

Usability testing of a data dissemination tool: an integrated approach of qualitative and quantitative data.

Alda Rivas, Erica Olmsted-Hawala, Shelley Feuer, & Lin Wang

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Center for Behavioral Science Methods
U.S. Census Bureau
Washington D. C. 20233



U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
[census.gov](https://www.census.gov)

This presentation is released to inform interested parties of research and to encourage discussion.
The views expressed are those of the authors and not necessarily those of the U.S. Census Bureau.

Background

- US Census Bureau is developing an integrated data dissemination tool.
 - to improve the public's access to demographic and economic data collected through official surveys.
- Since December 2016, we have conducted 7 rounds of usability tests

Objectives of each round of usability tests:

Identify issues where data users struggle with tool.

Provide suggestions to address usability issues.

Compare metrics across all rounds of usability testing.

Methodology:

Groups of users: Novices/Experts

Modality: Laptop/Smartphone

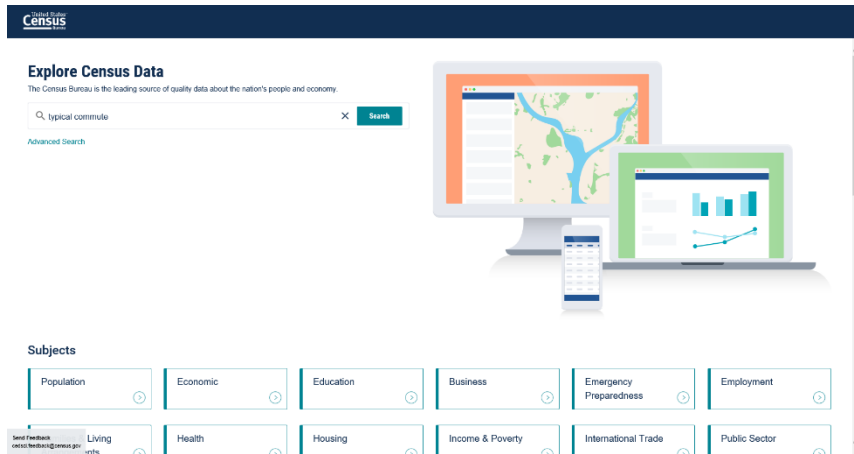
Complete 7 different tasks using the data dissemination tool
think aloud
screen/voice recording

Methodology: Tasks

- 1.- Typical commute
- 2.- High school graduation rate
- 3.- Mortgage
- 4.- Grocery stores
- 5.- Poverty rate
- 6.- Gini index
- 7.- SNAP

Methodology: Task example

- Find the typical commute time in your area.



Methodology: Task example

- Find the typical commute time in your area.

The screenshot displays the U.S. Census Bureau's data explorer interface. A search for 'typical commute' has been performed, resulting in a table titled 'COMMUTING CHARACTERISTICS BY SEX'. The table provides data for the United States, broken down by Total, Male, and Female, with estimates for the year 2017. The table includes categories such as 'Workers 16 years and over', 'MEANS OF TRANSPORTATION TO WORK', and 'MEANS OF TRANSPORTATION TO WORK BY OCCUPATION'. A sidebar on the left shows navigation options like 'ALL TABLES MAPS PAGES' and a list of subjects including Population, Economic, Education, Business, Health, Housing, and Income & Poverty.

		United States		
		Total	Male	Female
		Estimate	Estimate	Estimate
Workers 16 years and over		148,432,042	78,547,149	69,784,893
MEANS OF TRANSPORTATION TO WORK				
Car, truck, or van		85.6%	85.6%	85.6%
Drove alone		76.4%	76.4%	76.5%
Carpooled		9.2%	9.3%	9.0%
In 2-person carpool		7.0%	7.0%	7.0%
In 3-person carpool		1.3%	1.3%	1.3%
In 4-or-more person carpool		0.9%	1.0%	0.8%
Workers per car, truck, or van		1.06	1.06	1.06
Public transportation (excluding taxicab)		5.1%	4.8%	5.4%
Walked		2.7%	2.8%	2.7%
Bicycle		0.6%	0.8%	0.3%
Taxicab, motorcycle, or other means		1.2%	1.5%	1.0%
Worked at home		4.7%	4.0%	5.0%
PLACE OF WORK				

Methodology: Task example

- Find the typical commute time in your area.

The screenshot displays the U.S. Census Bureau's data exploration interface. A search for 'typical commute' has yielded three results. The primary result is a table titled 'COMMUTING CHARACTERISTICS BY SEX' for the American Community Survey, 2017, 5-year estimate, Table ID: S0801. The table provides data for the United States, broken down by Total, Male, and Female, with estimates for each category.

	Total	Male	Female
	Estimate	Estimate	Estimate
Workers 16 years and over	148,432,042	78,547,149	69,784,893
MEANS OF TRANSPORTATION TO WORK			
Car, truck, or van	85.6%	85.6%	85.6%
Drove alone	76.4%		
Carpooled	9.2%		
In 2-person carpool	7.0%		
In 3-person carpool	1.3%		
In 4-or-more person carpool	0.9%		
Workers per car, truck, or van	1.06		
Public transportation (excluding taxicab)	5.1%		
Walked	2.7%		
Bicycle	0.6%		
Taxicab, motorcycle, or other means	1.2%		
Worked at home	4.7%		
PLACE OF WORK			

The interface also includes a 'Geography' section with filters for 'GEOGRAPHY' and 'PLACE WITHIN STATE (S... << VIRGINIA'. The 'PLACE WITHIN STATE' filter is expanded to show a list of locations in Virginia, with 'Alexandria city, Virginia' selected. The 'Selected Filters' section at the bottom shows 'Commuting', 'Virginia', and 'Alexandria city, Virginia'.

Methodology: Quantitative outcomes

1. Effectiveness:

Task accuracy. Proportion of sample that successfully completed each task.



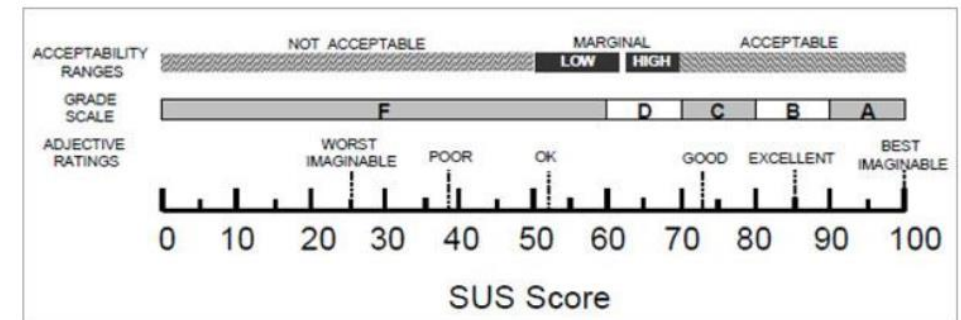
2. Efficiency

Time on task: Average completion time for tasks that were successfully completed.

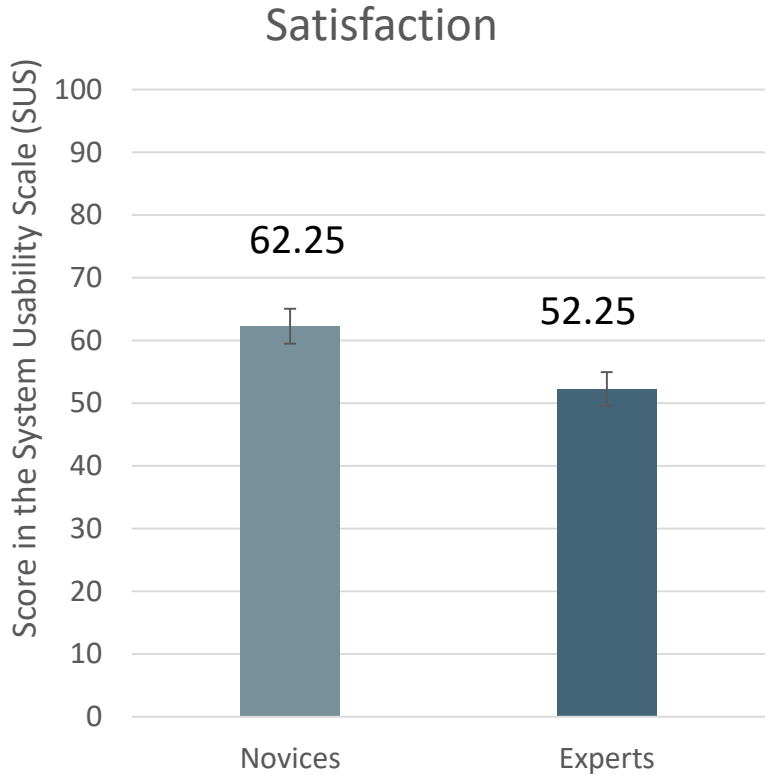
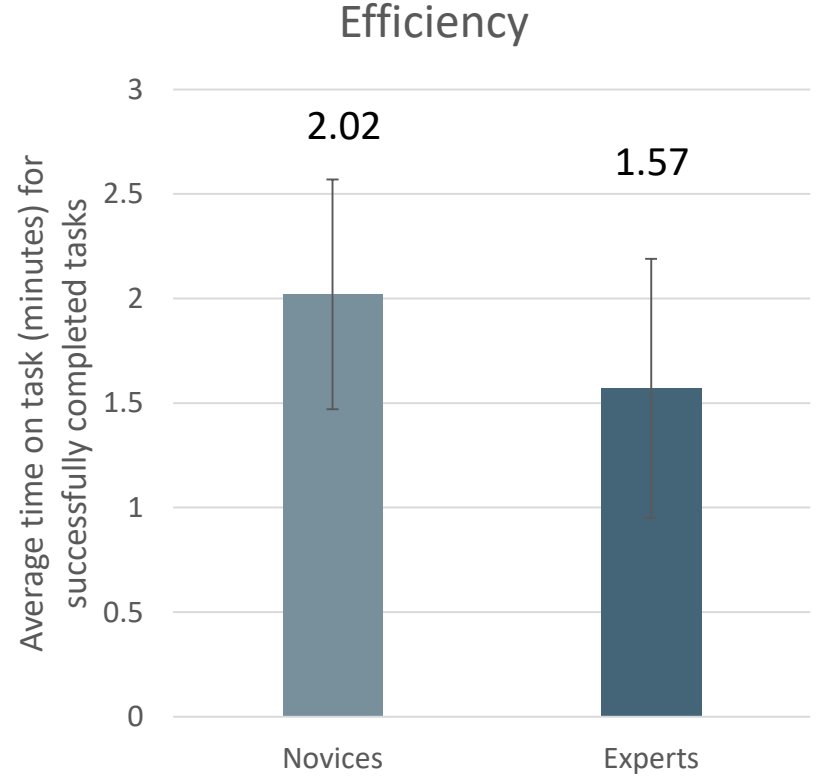
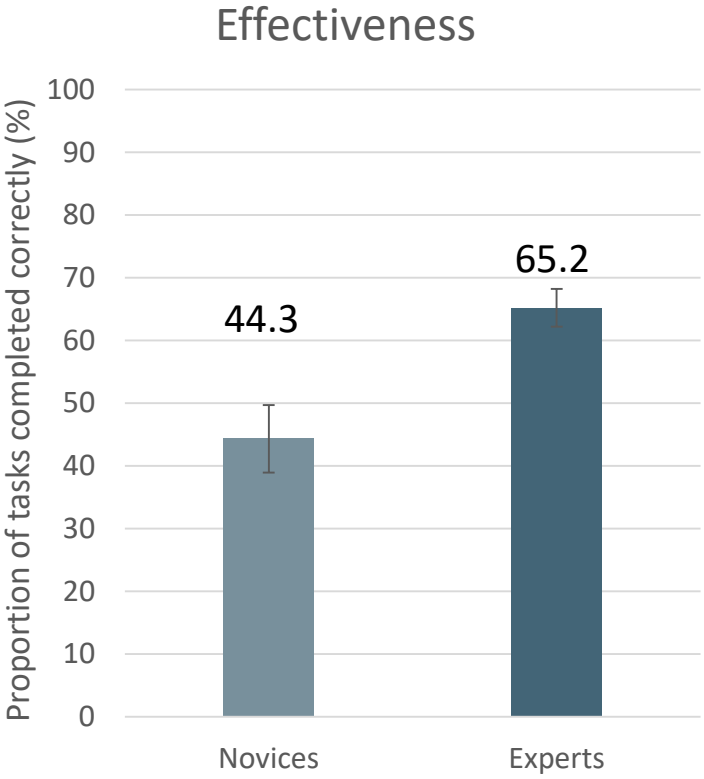


3. Satisfaction

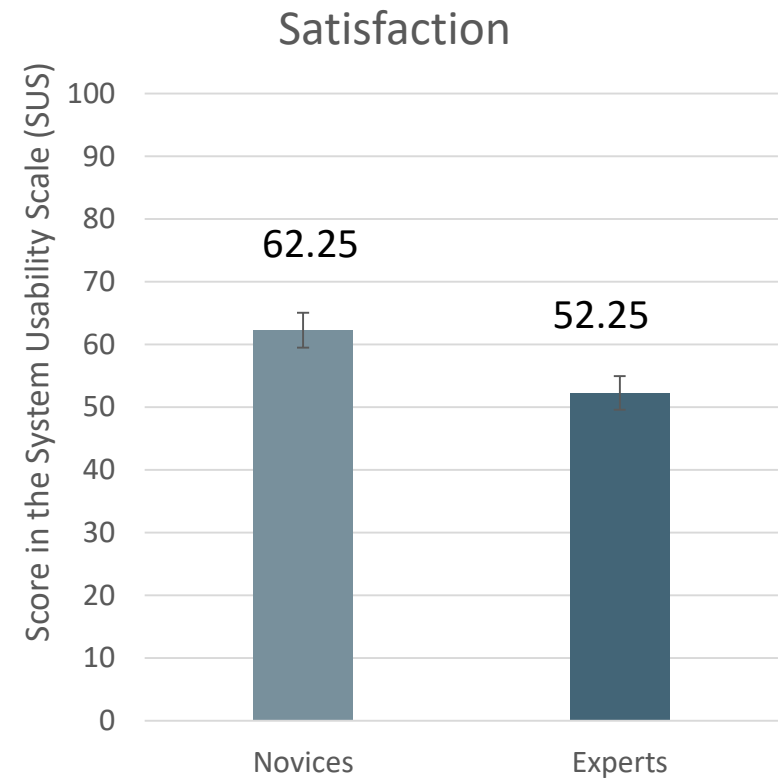
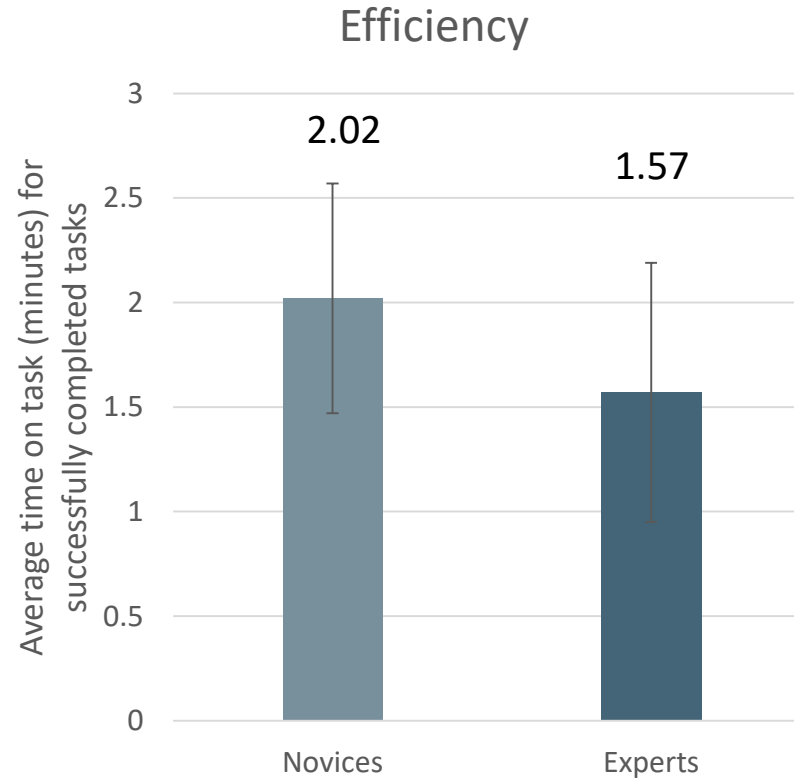
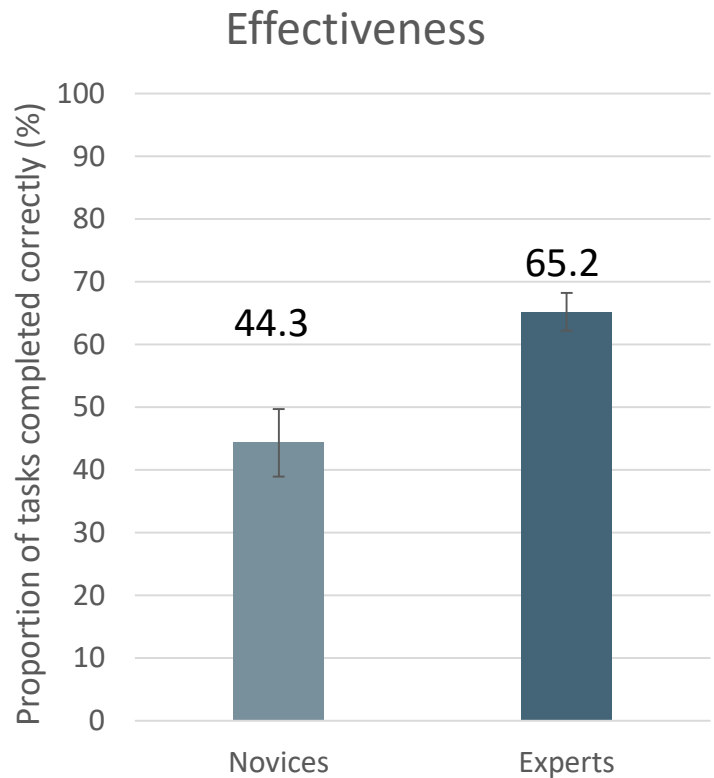
Satisfaction score as measured by the System Usability Scale (SUS)



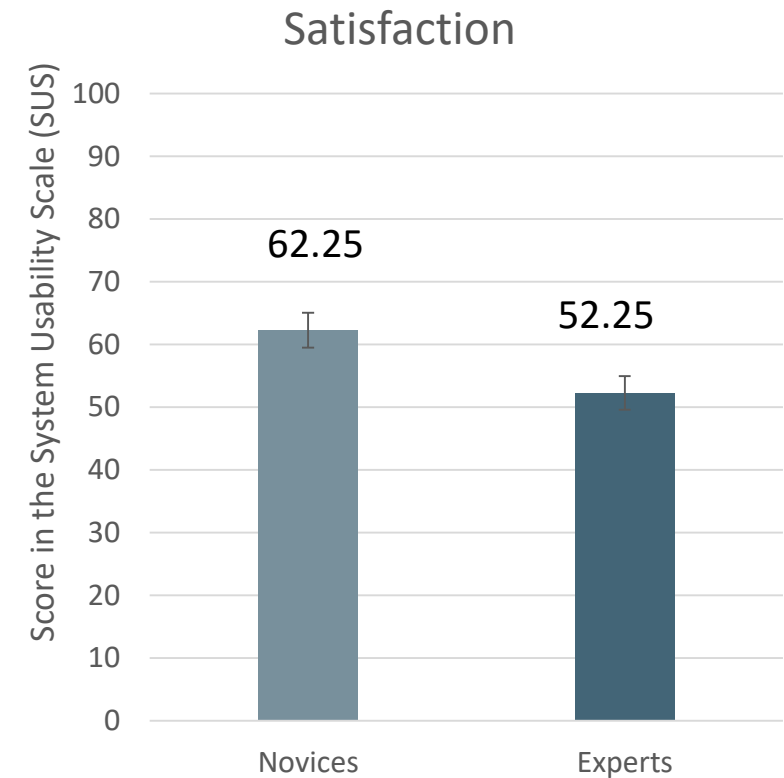
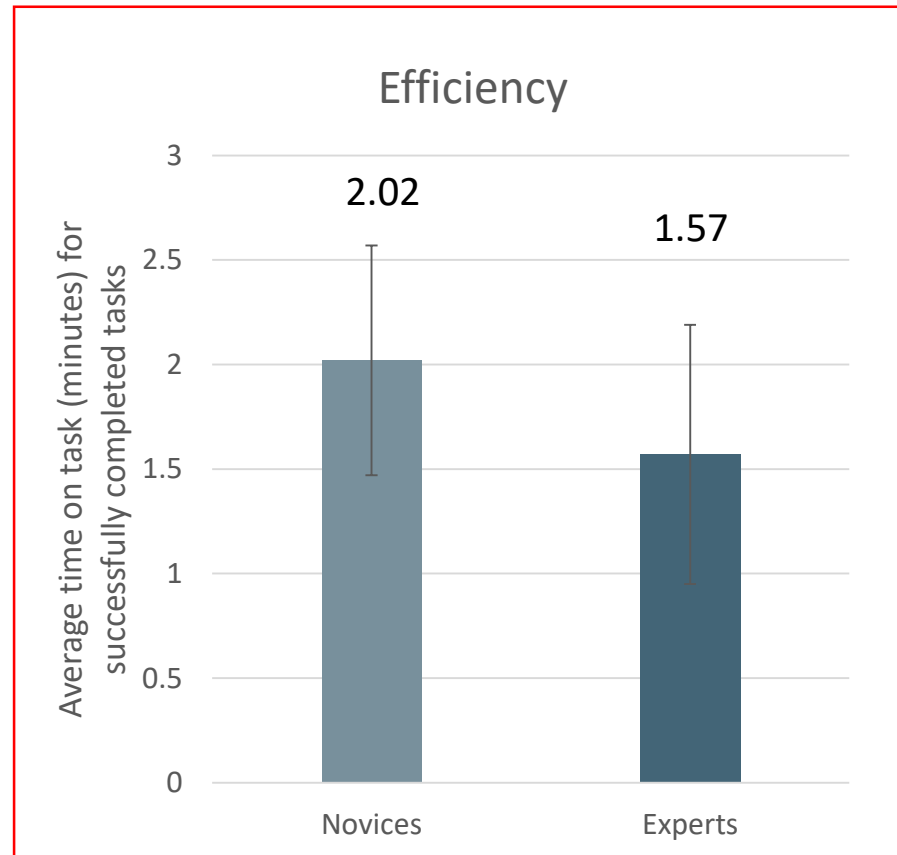
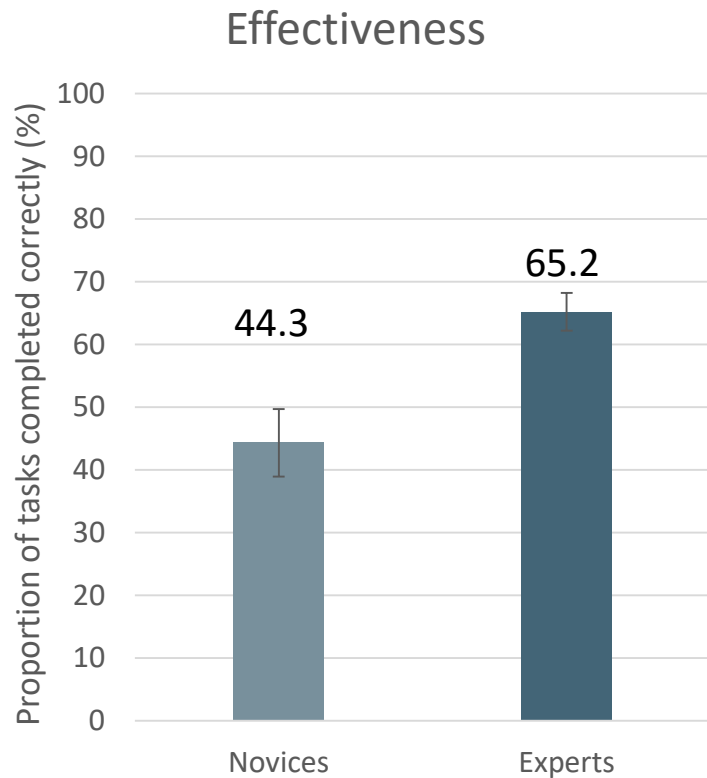
Summary of quantitative outcomes across tasks



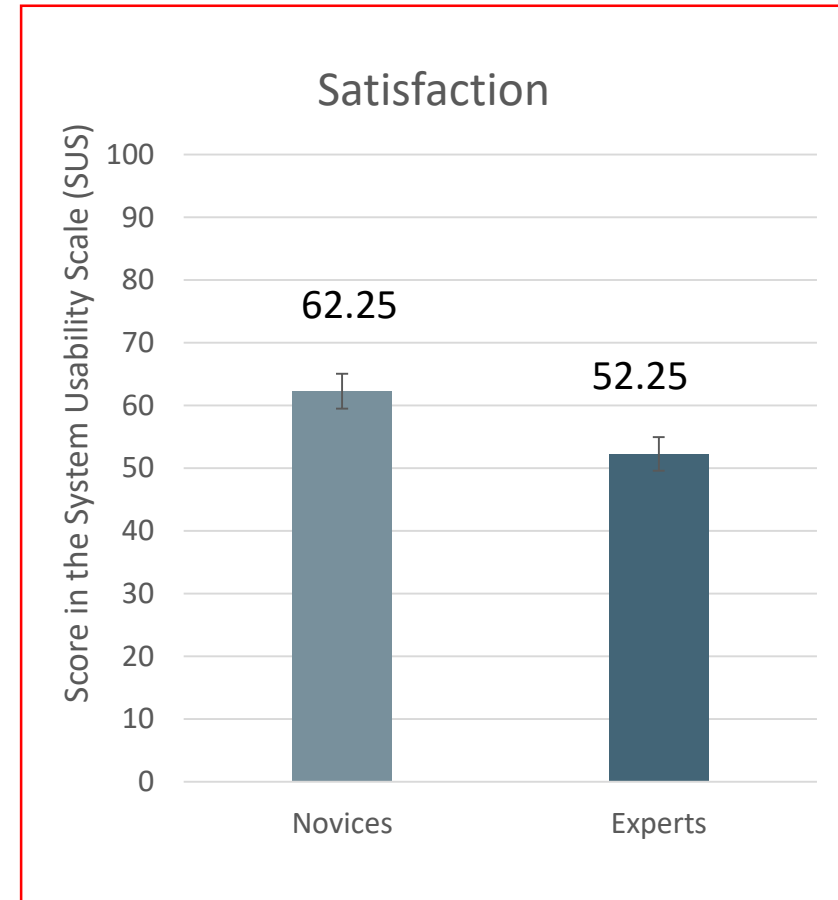
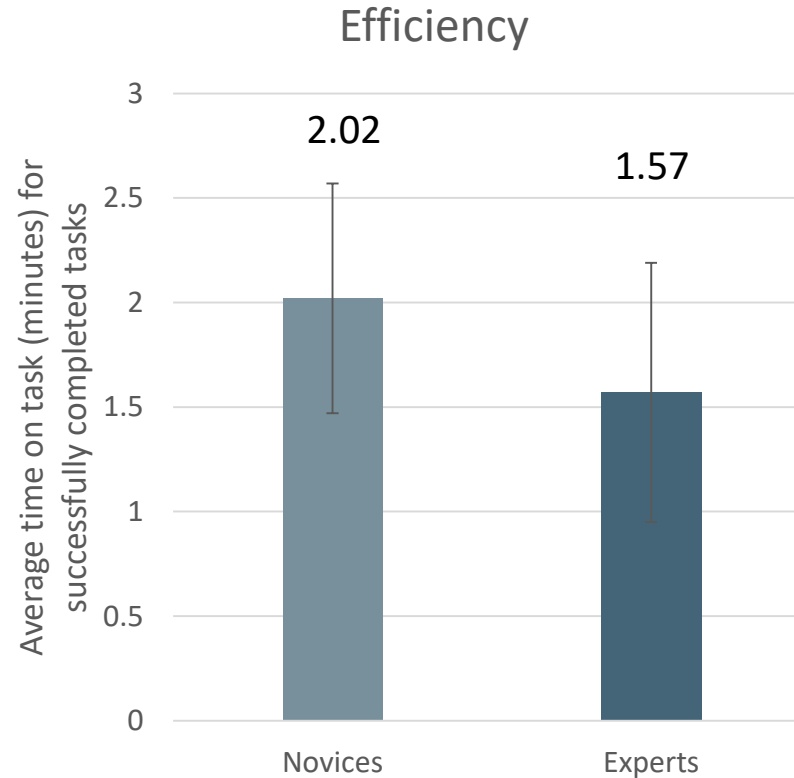
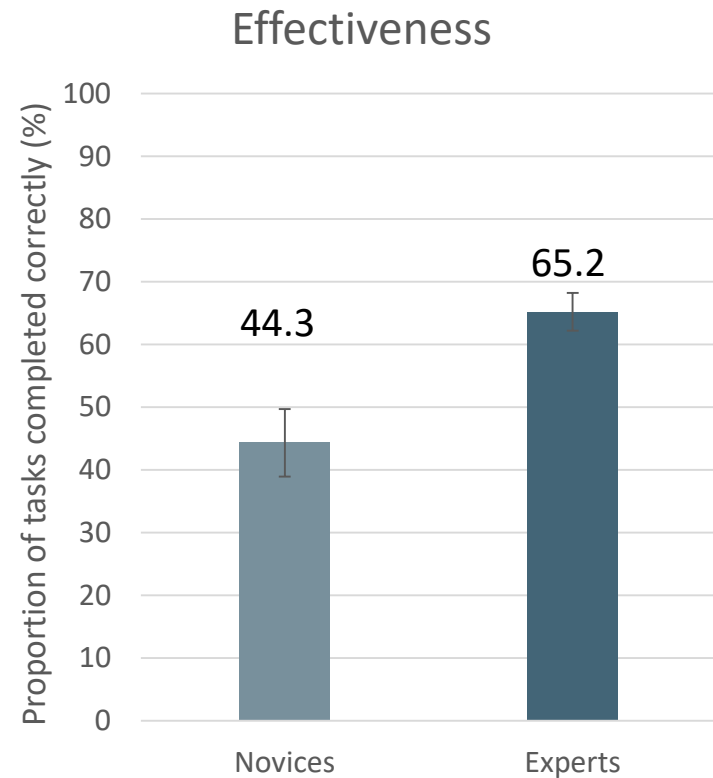
Summary of quantitative outcomes across tasks



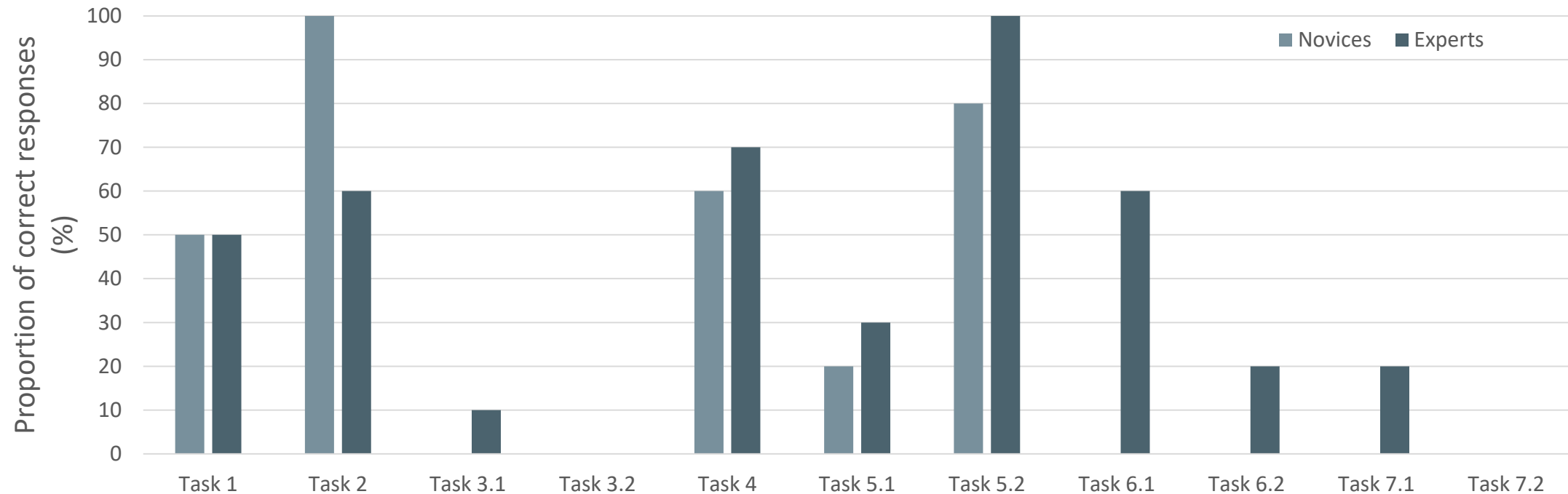
Summary of quantitative outcomes across tasks



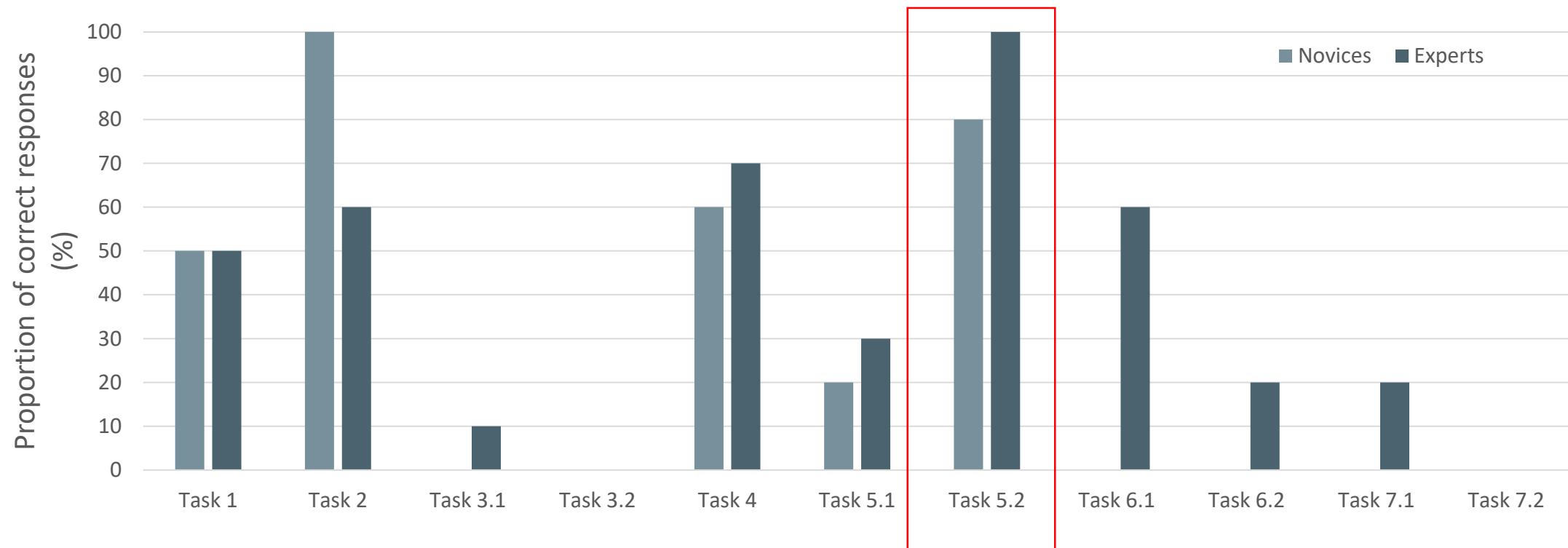
Summary of quantitative outcomes across tasks



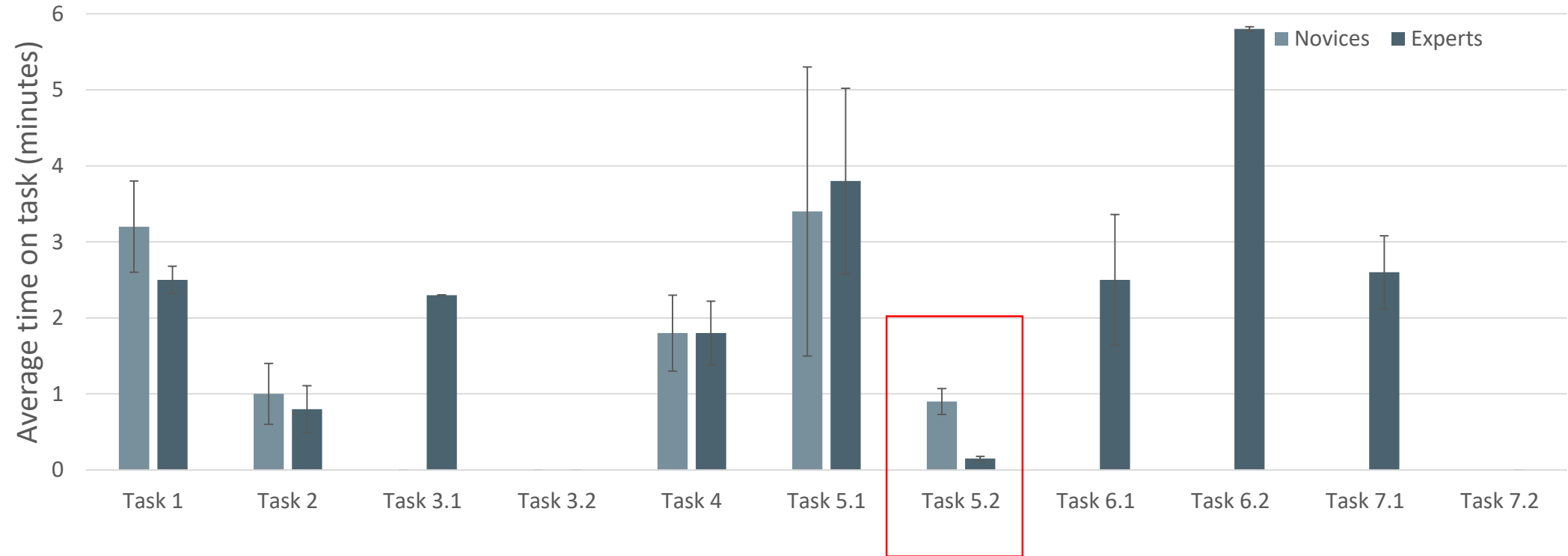
Effectiveness: Proportion of correct responses



Effectiveness: Proportion of correct responses



Efficiency: Average time on task



Methodology: Qualitative outcomes

Thematic classification of issues from researchers' notes

Frequency of issue

Proportion of sample encountering issue

Summary of qualitative data

Issue	Priority	Occurrences	Observed participants	Total participants	Proportion of sample showing issue (%)
1. Table layout	High	26	15	20	75%
2. Difficulty interacting with maps	High	13	10	20	50%
3. Glitch	High	11	7	20	35%
4. Missing information in table	High	5	4	20	20%

Current table layout: Collapsed rows as default

United States Census Bureau

typical commute wash

data.cen... > T... > S0801: COMMUTING CHARACTE...

COMMUTING CHARACTERISTICS BY SEX

Table ID: S0801

Read Table Notes and Methodology

Switch Dataset:
2017 : ACS 1-Year Estimates Subject Tables

Transpose Table:

Show Margin of Error:

[Add Geography](#)

[Filters & Sort](#)

COMMUTING CHARACTERISTICS BY SEX

Table ID: S0801

Survey/Program: American Community Survey

District of Columbia

	Total	Male	Female
	Estimate	Estimate	Estimate
Worked outside...	N	N	N
Not living in 12 sele...	N	N	N
Workers 16 years a...	347,713	170,783	176,930
TIME LEAVING H...			
12:00 a.m. to 4...	2.2%	2.7%	1.8%

United States Census Bureau

Economics and Statistics Administration
U.S. CENSUS BUREAU
census.gov

Recommendation: Expanded rows as default.

United States Census Bureau | typical commute dc

data.cen... > I... > S0801: COMMUTING CHARACTE...

COMMUTING CHARACTERISTICS BY SEX

Table ID: S0801

Read Table Notes and Methodology

Switch Dataset: 2017 : ACS 1-Year Estimates Subject Tables

Transpose Table:

Show Margin of Error:

[Add Geography](#)

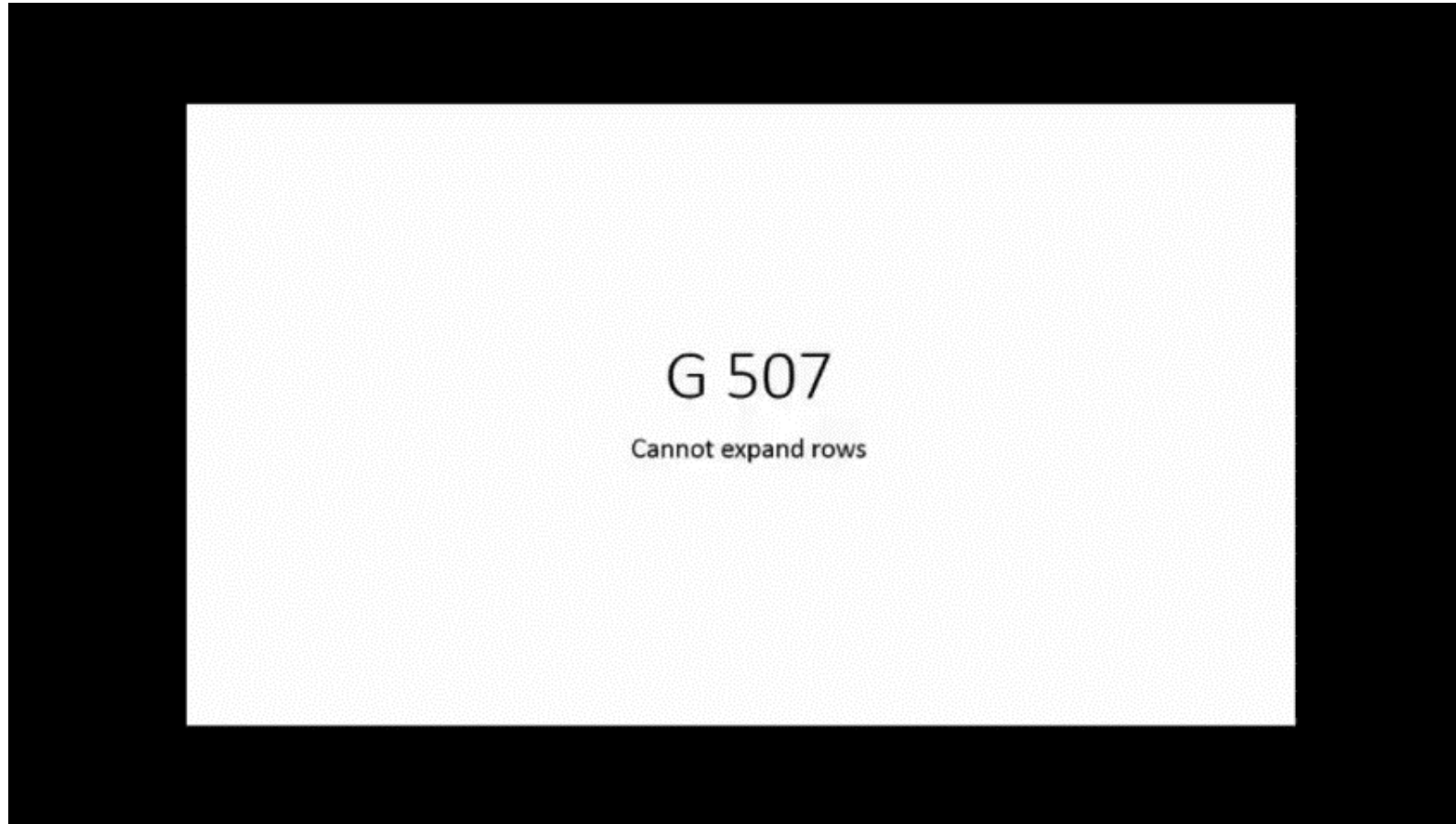
[Filters & Sort](#)

COMMUTING CHARACTERISTICS BY SEX

Table ID: S0801
Survey/Program: American Community Survey

	District of Columbia		
	Total	Male	Female
	Estimate	Estimate	Estimate
Not living in 12 selected states	N	N	
Workers 16 years and over who did not...	347,713	170,783	
TRAVEL TIME TO WORK			
VEHICLES AVAILABLE			
PERCENT ALLOCATED			

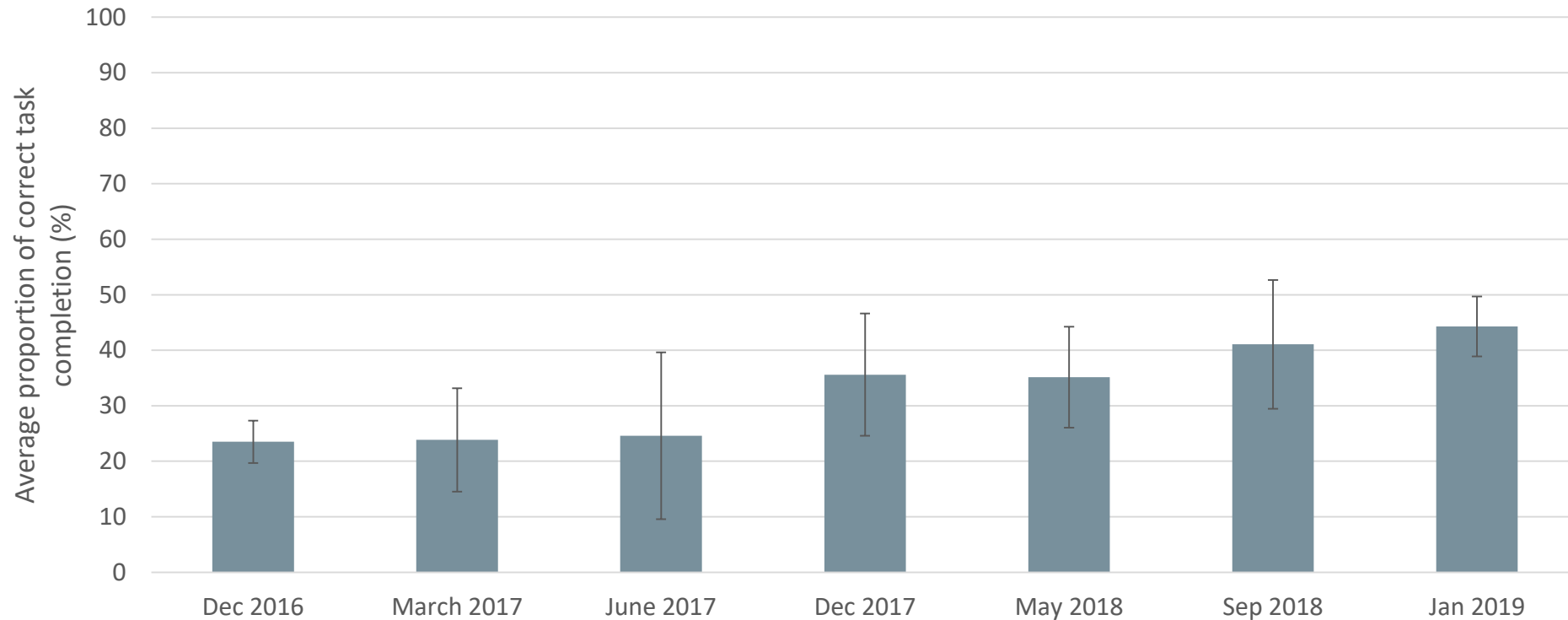
Usability issue: table layout



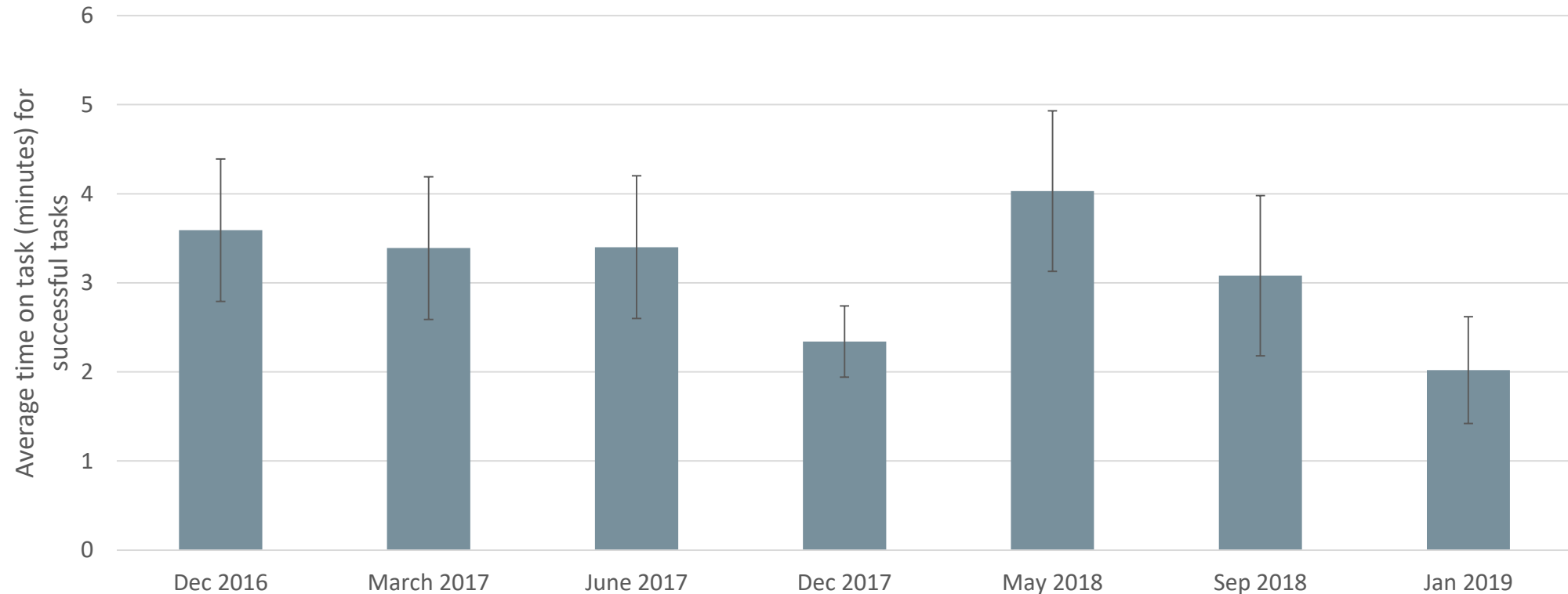
Comparison across iterations

Effectiveness, Efficiency, and Satisfaction

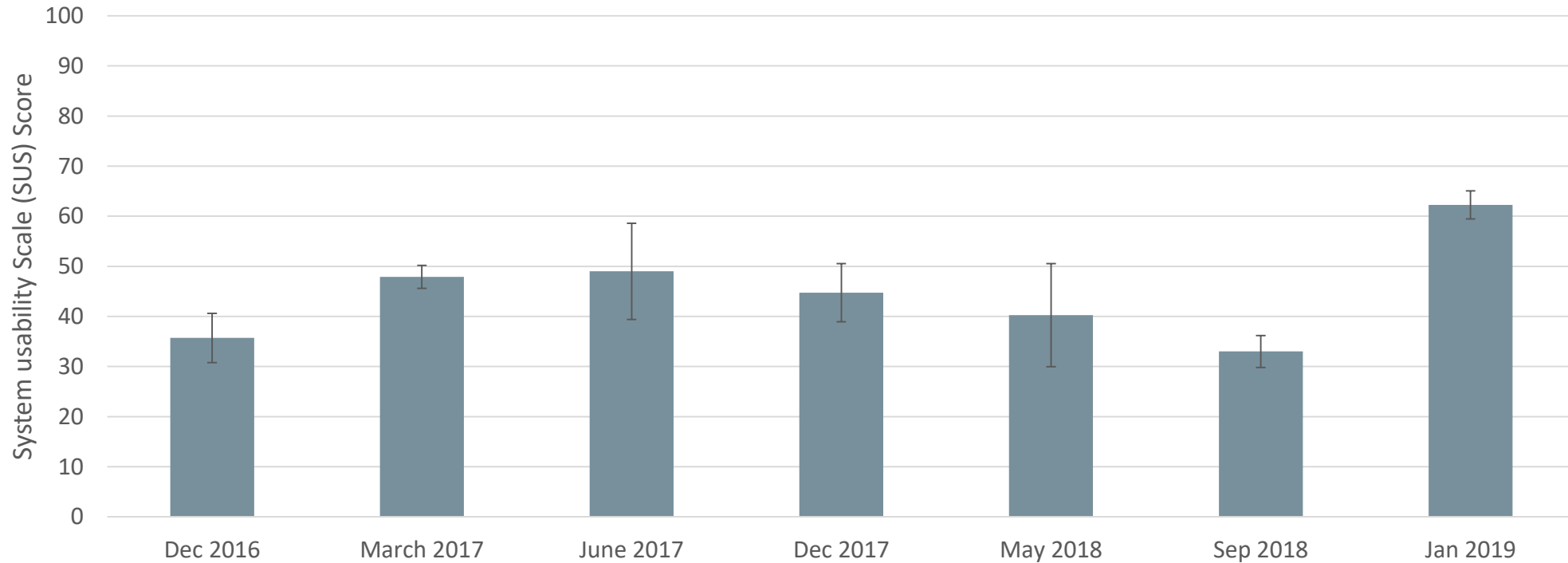
Comparison across iterations: Effectiveness Novices on laptop



Comparison across iterations: Efficiency Novices on laptop



Comparison across iterations: Satisfaction Novices on laptop



Conclusion

- Quantitative data provides important information about usability of the data dissemination tool.
- Qualitative data helps uncover reasons why users struggle in different tasks and to help us provide recommendations.
- Video snippets help us portray users' pain points.
- Report of quantitative data across iterations allows the developing team see how changes have impacted the user's ability to find the data of interest with ease.

Thank you!

Alda G. Rivas

Alda.g.rivas@census.gov