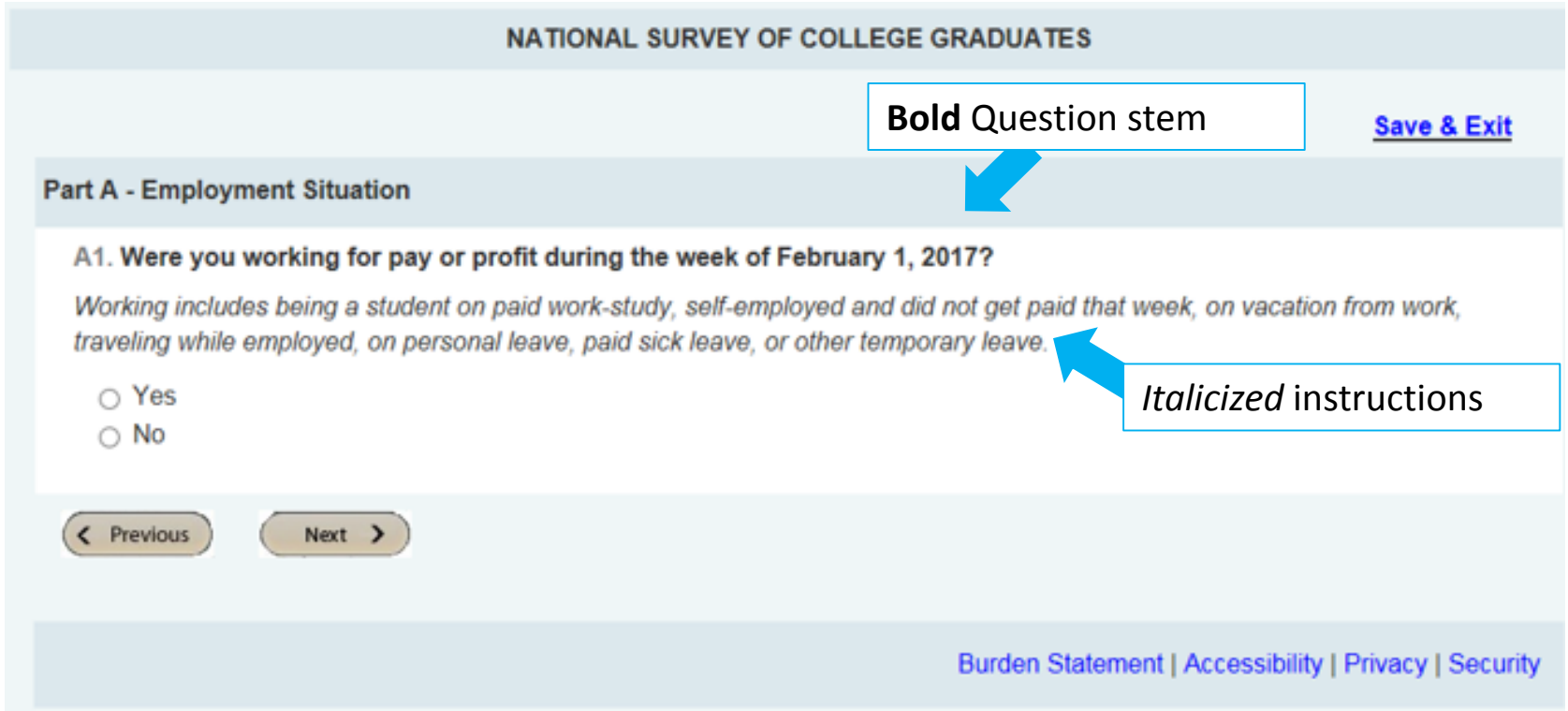
Background Literature

- Use dark print for questions and light print for answer choices
- Separate optional or occasionally needed instructions from the question statement by font or symbol variations

Source: Tailored Design Method (Dilman, 2007)

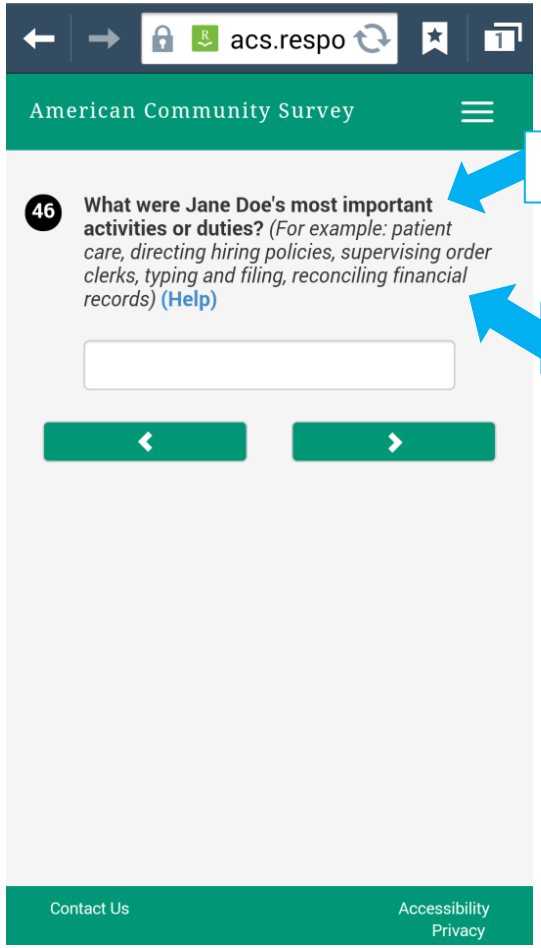
Examples in Practice - PC

National survey of college graduates



Examples in Practice - Mobile

American Community Survey



Bold Question stem

Italicized instructions

Motivation

- Lack of empirical evidence in support of theory and recommendations.

- Has not been tested for mobile.

Research Questions

- Does **bolding** question-stems make them more distinguishable and easier to find than other text on a mobile survey?

- Does *italicizing* instructions make them more distinguishable and easier to find than other text on a mobile survey?

General Method

- Quantitative Controlled Study
- Setting: In-person tests at community/senior centers in Washington DC area from Dec. 2016 to Jan. 2017
- Convenience sample
- Participants ages 60-75
  - Had to have at least one year of mobile phone experience
- Procedure
  - Participant completed background paper questionnaire (demographic questions)
  - Test administrator loaded survey app on iPhone 5s, handed phone to participant, instructed him/her to complete survey
  - 3-5 experiments run during 1 hour session

Method for this Experiment

- Self administered survey app
  - 5 questions to assess time
  - 2 questions to assess accuracy of responses
  - Satisfaction and preference data
- Between-subjects design: 4 conditions
- 30 participants
  - 7-8 participants per condition/group
  - 14-16 participants per factor level

Design

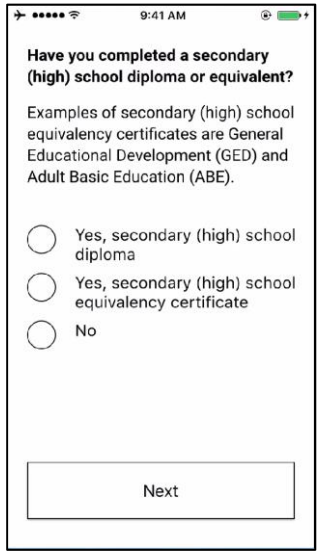
2 x 2 Factorial Between-Subjects

		Question stem	
		Bolded	Not Bolded
Instructions	Italicized	**Bolded** + *Italicized* (*n* = 7)	Non-bolded + *Italicized* (*n* = 8)
	Not Italicized	**Bolded** + Non-italicized (*n* = 8)	Non-bolded + Non-italicized (*n* = 7)

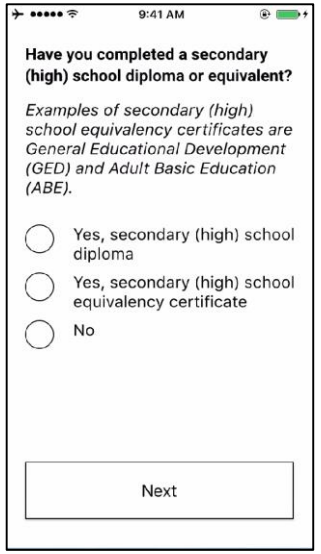
Design (cont.)

Four Conditions:

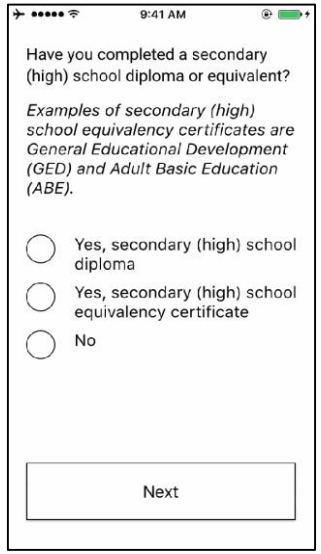
A: **Bold** + No Italics



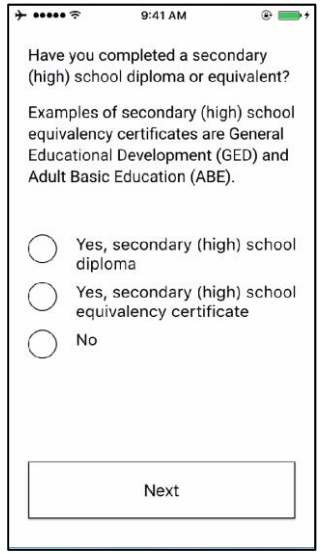
B: **Bold** + *Italics*



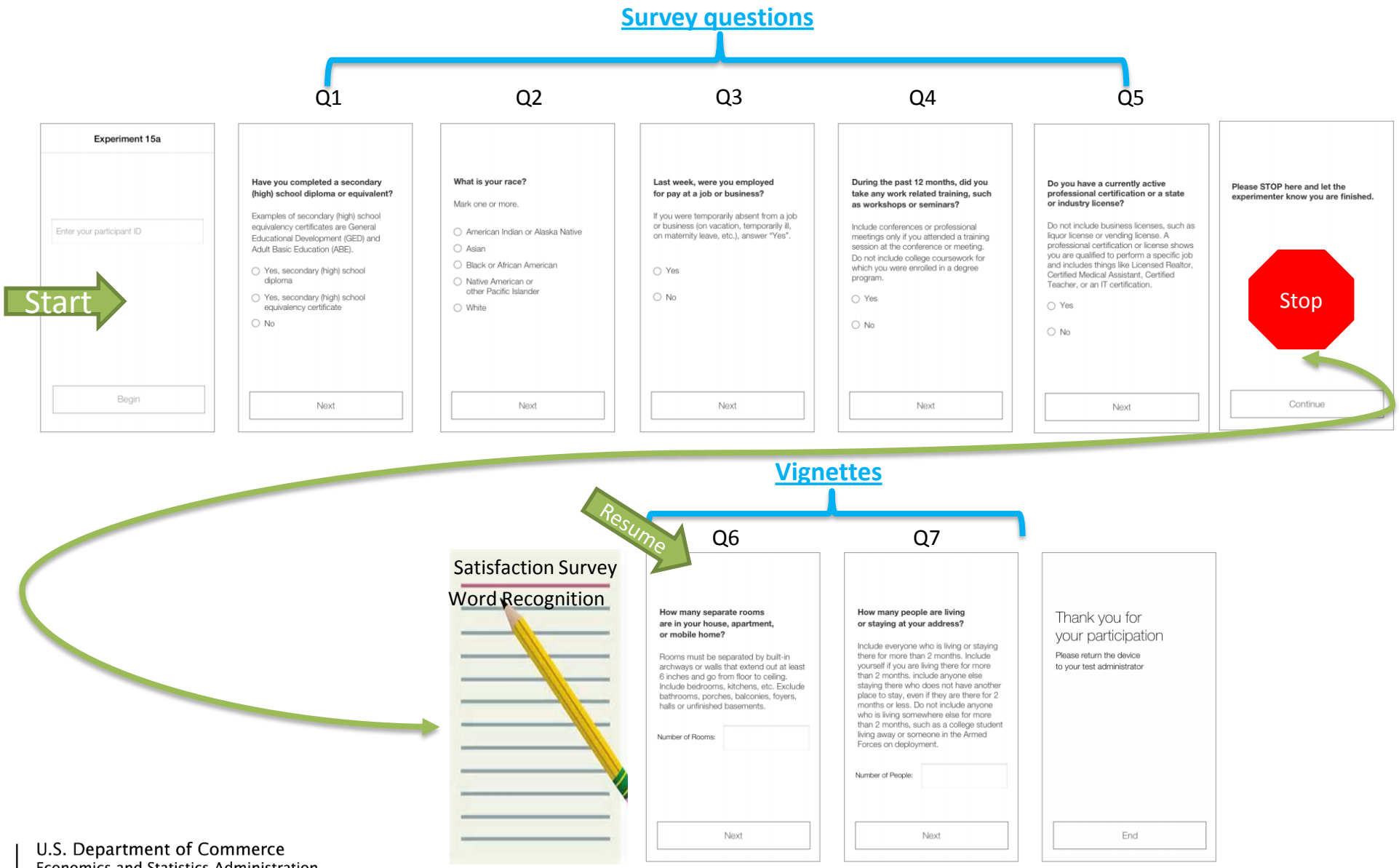
C: No Bold + *Italics*



D: No Bold + No Italics



Experimental Procedure



Word Recognition

- Indirect measure of how carefully question stem and instructional text was read, if at all.
  - Less words recognized = Less text read
- Word List
  - Participants instructed to circle keywords they remembered seeing
- Rationale: Allows us to address why survey completion times differ and would imply visual filtering of survey content.

Question 1: Education
Secondary
Adult Basic Education (ABE)
Adult Commensurate Education (ACE)
Primary

Question 2: Origins
Race
Mark One or More
Mark One Only
Ethnicity

Question 3: When Employed for Pay
Last Week
Sabbatical
Vacation
Next Week

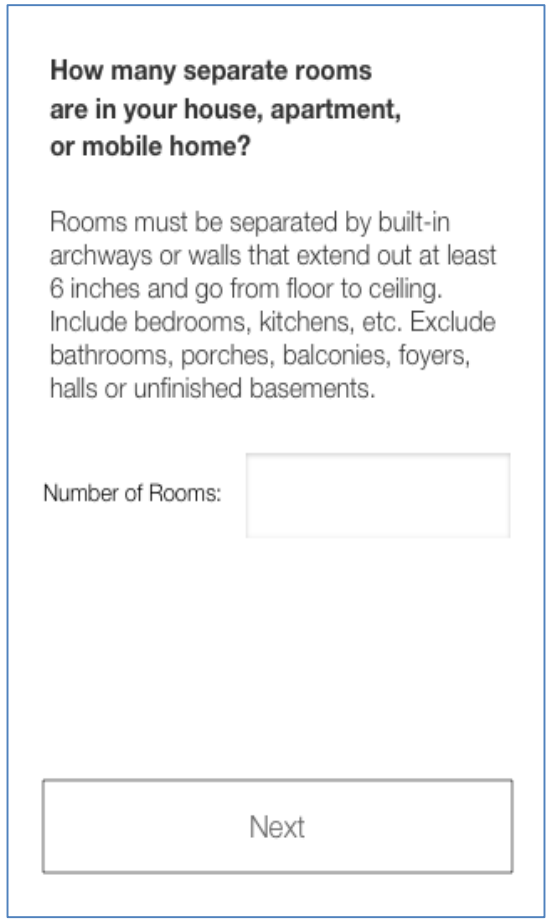
Question 4: Past 12 Months Training
Workshop
Seminars
Conferences
Internship

Question 5: Certifications or Licenses
Certified Medical Assistant
Certified Practitioner
Industry License
Technical License

Vignettes

- Vignettes provide information needed to answer survey question
- Chose a survey question with complex instructions
  - One correct answer: based on info in vignette & instruction
- Rationale: Allows us to investigate if faster survey completion time comes at a cost to accuracy.

Vignette 2: "You live in a home that contains two bedrooms, a bathroom, a hallway, a kitchen, an unfinished basement, and a living room and dining room separated by an archway that extends 5 inches from the wall."



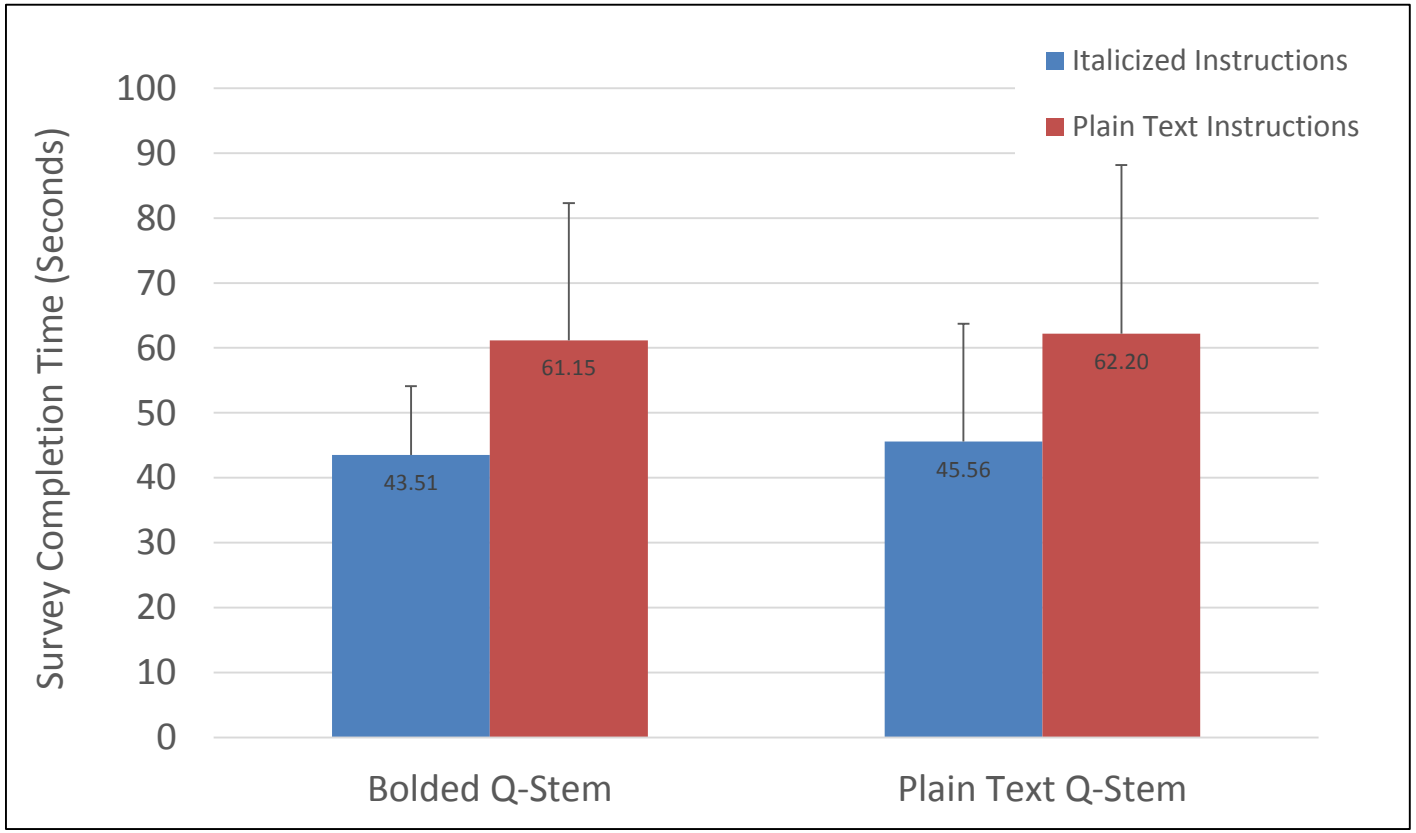
Metrics

1. Efficiency
   - Survey completion time
2. Effectiveness
   - Response Accuracy
3. Satisfaction
   - Task-Difficulty Rating
   - Overall Preference
4. Other metrics
   - Word Recognition – List of words
     - “Old”: words that appeared in survey
     - “New”: words that did not appear in survey

Analysis and Results

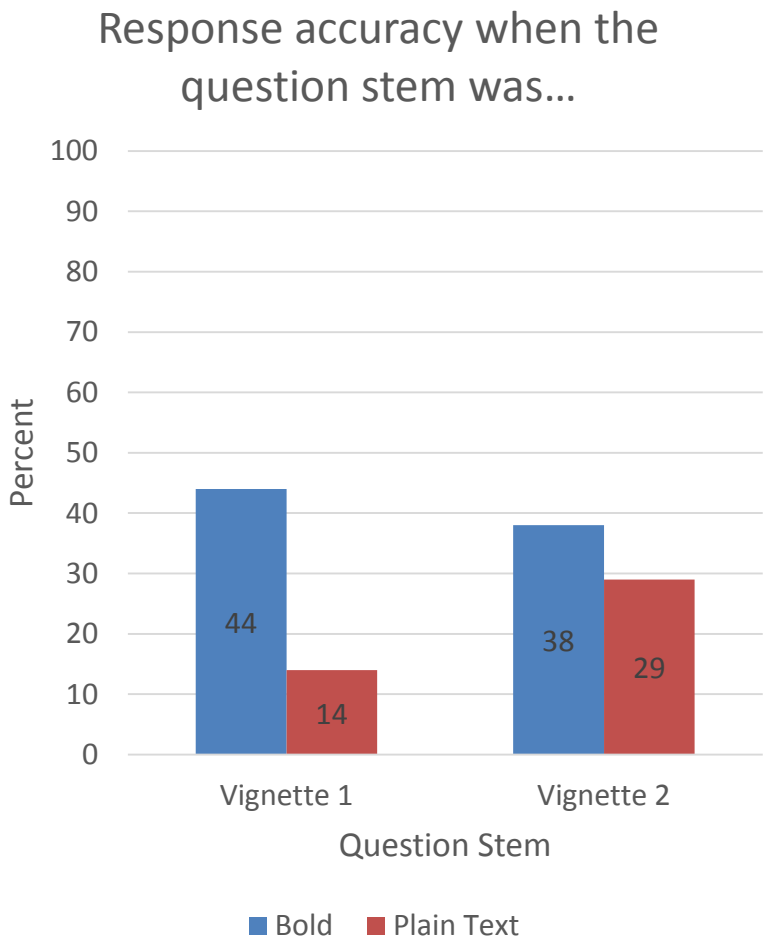
Efficiency: Survey Completion Time

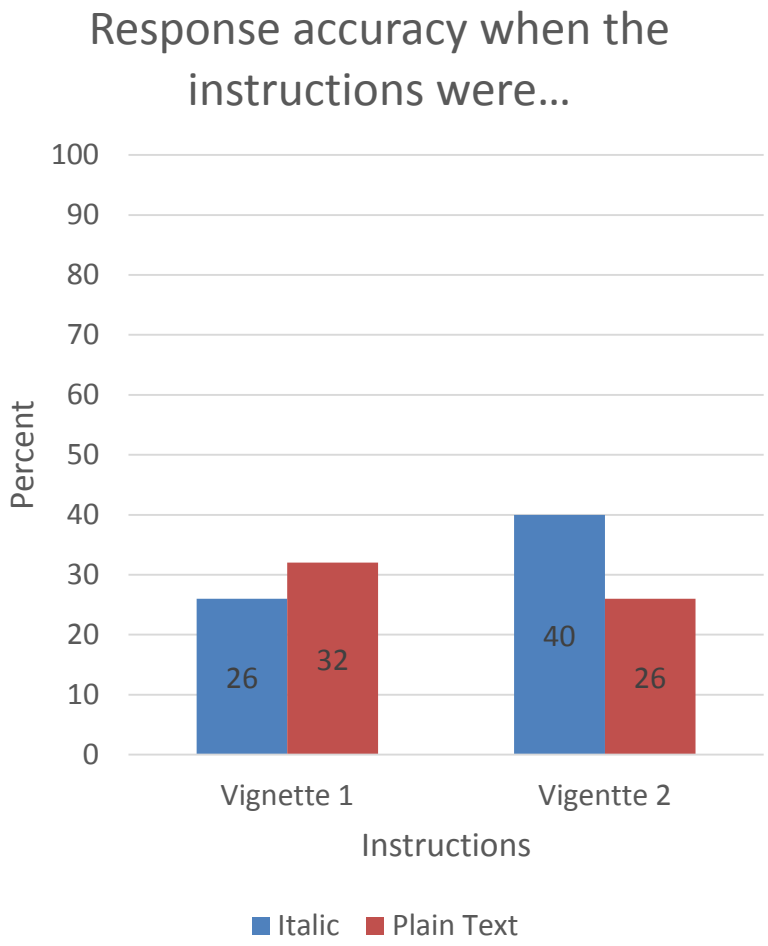
Main effect of instructions: *Italicized* instructions result in faster survey completion times compared to plain text.



- Bold – $F(3,26)=.04$, $p = ns$
- Ital – $F(3,26)=4.94$, $p < .05$
- Bold x Ital – $F(3,26)= .00$, $p = ns$

Effectiveness: Accuracy





Bold:
Vignette 1: $\chi^2(1) = 3.08$, p = n.s.
Vignette 2: $\chi^2(1) = 0.26$, p = n.s.

Italic:
Vignette 1: $\chi^2(1) = 0.15$, p = n.s.
Vignette 2: $\chi^2(1) = 0.60$, p = n.s

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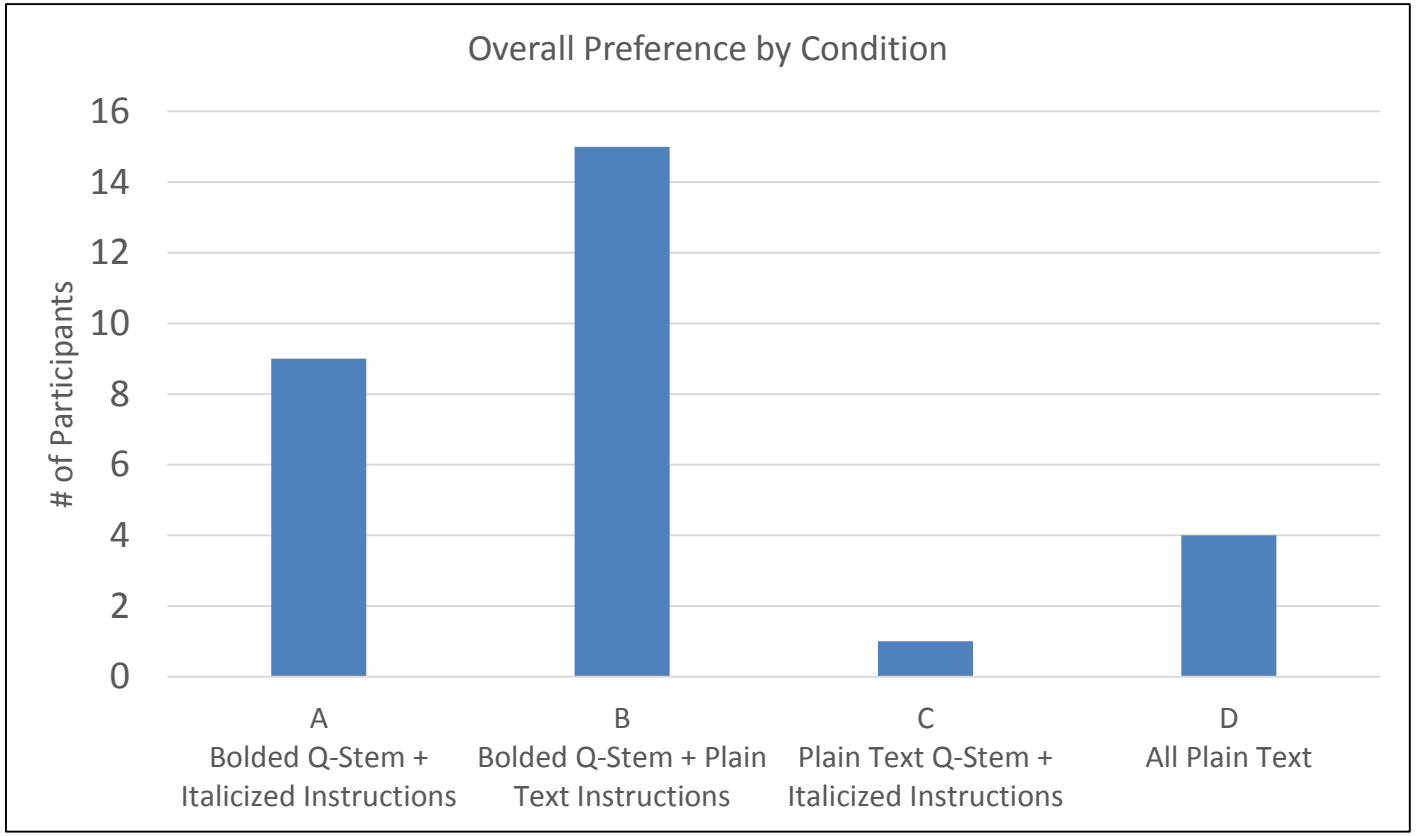
Satisfaction: Task Difficulty

There were no significant differences in task difficulty ratings between conditions.

Satisfaction: Overall Preference

- Participants overwhelmingly preferred conditions with a **bolded** question stem.
- Popular comment: “Easy to read”



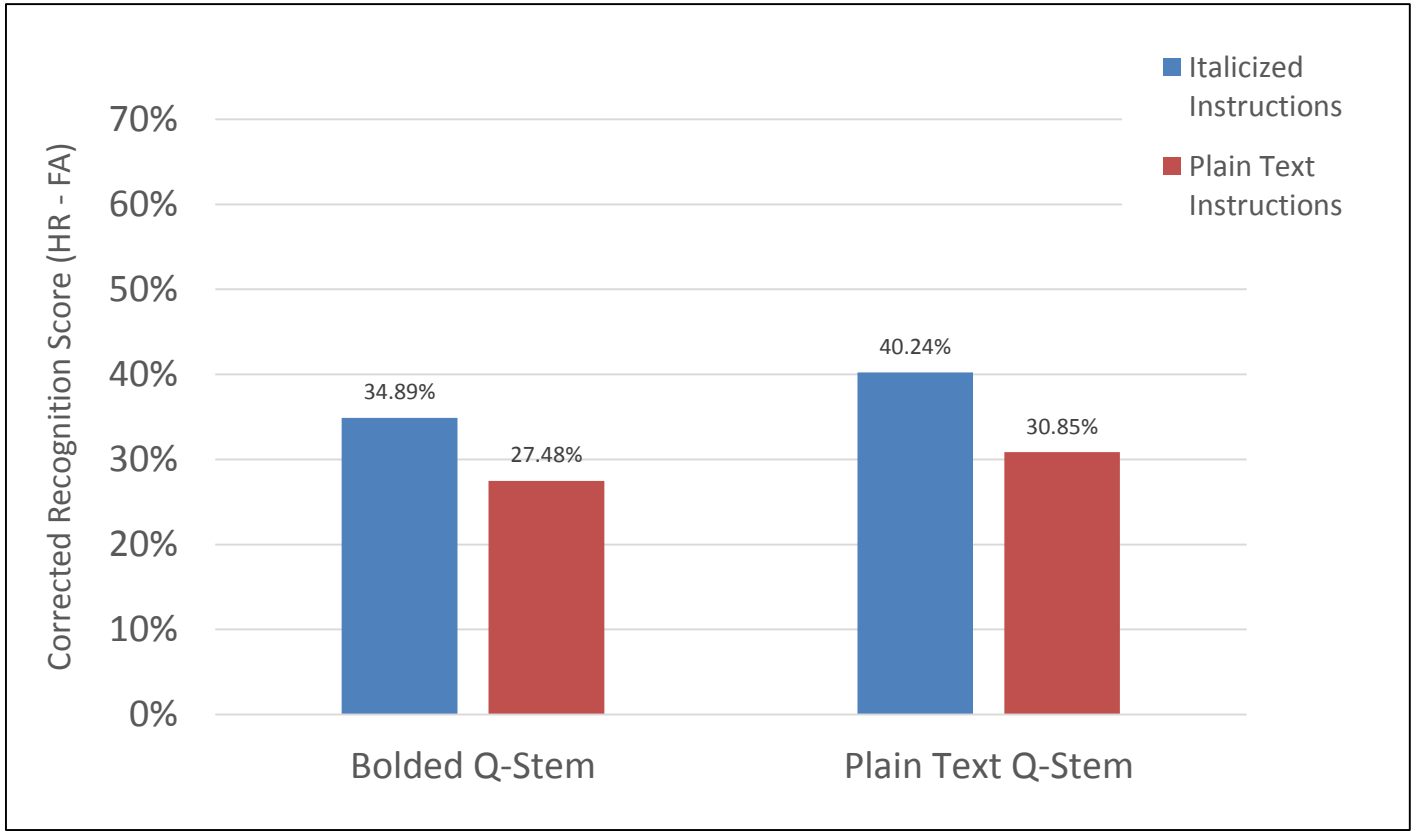
$\chi^2(3) = 14.03$, $p < .01$

Pairwise comparisons:

- A vs C and D, $p < .05$
- B vs C, $p < .05$

Other Metric: Word Recognition

Neither **bold** q-stem nor *italicized* instructions significantly affected the amount of text read.



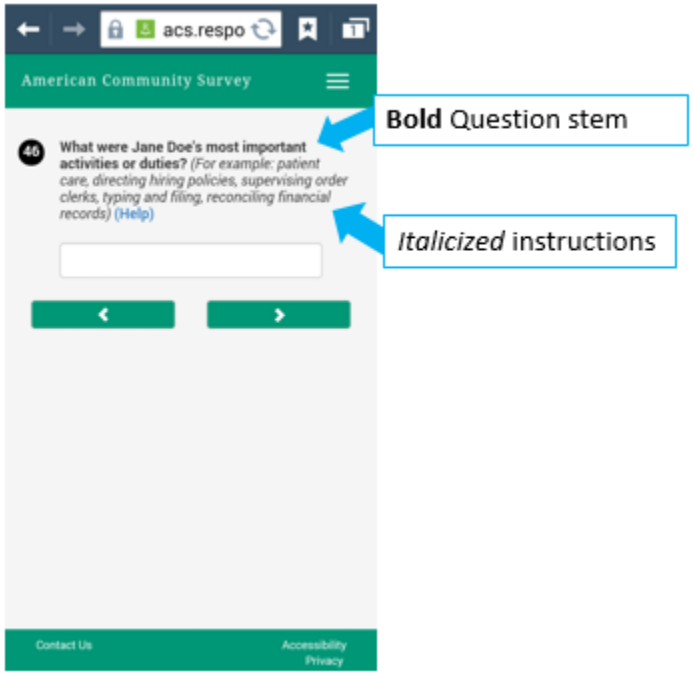
- Bold - $F(3,26)= .26$, $p = n.s.$
- Italics – $F(3,26)= .97$, $p = n.s.$
- Bold x Ital – $F(3,26)= .01$, $p = n.s.$

Recommendation

- *Italicize* instructions – This resulted in faster overall survey completion time
  - Speed benefit did not come at a cost to response accuracy
  - No evidence found for skipped instructions via filtering out of irrelevant text

- **Bold** question stems – Strongly preferred by study participants
  - No benefit or cost to speed or accuracy

- Some empirical support for the common practice of *italicizing* instructions and **bolding** q-stem



Limitations

- Our word recognition measure may not be sensitive enough to uncover the mechanism underlying faster survey completion times for *italicized* instructions due to high task difficulty.

- Accuracy results were based on an artificial task (vignettes)

Future Directions

- Eye-Tracking to investigate filtering of instructional text
- Test scrolling design to test possible benefits of **bolding** q-stem on mobile device survey

Questions?

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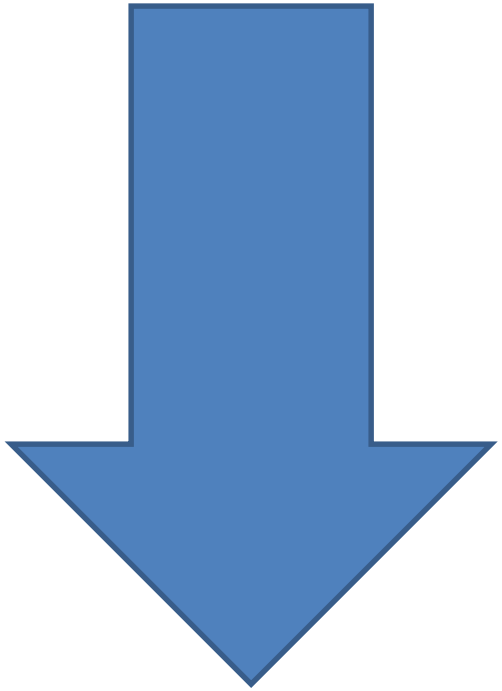
Extra Slides

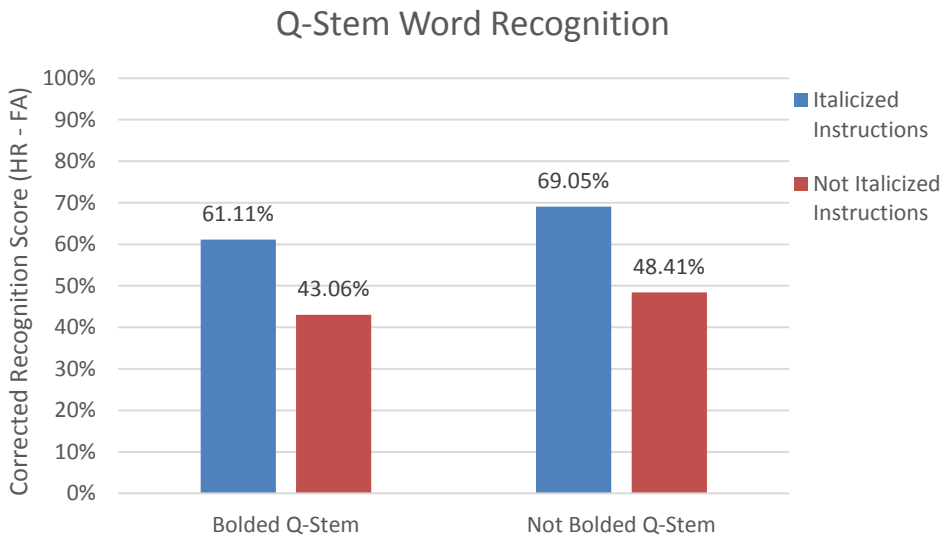


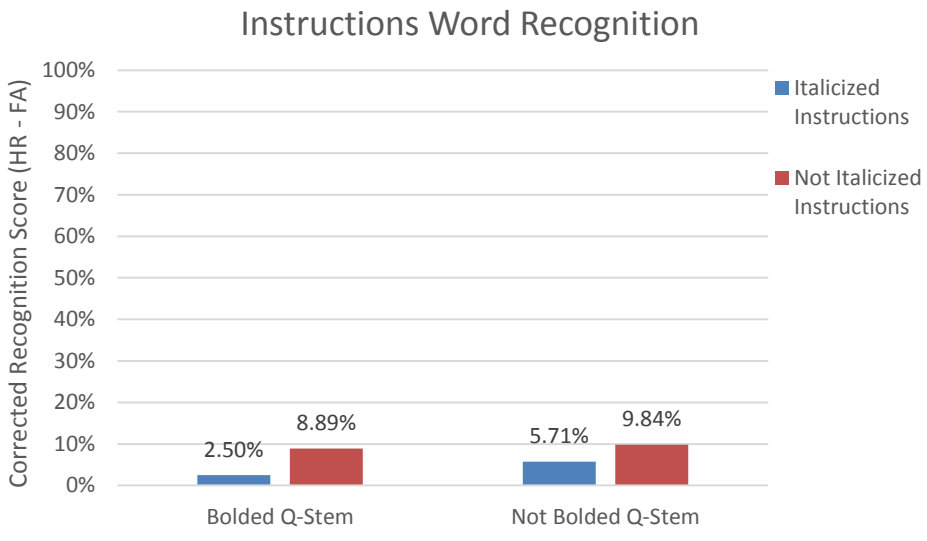
Word Recognition: The Details

- 11 “old” words, 9 “new” words
- Hit Rates (Recognition)
  - –% of “old” words circled
- False Alarm Rates (Guessing)
  - –% of “new” words circled
- Measure Used: Corrected Recognition Score
    - Hit Rate minus False Alarm Rate

Word Recognition - Results

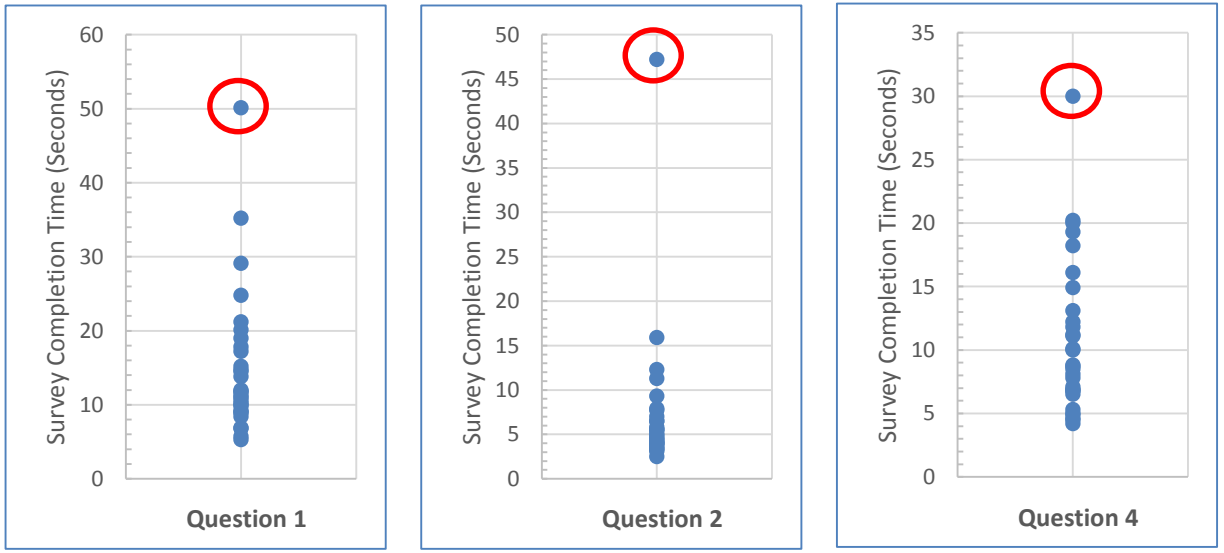
- No significant effects of Bold or Italics on recognition of words from the question stem or instructions





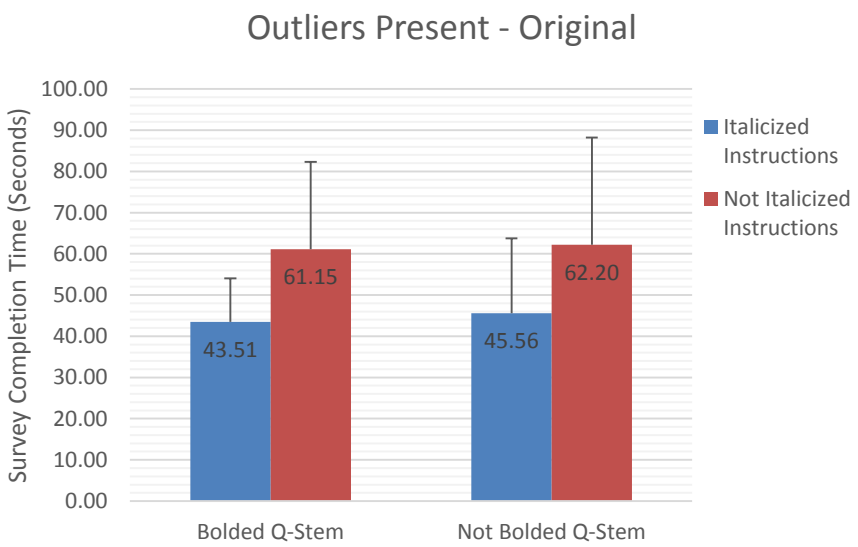
Outliers

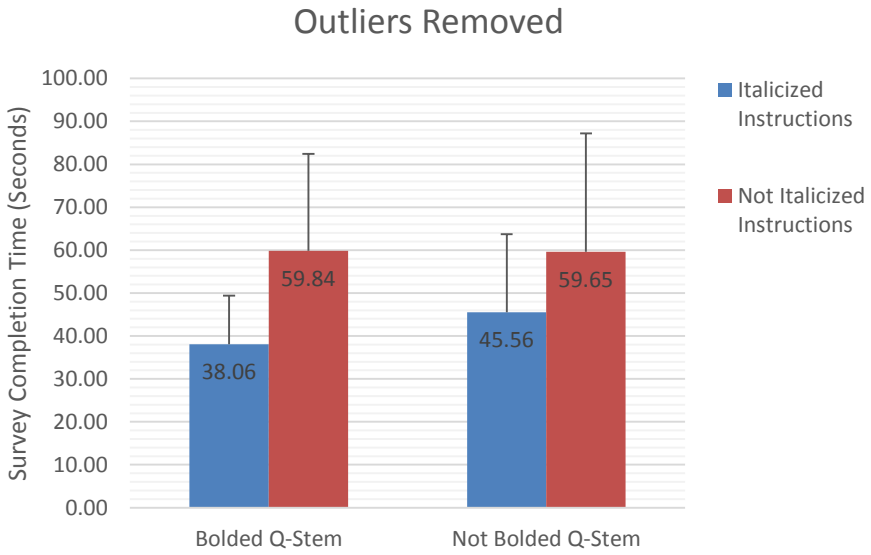
- 3 participants talked to TA during task
- Common outlier detection methods using conservative criteria were used to determine the need for sensitivity analyses:
  - 3 of 3 were >3 SDs above mean
  - 2 of 3 were >3xIQRs (Inter-Quartile Ranges) outside range



Sensitivity Analysis

- Main effect of italicized instructions remains significant:
- Subjects Removed – 2 x 2 ANOVA, *p=.03*





- Additional Confirmatory Analyses:
  - Mean imputation – 2 x 2 ANOVA, *p=.03*
  - Nearest neighbor – 2 x 2 ANOVA, *p=.01*
  - Only question-level data removed – Random Effects Analysis, *p=.02*

Satisfaction by factor