Linear Navigation Guideline

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Sample of Census Bureau questionnaires
American Community Survey - left

Sample of Census Bureau questionnaires

Business Survey - middle

Sample of Census Bureau questionnaires

2020 Census - right

Literature

- Placement of forward and backward navigation did not affect breakoff rates – Couper, Baker, & Mechling (2011)

- Placement of forward button to the right of the backward button increases user satisfaction and is preferred with no time-on-task differences noted – Romano Bergstrom, Erdman, & Lakhe (2016)

Web survey design issue

- For forward and backward navigation buttons we needed to know the optimal:
  - Placement
  - Color
  - Size
  - Label

User Experience Design Factors

- Mental models = how the user expects the design to work
  - Typically based on what the user knows from past experiences
- Fitts' law = is about how time on task is affected by size and distance
  - Bigger and closer targets take less time to engage

- Challenge: We suspected that time on task would be affected by the content of the survey questions we asked. We wanted to take that "cognitive factor" out of the equation.

Method

- Series of A/B experiments using nonprobability panels
  - Reside in the U.S. and opted in to participate in studies.
  - 400 participants in Experiment 1
    - 39% Male/61% Female
    - Age (mean=47 years old; range 18-88)
    - 5% Hispanic origin/95% not of Hispanic origin
    - 77% White only/23% nonwhite only
    - 16.5% High school or less/83.5% more than high school
    - 30% Mobile/ 70% PC
  - 515 participants in Experiment 2 confirmation experiment
    - PC/Mac only
    - Similar breakdowns but more High School or less
      - 34% High school or less / 66% more than high school

Placement experiment

4 navigation button placements & 3 questions
12 screens altogether

Centered with the radio button question

Either side with the dropdown question

Right-aligned buttons with the text entry question

Left-aligned buttons

How we tried to remove the "cognitive factor" from the questions and uncover the user's mental model
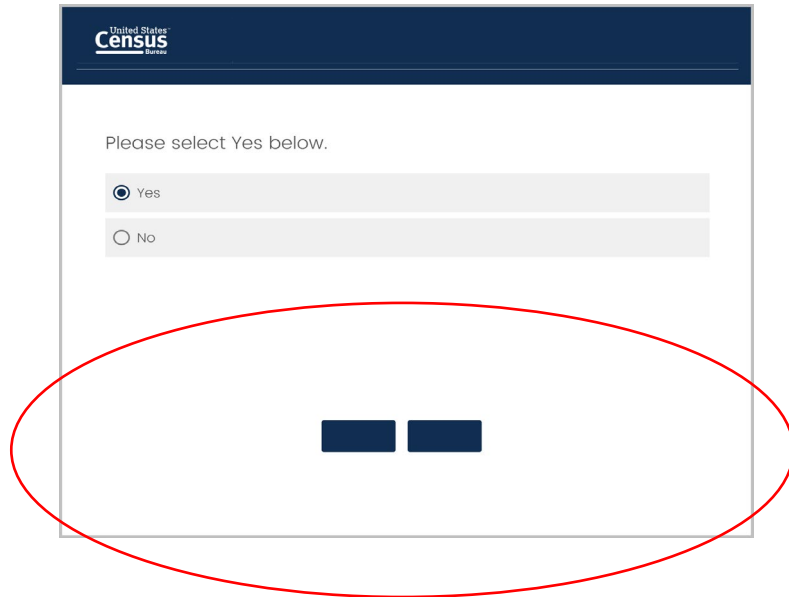
UX Placement winner

Faster selection

Centered
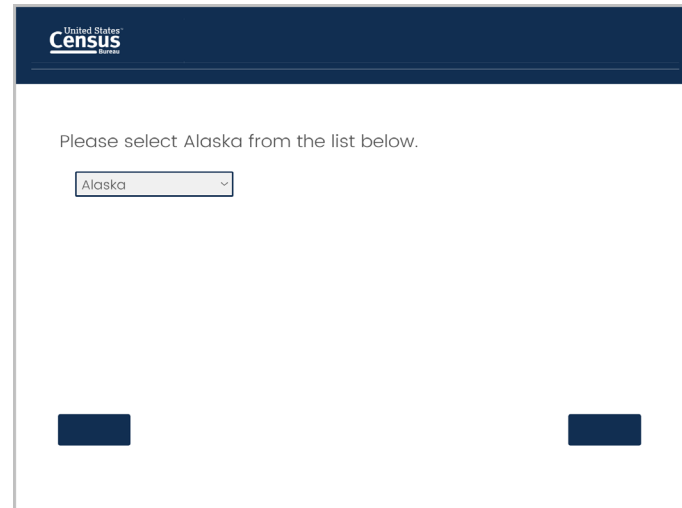
Either side

Other notes:

Over 97% of participants selected the button on the right to go forward.

Participants preferred the either side navigation buttons.

Participants preferred buttons closer to the question. This matches Fitts' law.

The centered buttons could be the same in larger and smaller devices so we went with that design with forward navigation on the right and backwards navigation on the left.

Color and size experiment

15 screens altogether
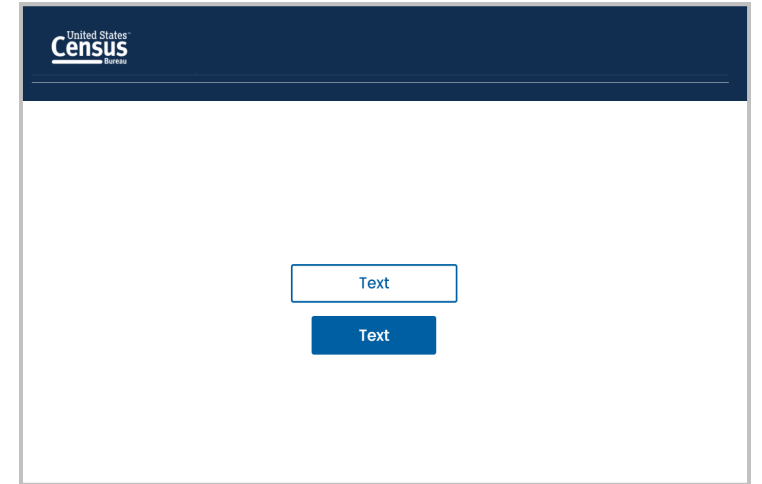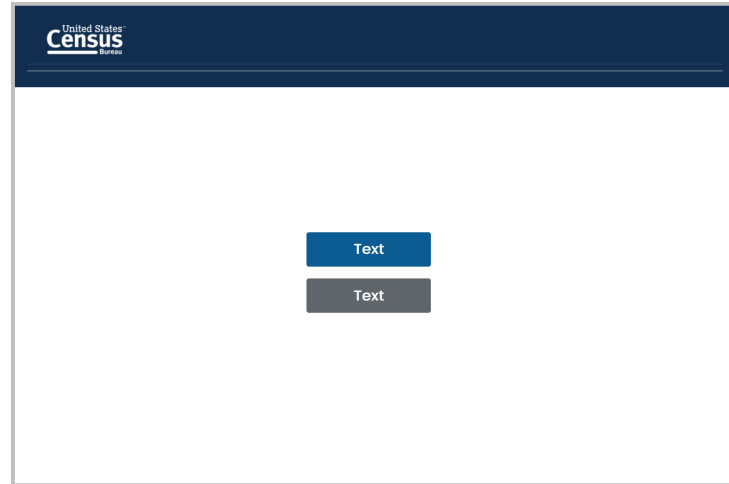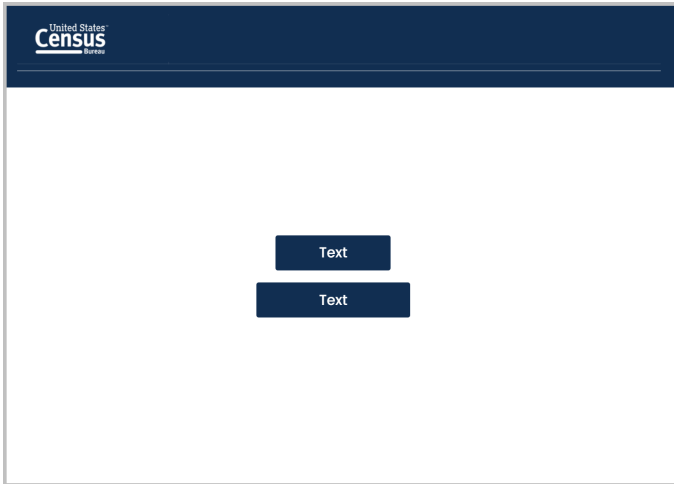
UX Color and size selection

There was not a clear UX winner; but there were less usable designs.

Do not:

Make the Previous button bigger than the Next button

Make the Previous button blue when the Next button is white

Use same sized buttons if the buttons are the same color
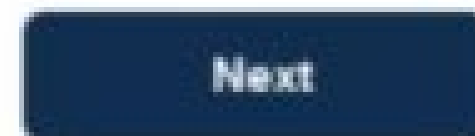
Confirmation experiment

Color, label and size
Measured time-on-task and accuracy of button selected
Showed 32 of 64 combinations - randomized
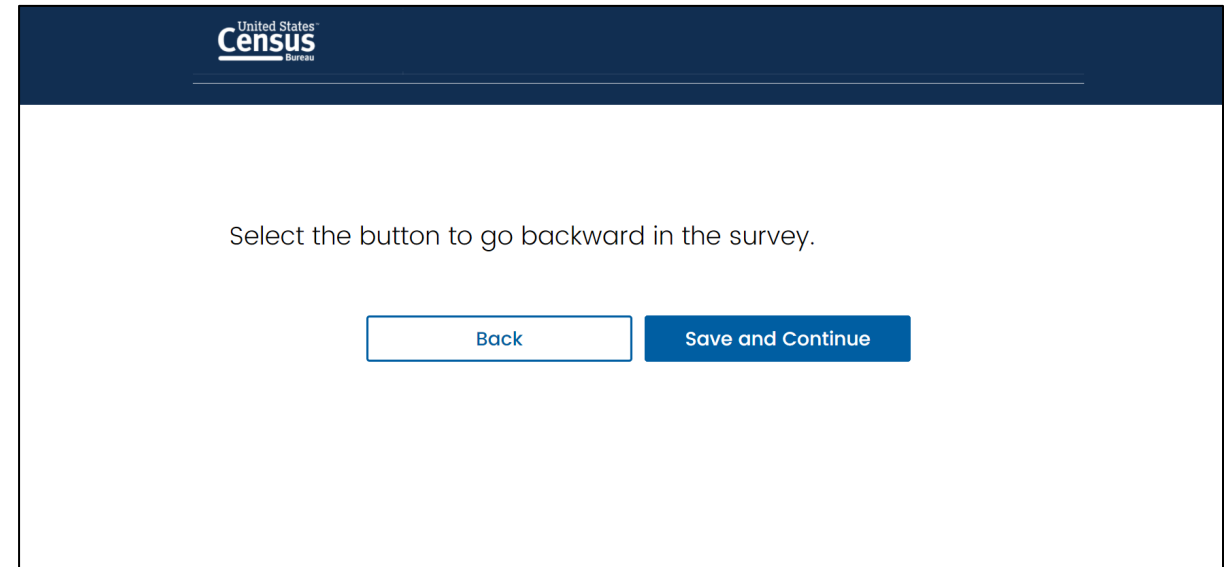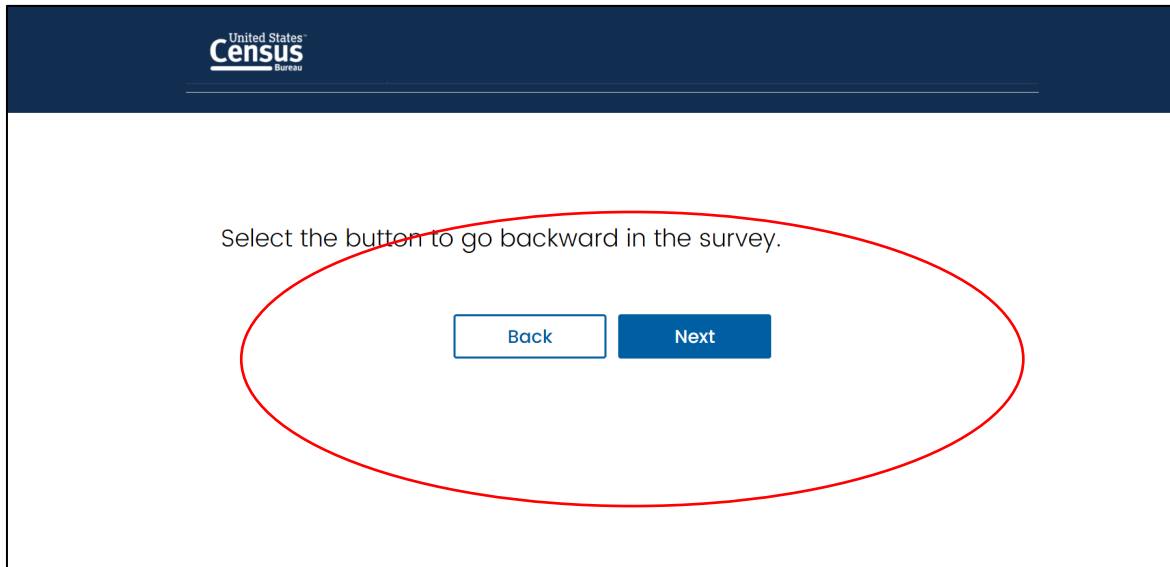
Guideline

- White and Colored button to match the branding of the survey

- Centered

- Default labels of Next and Back with the ability to choose an alternative or to add arrows in addition to text

Challenges & Compromise

- Small differences or no differences in time and accuracy once labeling and colors were in place

- Survey area stakeholders had strong opinions on labels
  - Compromise to include default labels but then allow for alternatives

Thank you!

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Designing Edit Validations

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October 27, 2022

Background

- Edits/validations are programmed into web surveys to catch possible errors or inconsistencies in the data

- The validations are triggered once the respondent attempts to leave the survey page and navigate to another page

- If an edit/validation is triggered, a message appears to the respondent alerting them to the issue

- Edits/validations are typically used to
  - remind respondents of missing answers
  - compare the answers to different questions
  - signal that an answer is out of range

Types of data entry errors

- Hard edits
  - Prevent respondent from answering more survey questions or submitting data
  - E.g., entering an address for the 2020 Census
- Soft edits
  - Do not prevent respondent from answering more survey questions or submitting data without changing responses
  - E.g., inconsistent age and date of birth

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Design questions

- How should these alerts appear?

- Length of alert message?

- Placement/location?

- Color?
  - Different for each type of alert (e.g., soft vs. hard)?

2014 Census Test

- Usability testing of census online instrument
- Think aloud protocol
- Tested three edit messages for the race/Hispanic origin item

Findings

- Race edits were not noticed when activated
  - Very few race edits were invoked during the actual sessions
- No pattern with one type of edit message helping more than another edit message
- During the debriefing these edits even caused some confusion

Findings

Content and color

- Long messages can be ignored, particularly in green

- Conflicting content/color "Red tells you that you skipped something, but message says it's OK to go on"

Color

- Green

    - Ignore

    - Positive

    - Not an error

- Red

    - Alerts user that there's an issue

    - Made an error

2016 Census Test

- Green message (soft) and red outline
- Participants do not pick on nuance of soft vs. hard

2020 Census: Soft edits

2020 Census: Hard edit

Challenges & Compromise

- Functionality of messages present programming challenges
  - Difficult to test experimentally
  - Have been unable to design and test edit messages due to software limitations
- Rely on United States Web Design System (USWDS) guidance
https://designsystem.digital.gov/components/alert

- More research will occur on this topic in FY23 using the American Community Survey panel

USWDS

ⓘ Informative status
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

⚠ Warning status
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

❗ Error status
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

✓ Success status
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

SLIM ALERT

ⓘ Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

ALERT WITH NO ICON

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod.

Guidelines

Hard edits (error)

- Messages should appear with red background color
  - Use sparingly
  - Only for information survey needs to allow respondent to continue

This is an example of a hard edit or error alert.	#F4E3DB

#D54309

Soft edits (warning)

- Messages should appear with yellow background color

This is an example of a soft edit or warning alert.	#FAF3D1

#BA8C3D

Guidelines

Informational alert
- Informational messages should appear with blue background color
  - Informational messages are rare within surveys

This is an example of an informational alert.   #E7F6F8

#00A1C2

Success alert
- Messages should appear with green background color
  - These are rare within surveys

This is an example of a success alert.   #ECF3EC

#00A91C

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Guidelines

- The alert message is at the top of the survey screen
- Outline the corresponding Dropdowns,
Combo boxes, and write-in fields in the same color

Challenges & Compromise

- The alert is the message that appears when a validation/edit is triggered

- Information messaging that needs to be communicated to the respondent

- Software limitations prevented systematic design testing (e.g., of color and placement of alert)

- Rely on USWDS guidance

- More research on edit validations ahead in FY23

Thank you!

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Web Survey Branding

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Banner

Wrapper

Footer

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2020 Census Planning Survey

English   Español   Save and Logout

What is the highest degree or level of school you have completed?
Select only one answer.

○ No high school

○ Some high school

○ High school graduate or equivalent (for example GED)

○ Some college, but degree not received or is in progress

○ Associate degree (for example AA, AS)

○ Bachelor's degree (for example BA, BS, AB)

○ Graduate degree (for example master's, professional, doctorate)

OMB No.: 0607-0978 Approval Expires: 08/31/2020   Accessibility   Privacy   Burden   Security

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Examples of wrappers used in surveys

Goals

- Wanted to create a uniform look-and-feel for all survey wrappers.

- With the help of Public Information Office, designed survey wrappers to embed in testing that would inform guidelines

- Research Questions:

  1. Where did users expect these select survey features to be located?

  2. What did users think of redesigned survey wrappers?

Methods

- Conducted unmoderated testing in Qualtrics
- Series of A/B experiments using nonprobability panels
  - 795 participants
    - 38% Male/62% Female
    - Age (mean=46 years old; range 14-90)
    - 12% Hispanic origin/88% not of Hispanic origin
    - 74% White only/26% nonwhite only
    - 43% High school or less/57% more than high school
    - 30% Mobile/ 70% PC

Where did users expect these survey features to be located?

      1. Logo of the survey sponsor

      2. Name of the survey

      3. Contact us

      4. Frequently asked questions (FAQ)

      5. Language toggle

- "Typically, surveys have the logo of the survey sponsor. Where do you expect to see that logo on the page? (Click or touch the image.)"

Heat map results: Where do you expect to see that logo on the page?
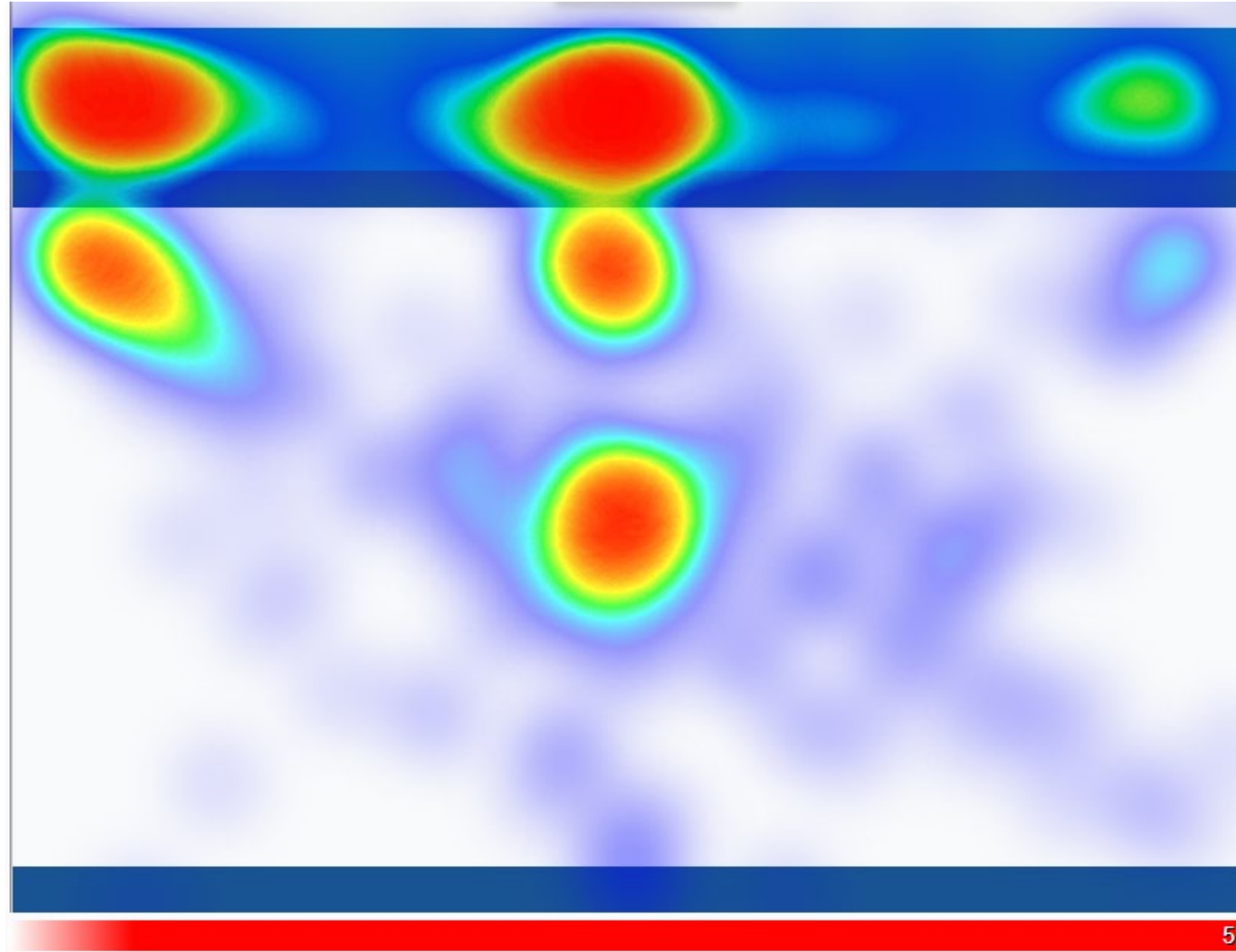
*The dark red signifies the most frequently clicked (or touched, if mobile) area

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Results: Where would you expect to find a Contact us link?
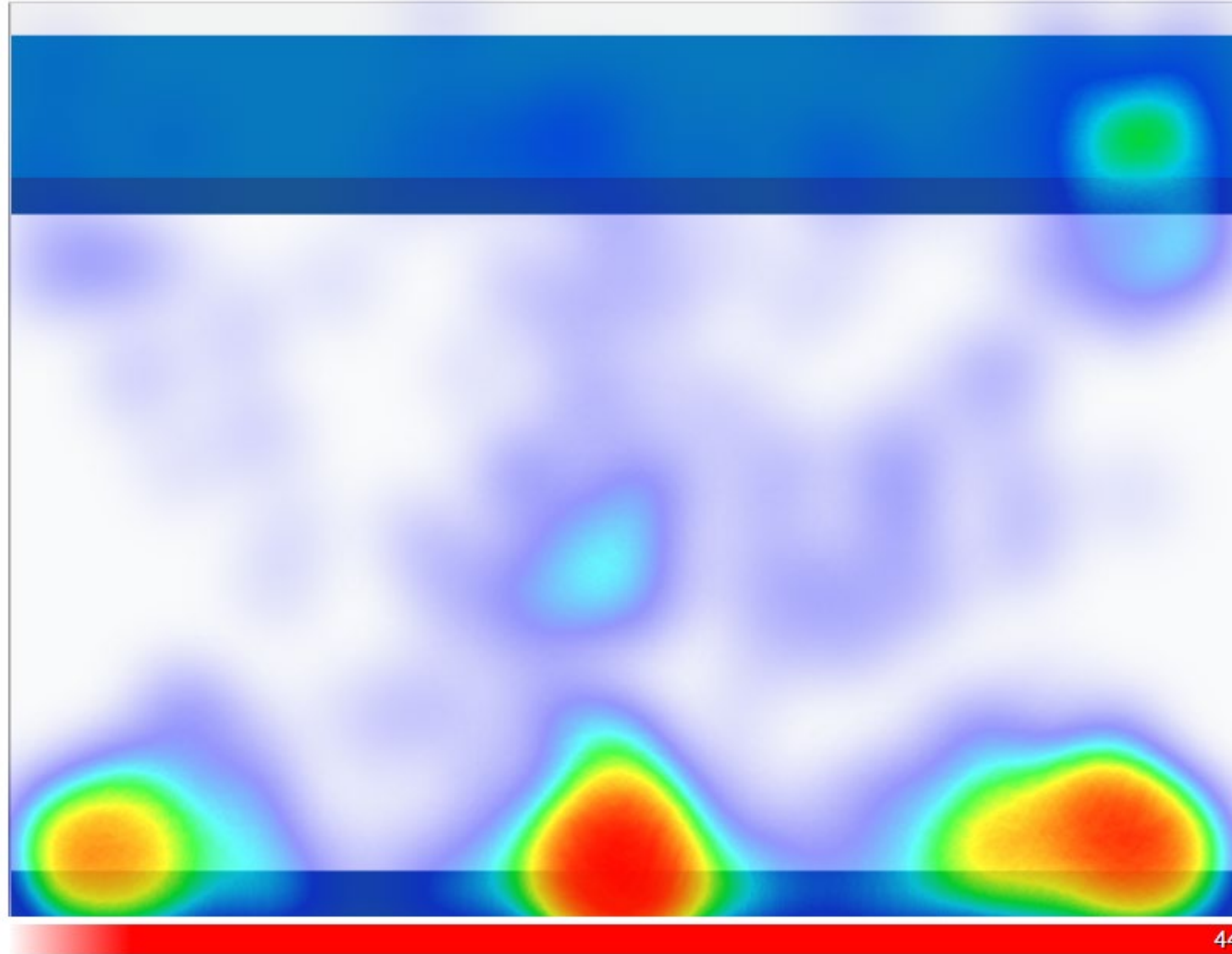
Results: Where would you look for the language toggle feature?
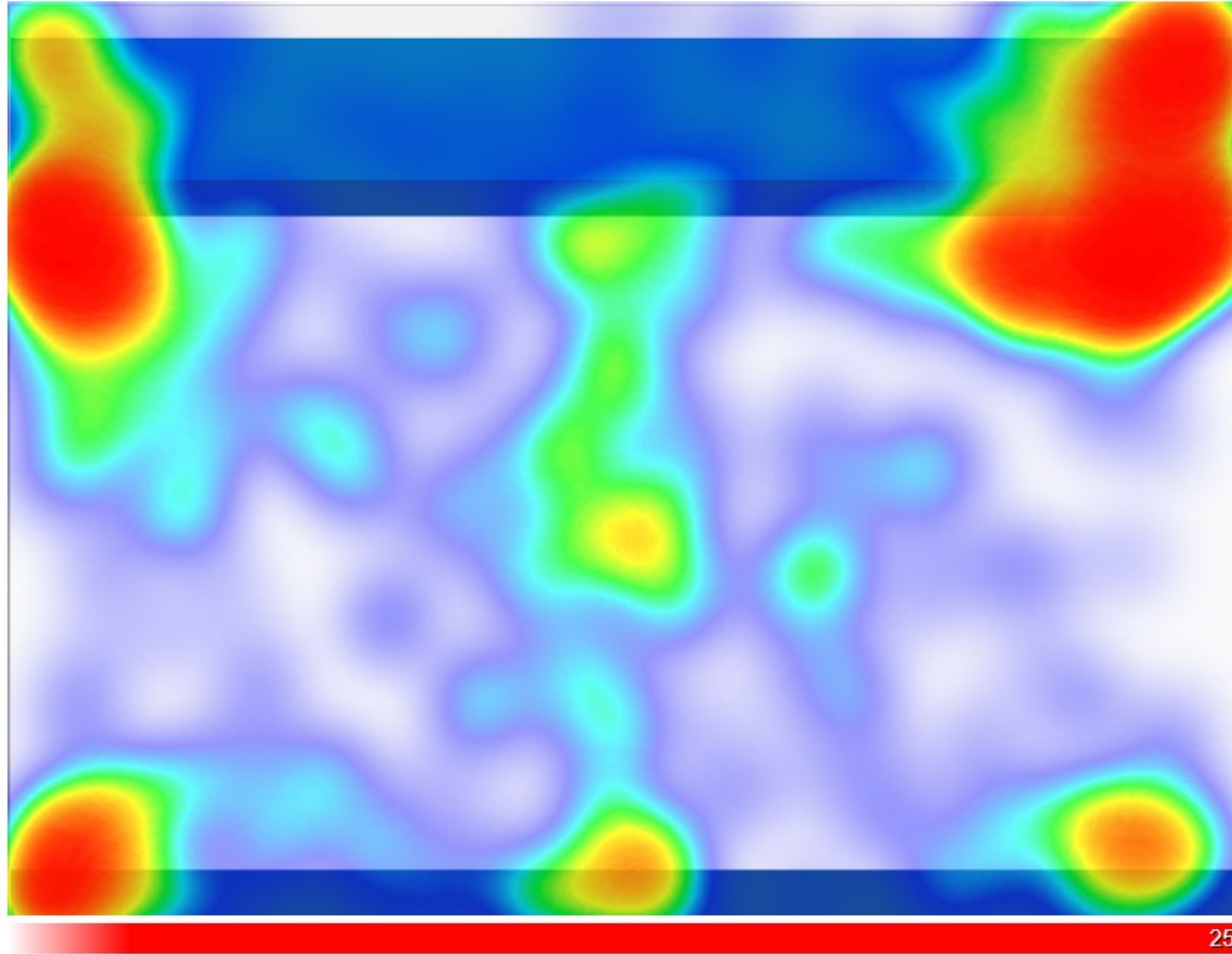
What did users think of redesigned survey wrappers?

Census Planning Survey

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2020 Census Planning Survey

English | Español | Save and Logout

What is the highest degree or level of school you have completed?
Select only one answer.

- ○ No high school
- ○ Some high school
- ○ High school graduate or equivalent (for example GED)
- ○ Some college, but degree not received or is in progress
- ○ Associate degree (for example AA, AS)
- ○ Bachelor's degree (for example BA, BS, AB)
- ○ Graduate degree (for example master's, professional, doctorate)

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Redesign 1 – People Design

Redesign 2 – Logo Only Design

Question 1: Which redesign did participants prefer?

OR

Question 2: Did they prefer the chosen redesign or the original design?

Preference from Q1 above

OR

Census Planning Survey Preference (Redesigns)

- Chi-square test between conditions
- X^2 (2, N = 265) = 100.76, $p < 0.01$
- Users preferred the people design over the logo only design

Preference for People versus Logo Only
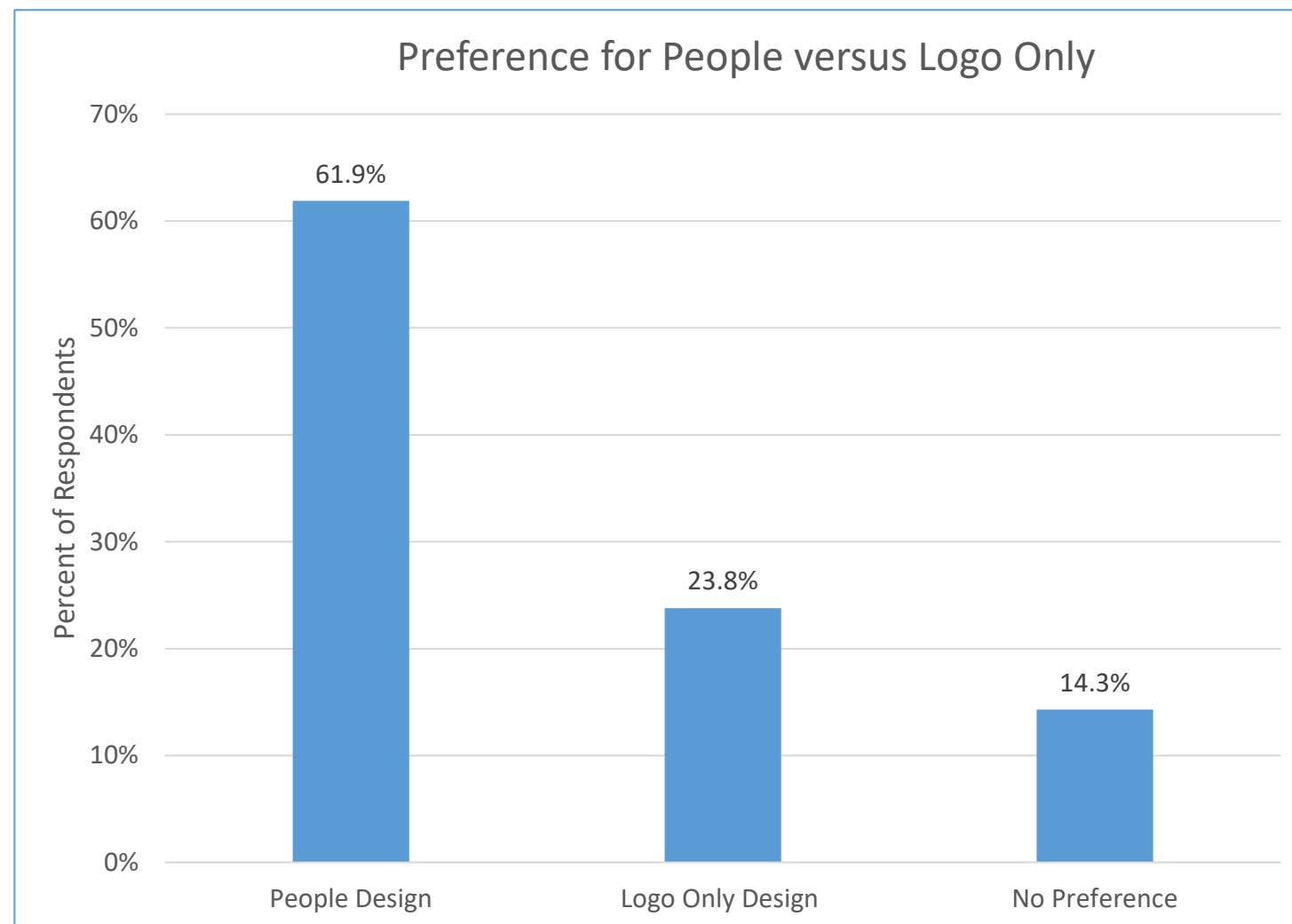
Census Planning Survey Preference (People versus Original design)

- Chi-square test between conditions
- $X^2 (2, N = 183) = 95.344, p < 0.01$
- Users preferred the people design over the original design

Preference for people versus original design

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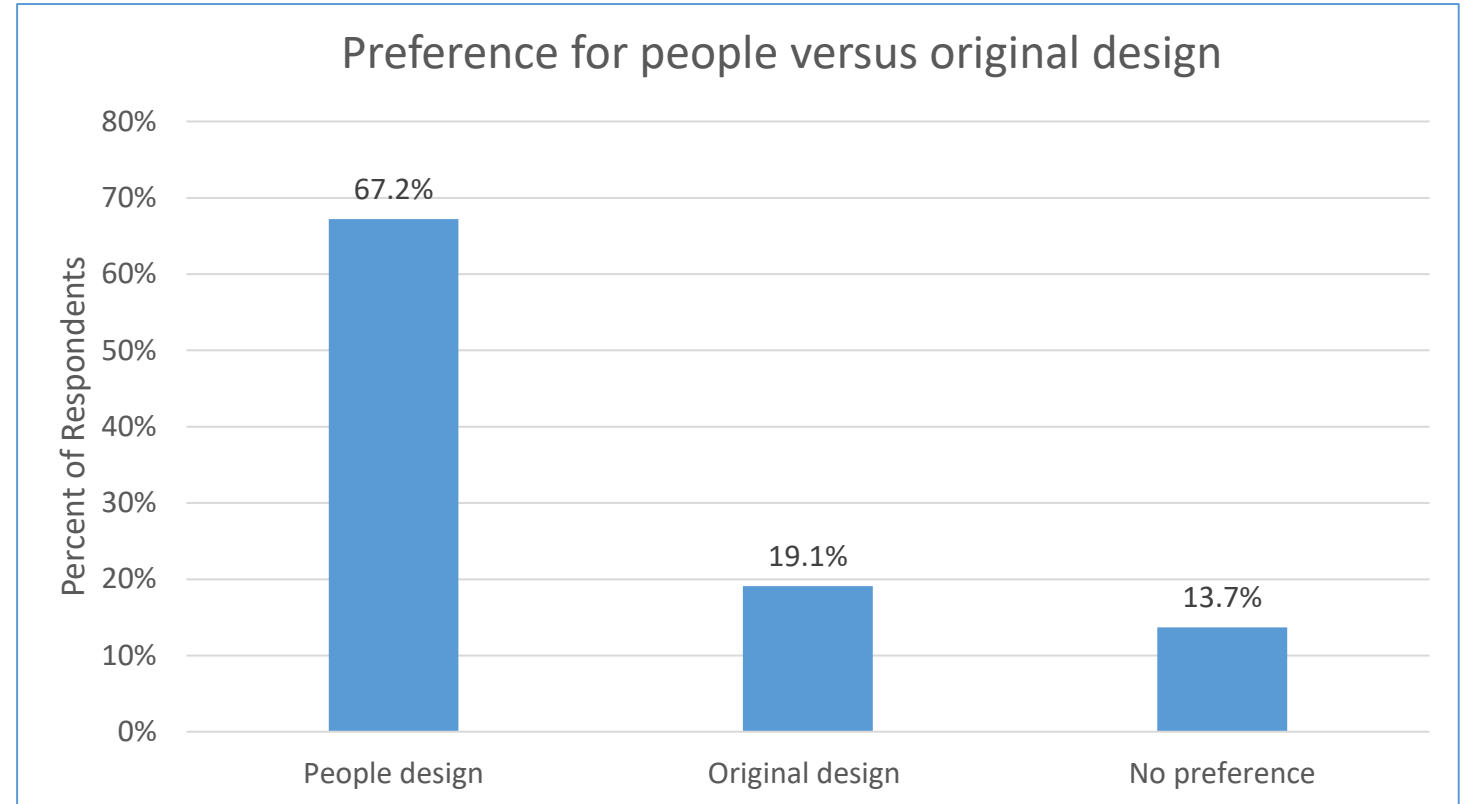
What did we recommend for the final guideline?

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Survey Title

FAQ   Español   Save and Log out

Accessibility   Privacy   Security   Contact Us

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Challenges

- Many respondents skipped the questions asking them to click (or touch) where they expected select features.

- Sometimes it was not exactly clear where select survey features should be located on the wrapper

- Does preference for the people images lead to better data quality?

Thank you!

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Progress Indicators

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Any views expressed are my own and not those of the U.S. Census Bureau.

What is a progress indicator?

10% of the questionnaire completed
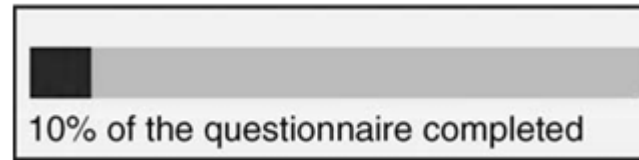
Source: Heerwegh and Loosveldt, 2006

- Visual display to inform respondents how they are progressing through a survey

- Typically displayed across the top, in the top corner or in the bottom corner

- Can provide a percent complete, number of questions (question 2 out of 10), or no textual reference

Why use progress indicators?

- Social exchange theory
  - Respondent agrees to participate and in exchange they receive information on the burden of the survey and how they are progressing (Villar, et al., 2013)
- Keep respondents motivated
  - Respondents may be more likely to complete if they see they are making progress (Villar, et al., 2013)
  - If respondents are feeling fatigue, they may see they are almost finished and complete the survey (Heerwegh and Loosveldt, 2006)

Web survey design issue

- Goal is to set an expectation of time

- Most surveys are not linear
  - Not every respondent sees every question
  - Questionnaire length can vary depending on pathing

- This results in unpredictable progress indicators
  - Static – jump around depending on pathing
  - Dynamic – start the progress slow until paths have been established

Method

- Conducted a literature review to determine effectiveness
  - Google Scholar
  - Conference Proceedings
  - Books
- Sources
  - Experiments
  - Meta-analysis
  - Usability testing
- Experiments date back to 2001

What the research found
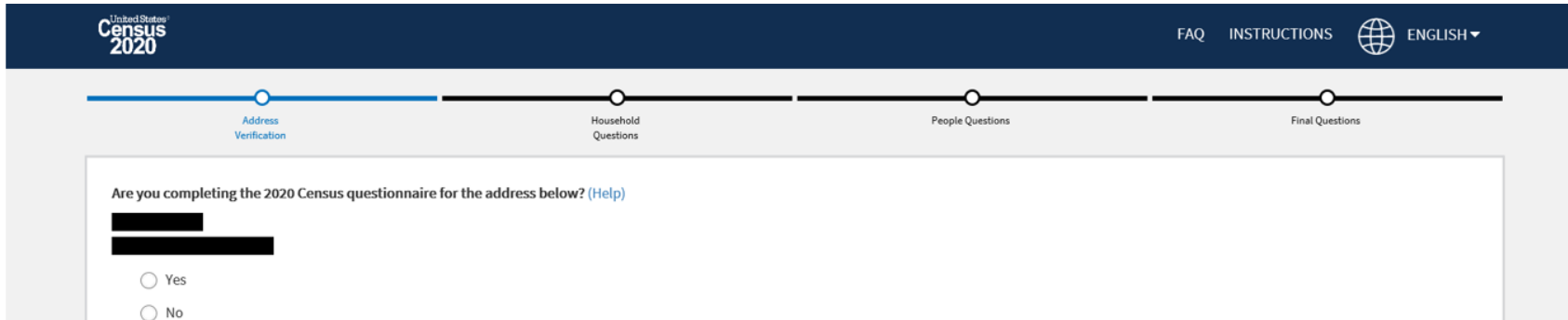
- Progress indicators work when
  - Respondents believe a task will take longer than it actually ends up taking (Yan, et al., 2010)
  - If the survey is promised to be short and is actually short (Yan, et al., 2010)
  - Start off fast but later slow down (Villar, et al., 2013)

- Progress indicators don't work when
  - Respondents don't see early progress (slow to fast) (Villar, et al., 2013; Crawford et al, 2021)
  - They jump around as pathing changes (Kaczmirek, 2008)

- In other cases, there is no effect (Couper et al., 2001; Yan, et al., 2010; Villar et al., 2013; Crawford et al., 2021)

Guideline

- Do not include progress indicators for survey completion status
  - Progress indicators are unlikely to help and may reduce completes

Challenges & Compromise

- Some surveys want a way to communicate expectations

- Solution – section progress indicators
  - Allows respondents know where they are and what's to come
  - Is not influenced by pathing
  - Indicator was not problematic in 2020 Census usability testing (Nichols, et al., 2017; Olmsted-Hawala, 2018; Olmsted-Hawala, et al., 2019; Olmsted-Hawala, et al., 2020)

Source: 2020 Census

Thank you!

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Personalizing Questions for Online Self-Response Modes: Allowing respondents to enter in timeframes that fits their situation

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Federal Committee on Statistical Methodology

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Income question user issues

- The American Community Survey (ACS) asks the income question over past 12 months

- Timeframe is "annually"

- People may think about the amount of money the earn in a different time period
  - Daily, weekly, monthly,

We noticed in user testing that participants may have been reporting different time frames –

Example of cost of water and sewer in the ACS: timeframe past 12 months

Expert review of ACS

- The ACS had an expert review done by an outside vendor (contractor) and they recommended harnessing the benefits of online survey design for these types of questions.
- They suggested that if we know the timeframe, we can ask the question that best fits the respondent and may get better data.

- Here is an example of what the contractor recommended...

National Household Education Survey (NHES) example of time spent at daycare

NHES example of day care costs

What is the easiest way for you to tell us the amount your household pays for Jane to go to this day care?
Do not include any money that you may receive from others to help pay for care.

○ Hourly

○ Daily

◉ Weekly

○ Every 2 weeks

○ Monthly

○ Yearly

○ Other – Specify: [   ]

○ Weekly

○ Every 2 weeks

○ Monthly

○ Yearly

○ Other – Specify: [   ]

How much does YOUR HOUSEHOLD pay for Jane to go to this Day care weekly, NOT COUNTING any money that you may receive from others to help pay for care?
Enter '0' if your household does not typically pay for this care.

$[   ].00

Previous   Next

What's the best design for a survey question with a dynamic timeframe?

- ACS was not able to test this topic in the production setting
- So – our team decided to test alternate ways of asking timeframe questions
  - Focused on personalizing the question based on the respondent's situation

Method

- Two Rounds - modifying the design in each round

- Split-panel survey with 2 conditions

- Between-subjects design

- Three main questions where we captured data:
  - Questions on paying for household electricity (amount paid)
  - Questions asking for water and sewer (amount paid)
  - Question asking about respondent wages (amount earned)
    - Follow up question that calculated the income amount for a year and asked if the amount was correct, if not, open text field to input the correct amount.

Data collection

- Online survey using Qualtrics platform
- Non-probability panel
  - Members of U.S. public who signed up to participate in surveys through a private panel provider
- Sample
  - Round 1: 520 completed surveys
  - Round 2: 508 completed surveys
  - Quotas set for region and participant age
  - No IE browser & PC only
- Data collected:
  - Round 1: June 8-16, 2020
  - Round 2: September 2-10, 2020

Round 1 design

Dropdown design

Did you receive any wages, salary, commissions, bonuses, or tips during the PAST 12 MONTHS?

◉ Yes

○ No

What was the amount you received? *Report amount from all jobs before any deductions for taxes, bonds, dues, or other items.*

I received $ [____] .00   every [Select ▾]

Response options visible at all times

Did you receive any wages, salary, commissions, bonuses, or tips during the PAST 12 MONTHS?

◉ Yes

○ No

What is the easiest way for you to tell us the amount of wages, salary, commissions, bonuses or tips you receive?
This includes jobs before any deductions for taxes, bonds, dues, or other items.

○ Weekly

○ Every 2 weeks

○ Twice a month

○ Monthly

○ Annually

What was the amount received every ? *Report amount from all jobs before any deductions for taxes, bonds, dues, or other items.*

$ [____] .00

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Outcome of first test

- It takes more time for users to answer the questions with response options visible at all times than it does to answer the question with dropdown design
- There was slightly more missing data in the dropdown design.
- So - we retested with a tweak to the dropdown design: switch the dropdown fields: first ask for the timeframe and second ask for the amount

Round 2 design

- **Dropdown design**

- **Response visible at all times**

Did you receive any wages, salary, commissions, bonuses, or tips during the PAST 12 MONTHS?

⦿ Yes

○ No

What was the amount you received? *Report amount from all jobs before any deductions for taxes, bonds, dues, or other items.*

Every [Select ▾] I receive $[____].00

Did you receive any wages, salary, commissions, bonuses, or tips during the PAST 12 MONTHS?

⦿ Yes

○ No

What was the amour[...]ed? *Report amount from all jobs before any dedu[...]xes, bonds, dues, or other items.*

Week
2 Weeks
Twice a Month
Month
Year

Every [Select ▾] I receive $[____].00

Did you receive any wages, salary, commissions, bonuses, or tips during the PAST 12 MONTHS?

⦿ Yes

○ No

What is the easiest way for you to tell us the amount of wages, salary, commissions, bonuses or tips you received?

○ Weekly

○ Every 2 weeks

○ Twice a month

○ Monthly

○ Annually

What was the amount received annually?
Report amount from all jobs before any deductions for taxes, bonds, dues, or other items.

$[____].00

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Summary

- Accuracy
  - Swapping the two dropdown boxes didn't seem to matter. There was still a slight difference in item missingness
    - Frequency was more often left blank in the dropdown design than in the response visible on screen at all times

- Efficiency
  - Takes more time for design questions visible on screen at all times

Guideline: Personalizing questions to fit respondent situation

- When asking question where the answer may come in different timeframes – consider allowing respondents to choose the best timeframe for them.

- We tested two different "choose how to respond" designs
  - Mixed results
  - Either design could work, depending on question
  - But we recommend the design where responses are visible on screen at all times.

We recommend: Response visible at all times

Does anyone in this household pay for electricity?

⦿ Yes

○ No

What is the easiest way for you to tell us the amount your household pays for electricity?

○ Weekly

○ Monthly

○ Every 3 Months

○ Annually

How much does YOUR HOUSEHOLD pay for electricity monthly ?

$ [ ] .00

Did you receive any wages, salary, commissions, bonuses, or tips during the PAST 12 MONTHS?

⦿ Yes

○ No

What is the easiest way for you to tell us the amount of wages, salary, commissions, bonuses or tips you received?

○ Weekly

○ Every 2 weeks

○ Twice a month

○ Monthly

○ Annually

What was the amount received annually?
Report amount from all jobs before any deductions for taxes, bonds, dues, or other items.

Thank you!

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Input Field Formatting:
Monetary values

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Federal Committee on Statistical Methodology

October 27, 2022

Entering Dollar Values
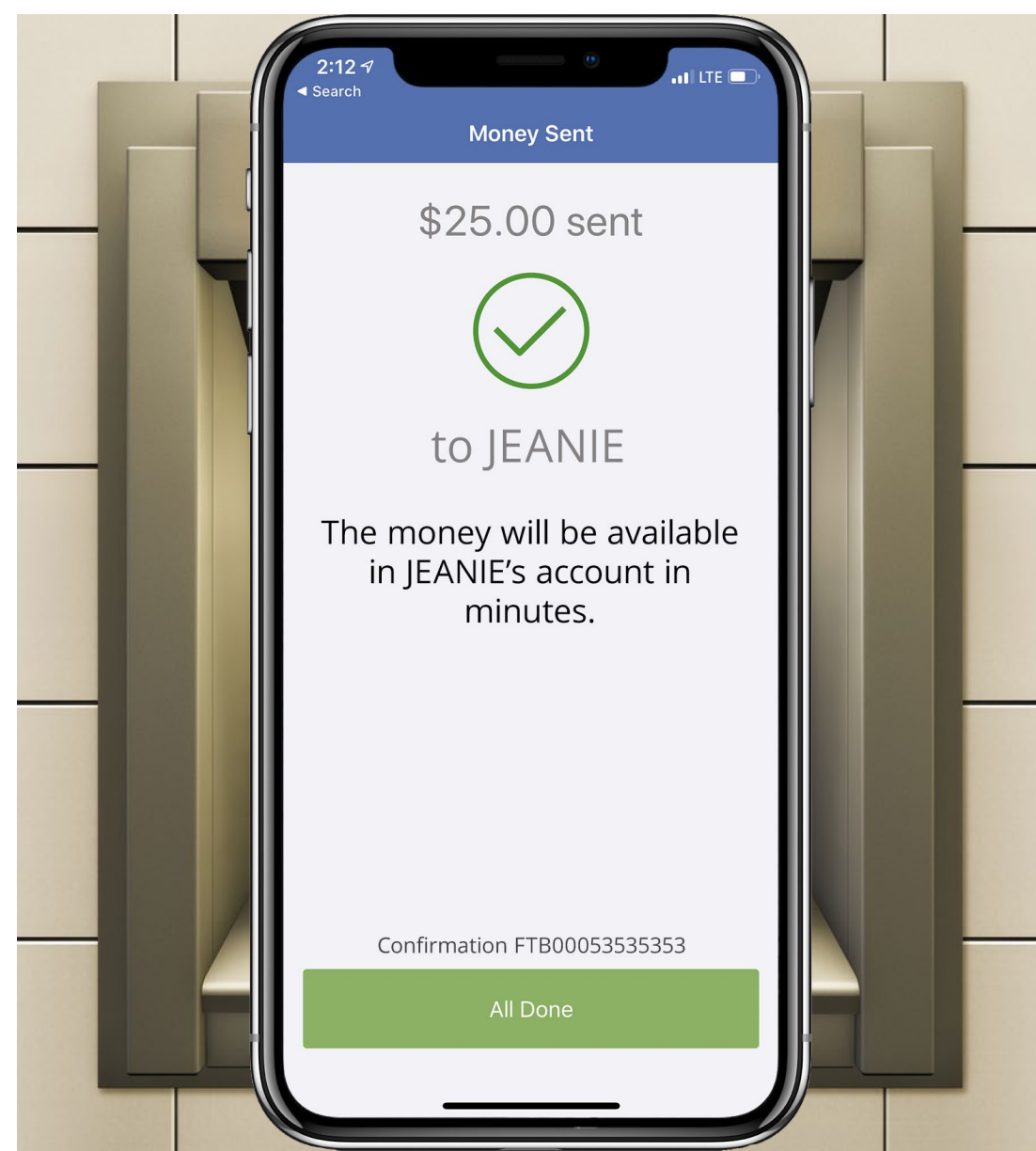
Entering Dollar Values

Enter Amount

M

Send

$0.00

to

Prior Research

- Research suspects that providing a visual template reduces reporting errors
  - (Couper et. al, 2011)

How much did you spend last month on PRESCRIPTION drugs?

$ [   ] .00

Next

Template example:
Household survey

Example from the American Community Survey

Template example:
Business Survey

Description	Structures HELP (1)	Equipment HELP (2)	Other HELP (3) (Describe in Item 3)	Total (Add Columns 1+2+3) (4)
1. Capital expenditures for **NEW** structures and equipment (Include major additions, alterations, and capitalized repairs to existing structures)	$,000	$,000	$,000	$,000
2. Capital expenditures for **USED** structures and equipment	$,000	$,000	$,000	$,000
3. **TOTAL (Add Rows 1+2)**	$,000	$,000	$,000	$,000

Previous **Next**

Example from the Annual Capital Expenditures Survey

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Template **outside** the input field

Template **inside** the input field

TOTAL AMOUNT for past 12 months

$ | .00

$| ,000
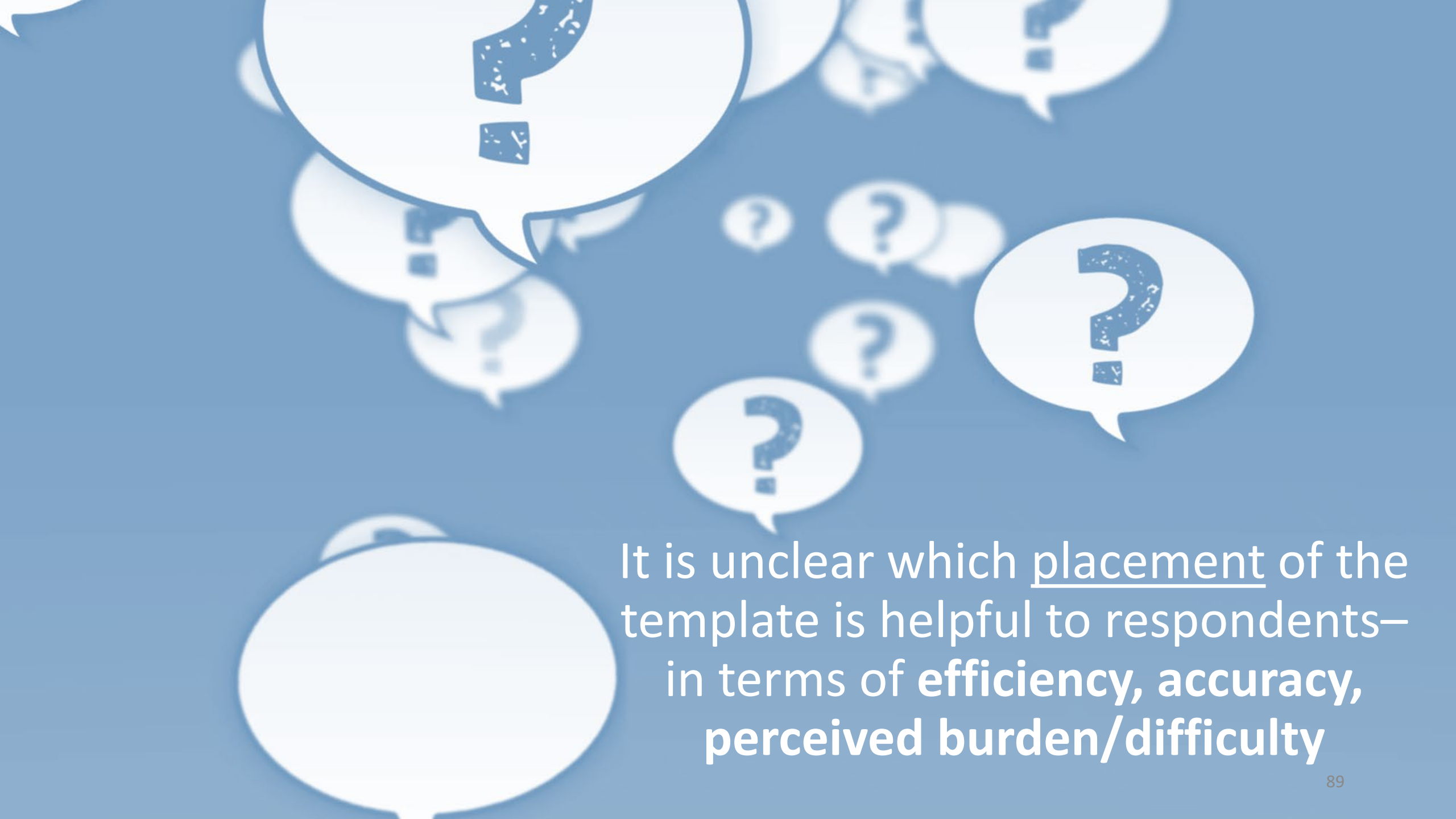
Enter Amount

M

Send

$0.00

to

It is unclear which <u>placement</u> of the template is helpful to respondents— in terms of **efficiency, accuracy, perceived burden/difficulty**

Methodology: Participants

- 515 participants
- 44% Male/ 56% Female
- Age (mean=46 years old; range = 18-96)
- 9% Hispanic origin/91% not of Hispanic origin
- 76.5% White only/ 23.5% non-White only
- 34% High school or less / 66% more than high school
- .5% Mobile/99.5% PC or Mac

Methodology: Study Design

- Between-subjects design
- Two versions of the formatting template placement
  - Outside the field (n=256)
  - Inside the field (n=259)
- Each version contained four tasks
  - Whole dollar
  - Thousands

Challenge

- **Accuracy performance metric**
  - True value

Our solution

Tasks:

- 'Simple' addition problems
  - Whole dollar
  - Thousands
- Audio stimuli
  - Whole dollar
  - Thousands

Outside the Field: Whole Dollar

- Task 1: 'Simple' addition

Enter the solution to the *nearest whole dollar:*

$35.10 + $1.20 =

$ [   ] .00

- Task 2: Audio

Click on the arrow to hear the value to enter in the box.

▶ 0:01 / 0:01 ━ ◀)) ⋮

Enter the value to the *nearest whole dollar:*

$ [   ] .00

Outside the Field: Thousands

- Task 3: 'Simple' addition

Enter the solution *rounded to the thousands:*
$20,020 + $5,000 =

$ [   ] ,000

- Task 4: Audio

Click on the arrow to hear the value to enter in the box.

▶ 0:00 / 0:02 ⎯⎯⎯⎯ 🔊 ⋮

Enter the value *rounded to the thousands.*

$ [   ] ,000

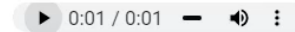# Inside the Field: Whole Dollar

- Task 1: 'Simple' addition

Enter the solution to the *nearest whole dollar*:

$35.10 + $1.20 =

$ .00

- Task 2: Audio

Click on the arrow to hear the value to enter in the box.

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Enter the value to the *nearest whole dollar*:

$ .00

Inside the Field: Thousands

- Task 3: 'Simple' addition
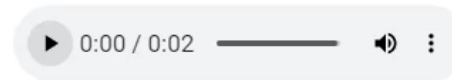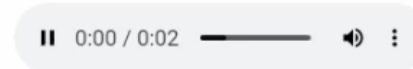
Enter the solution *rounded to the thousands*:

$20,020 + $5,000 =

> $,000

- Task 4: Audio

Click on the arrow to hear the value to enter in the box.

⏸ 0:00 / 0:02 ▬▬▬▬▬▬ 🔊 ⋮

Enter the value *rounded to the thousands*:

> $,000

Results

Accuracy

*p<.05

Completion Time

- Mixed Model Analysis of log of time
  - Longer completion times when format is **inside the field**
    - Whole dollar (*p<.01)*
    - Thousands (*p=.07)*

Ease/Difficulty

For the questions you just answered, how easy or difficult was it for you to enter the correct amount **using the formatting of the box?**

Legend: ■ Outside field ■ Inside field

Extremely easy: Outside field 28.79%, Inside field 22.76%
Somewhat easy: Outside field 14.20%, Inside field 17.51%
Neither easy nor difficult: Outside field 3.31%, Inside field 3.11%
Somewhat difficult/extremely difficult: Outside field 3.50%, Inside field 6.81%
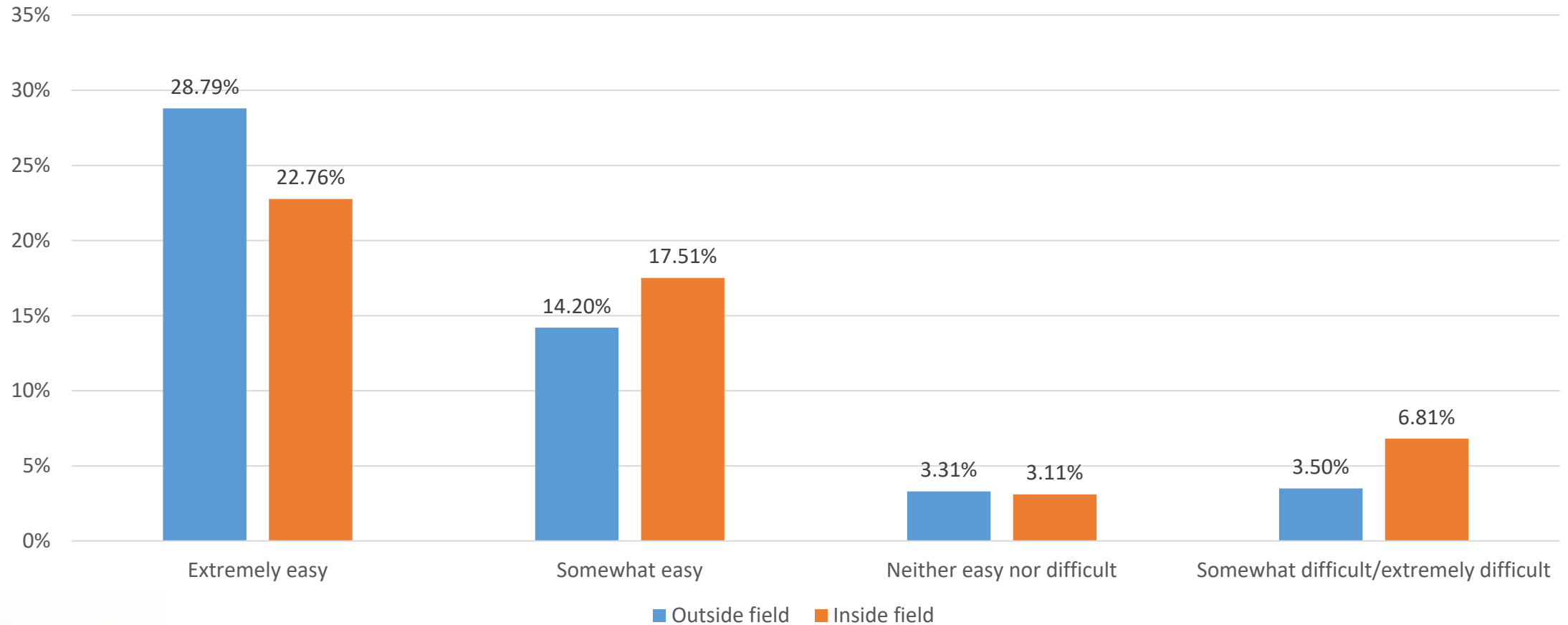
Preference
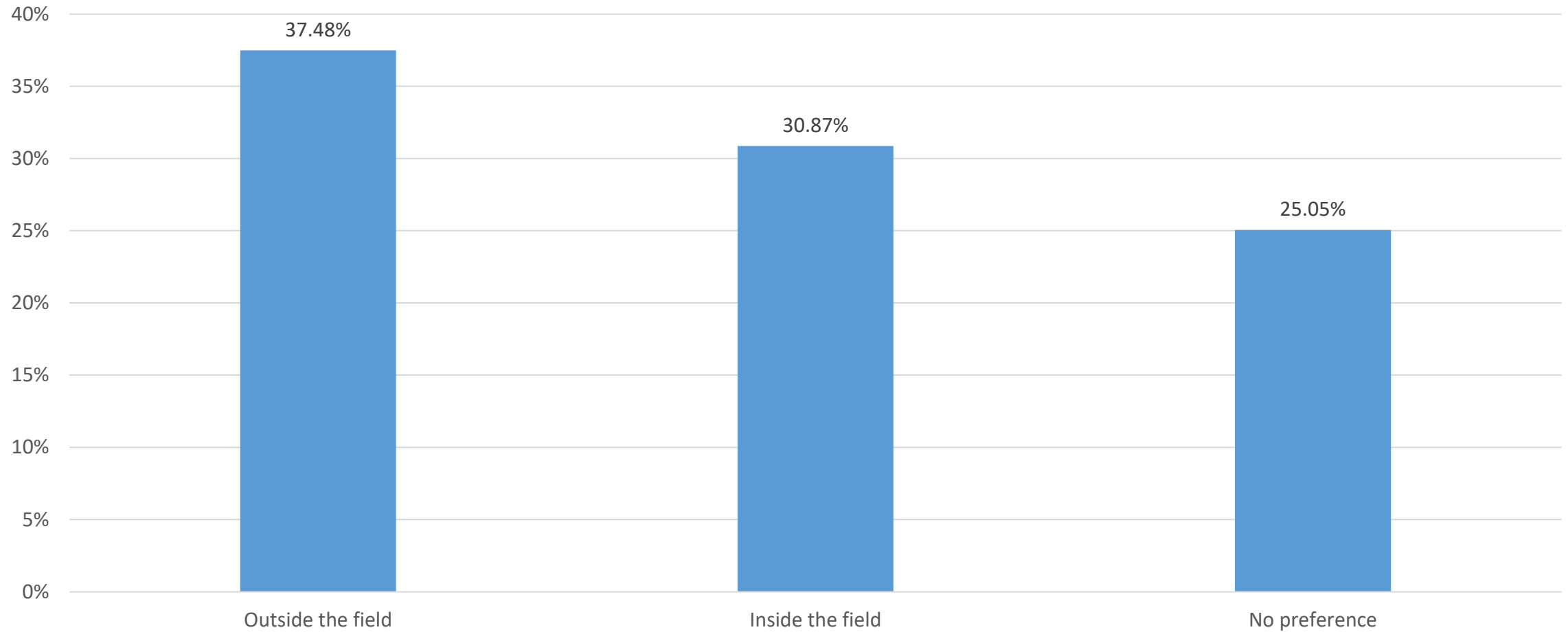
Summary

- Formatting **inside the field** may be helpful when requesting large values (thousands) as this resulted in greater accuracy

- Formatting **inside the field** takes longer to complete when entering small values (whole dollar)

- Formatting **outside the field** was perceived as less difficult

Additional findings

- Requiring participants to **add values** took **longer to complete**

- Communicating values via **audio stimuli** took **less time** for task completion

- Entering **smaller values** took **longer** to complete

The Guideline

- For monetary data rounded, place the format (".00" ",000.00") **outside the field** to the right, and the $ symbol outside the field to the left
- Do NOT allow entry of a decimal.

Thank you!

Temika Holland

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Questions

- Lora Rosenberger – U.S. Census Bureau Enterprise solution
- Elizabeth Nichols – Navigation buttons
- Shelley Feuer – Edit validations
- Branding – Jonathan Katz
- Progress Indicators – Rachel Horwitz
- Personalizing Questions – Erica Olmsted-Hawala
- Input field formatting for monetary values – Temika Holland

Request a copy of the web survey design guidelines