Telegraph Avenue User Research Report Redesign

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Overview and Goals

The City of Oakland is currently undertaking the Telegraph Avenue Complete Streets Project (http://bit.ly/1lwNpyu), the purpose of which is to "design Telegraph Avenue to be a better street for walking, bicycling, riding transit, and driving between 20th and the Berkeley border, with a focus on the area south of 57th Street." As a part of this project, the city conducted a survey of community members and produced a report on the results (http://bit.ly/1ozvV99).

The report's findings are interesting and the report is doubtless extremely useful for an audience of government stakeholders seeking information about the survey findings and what they indicate about the direction of the Telegraph Avenue Complete Streets Project. However, for for community members who will be affected by the survey results and the project but who are not well versed in material of this nature, the city's report does not encourage understanding or engagement. The goal of our project was to produce a new, visually driven report on the Telegraph Avenue user survey that conveys the survey's findings quickly, easily, and in an engaging and easily digestible manner for a general audience of people who live, work, and recreate in the avenue's many neighborhoods.

Related work

In addition to the Alberto Cairo's case studies and process guidelines for creating narrative infographics, we were guided by ideas (Wexler 2013) and (Segel and Heer 2010). (Wexler 2013) provided some very concrete advice, particularly about visualizing Likert-scale data, while (Segel and Heer 2010) helped us recognize our goal of taking an author-driven strategy while enabling a limited amount of reader-driven exploration.

The visualization

We considered doing a static visualization, because, through our analysis we determined that our primary message is that there is broad agreement in the Telegraph community that the street does not balance the needs of its users well, and bicyclists are particularly ill-served. Even respondents who name driving as their primary method of transportation generally recognize the lack of accommodations for bikes on Telegraph. However, we ultimately decided that a web-based report would be more engaging for users and would allow them to better see the data for themselves rather than taking our word for it.

Our design is a simple, single-page website with four sections: one for an introduction and three for groups of data. We included a simple navigation menu that floats at the top of the screen so that users can either scroll or click to navigate among the sections.

Telegraph Avenue: Usage, Opinions and Ideas

Complete Streets Project survey results

The City of Oakland is currently undertaking the Telegraph Avenue Complete Streets Project, the purpose of which is to "design Telegraph Avenue to be a better street for walking, bicycling, riding transit, and driving between 20th and the Berkeley border, with a focus on the area south of 57th Street." As a part of this project, the city surveyed 1,108 community members about how and how often they use Telegraph, how they feel about it, and how they think it should be improved. This website summarizes the results.

The first pane has three charts: a stacked bar chart that shows responses to a Likert-scale question about whether Telegraph Avenue's current configuration works for users using different modes of transit, a bar chart showing what respondents consider to be the highest priority for improvements, and a bar chart showing what respondents consider to be the lowest priority for improvements. At the top of the pane is a dropdown menu inviting users to filter the display based on the respondents' primary mode of transit.

Respondents broadly agree: Telegraph doesn't work very well for anyone, but it is the worst for bicyclists
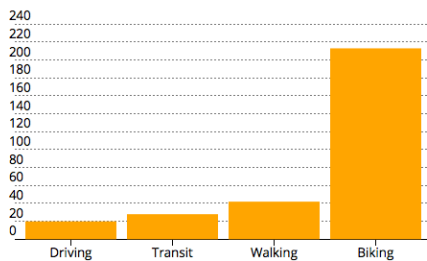
See answers from Telegraph users who primarily: [Bike ⇅] [See the filtered data]
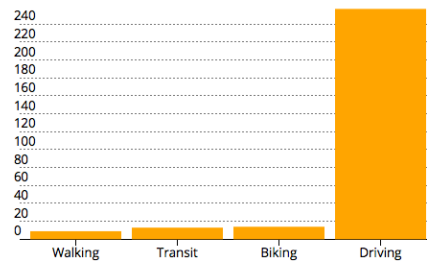Number of users in this category: 409

Do you agree or disagree with this statement: The current configuration of Telegraph works well for travelers using the following modes of transit.
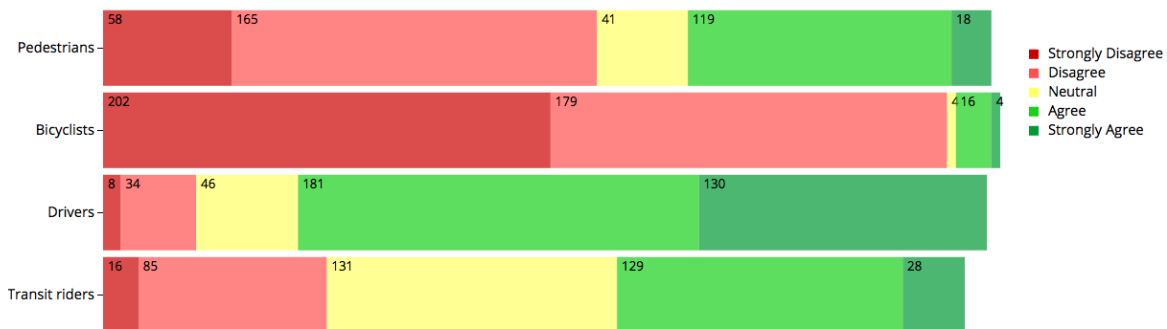
What mode of transportation should have the highest priority for improvements?   What mode of transportation should have the lowest priority for improvements?

Note: some respondents named multiple modes of transit as their primary mode, and so are counted more than once.
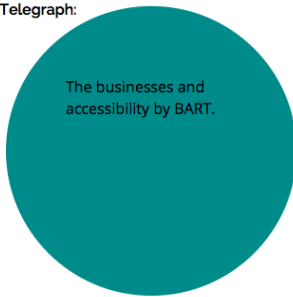Numbers represent answer count, not percentages.

The second pane contains some of the open-text data that was gathered in the survey. We wanted to take the opportunity to showcase respondents' voices in a way that a print

report—or a report that consisted only of charts and other analyzed data—could not. The top of the pane contains decorative bubbles displaying randomly selected quotes about what people like, wish were different, and would like to see happen on Telegraph. A link invites users to see more quotes; when clicked, new random quotes display in the bubbles. The bottom of the pane contains an overview of commonly proposed ideas as well as some contradictory ideas respondents had. The city's analyst had organized the open-text data into categories of proposed ideas; we condensed some categories that we felt were too granular and hard coded the results into our report.
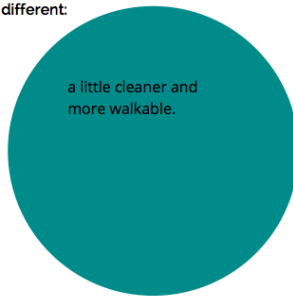
What people said

The survey offered the opportunity for open comments. Here's some of what people had to say.
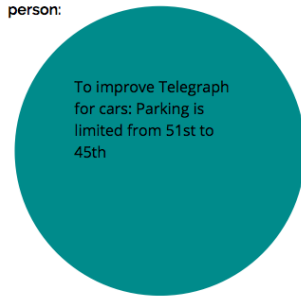
Here's what one person likes about Telegraph:

The businesses and accessibility by BART.

Here's what another person wishes were different:

a little cleaner and more walkable.

And here's an idea from yet another person:

To improve Telegraph for cars: Parking is limited from 51st to 45th

See more quotes

The top 5 most commonly proposed ideas for improving Telegraph and the number of people who proposed them

|	
Add more and/or more protected bike lanes: 445	
Widen sidewalks, add more crosswalks, and make other pedestrian improvements: 397	
Improve bus stops/shelters: 125	
Improve pavement conditions: 115	
Promote awareness of bicyclists: 115	

Dueling views

In spite of broad-strokes agreement, there are still some conflicting opinions

|	
Ban **cars** on Telegraph: *3*	Ban **bikes** on Telegraph: *3*
Increase parking: *29*	**Decrease** parking: *7*
Better traffic code enforcement of **drivers**: *34*	Better traffic code enforcement of **cyclists**: *25*

The bottom pane contains an overview of survey respondents, to give context to the data already presented. We chose to put this data last because, while it's important to a full understanding of the survey results, it's not particularly compelling to users who have not already engaged with the data in the first two panes.

Who answered the survey?
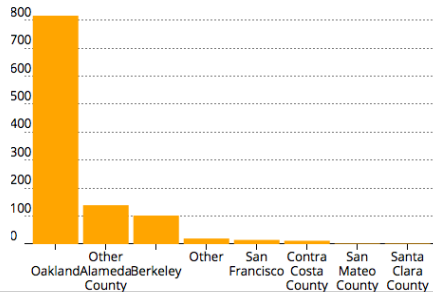
How often do you use Telegraph?
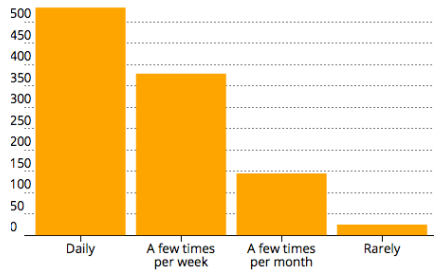
**What is your primary mode of transit?**
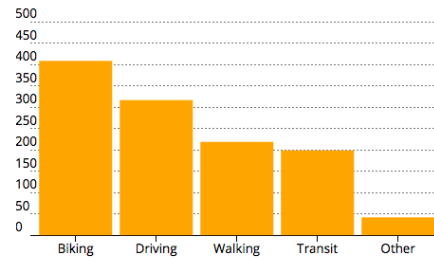
Where do you live?
Oakland and Berkeley are in Alameda County, hence the "Other Alameda County" category. "Other" represents all respondents with home zip codes in other parts of California, the US, and the world.

How connected are you to Telegraph?
Respondents explained their connection to the avenue by choosing all that apply: living nearby, working nearby, patronizing nearby businesses, commuting via the avenue, and owning a business there. This chart shows how many people have how many connections.
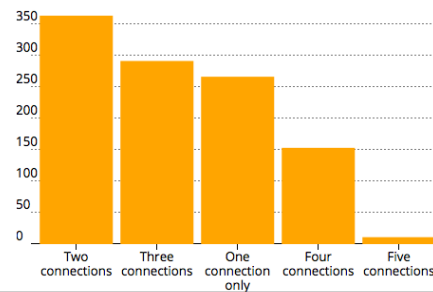
Created by Lisa Jervis and Molly Robison in 2014 for Information Visualization at the UC Berkeley School of Information.

The visualization is at http://groups.ischool.berkeley.edu/telegraph; code is publically available at https://github.com/leesajay/telegraph.

The data

The city released the complete dataset of survey results (http://bit.ly/Pu6QwS), comprising 1,108 responses to 14 questions. The results include home and work zip code data for respondents, Likert-scale answers about the quality of Telegraph for different purposes, self-reported frequency of various activities, and free text comments. (The survey instrument is at http://bit.ly/1hLknKN.)

The tools

We used Data Wrangler, Open Refine, and Excel to prepare our data for analysis. We then used Tableau to conduct an exploratory analysis. Our final product is a website built in Flask backed by an SQLite database and D3 (and a supplemental tooltip library) on the front end.

The process

Our first step was an exploratory data analysis (EDA). Our data was relatively clean, but not in an optimal format for our EDA. First, following advice in (Wexler 2013), we used

Data Wrangler to fold the data such that each answer from each respondent was on its own line. That turned out to yield very little that seemed useful in Tableau, because even though we had a unique ID for each respondent attached to each question, it was too difficult to link respondents' answers to each other for filtering. So we returned to the original spreadsheet and went about it differently.

We identified the problem that was standing in our way the most, which was the way the ranking questions (how often users take different modes of transportation and how improvements to Telegraph should be prioritized) were structured: instead of having respondents place a mode of transport (driving, walking, biking, BART, and AC Transit) in ranked order, the survey had respondents place a rank on each mode of transport. This gave us no way of viewing the modes of transit in ranked order overall. With a combination of Data Wrangler, Open Refine, and Excel, we transformed the data so that instead of "Driving: 1," "Walking: 2," etc., we had "Mode1: Driving," "Mode2: Walking," etc. Once this was loaded into Tableau we could effectively conduct our EDA.

What we found was that the city of Oakland's analyst did a great job. There was nothing of note that was not already included in the existing report; our job was simply to display the findings in a more engaging way. At the same time, we conducted a critical analysis of the city's published report to determine the key points their visualizations were making. As with the EDA, we found their content to be sound; the execution and focus were the only things that needed to shift for our work.

Next, we each sketched out some ideas separately, and then came together to compare ideas, iterate, and refine them. We had some overlap among our ideas and some that were nicely complementary. We mixed and matched from the ideas we liked and came up with the three-pane structure and content described above.
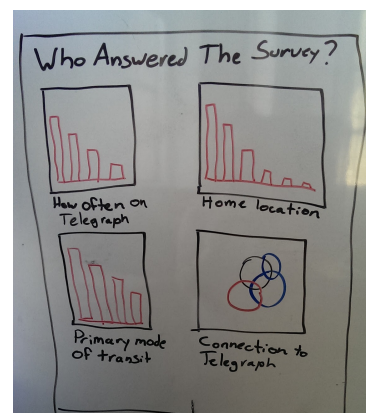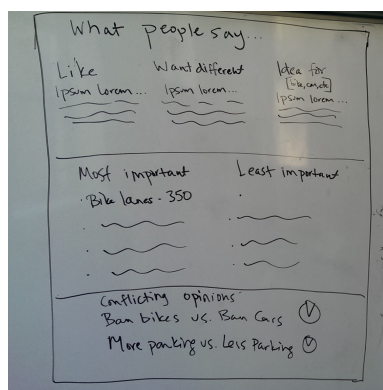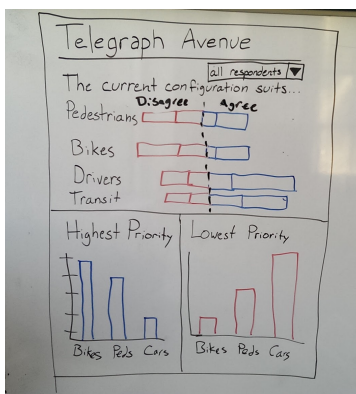
Next was the implementation phase: populating the database, writing the database calls to serve the data to the front end, making HTML containers, filling them via D3 code, hooking up the front end to the back end, and styling.

For the most part, things unfolded as we expected during the implementation, but there was one major exception. We had planned a Venn diagram for the very last question, about how people are connected to and spend time on Telegraph. Since the

original question was a multiselect, and there was significant overlap in the all of the categories, we thought that the most interesting thing about the data was the multiplicity of most community members' relationship with Telegraph. A Venn diagram seemed like the ideal way to show people's membership in multiple categories at once. However, once we pulled the necessary data out of our database and plugged it into a function using Ben Frederickson's venn.js D3 library, we saw how wrong we were:

What is your connection to Telegraph?

Due to the density of overlaps, there was clearly no way to make this visualization informative or even remotely legible. As we brainstormed and sketched possible replacements, we realized we wanted to preserve the motivation for the choice of the Venn: showcasing people's multifaceted relationships with Telegraph Avenue. But with 26 combinations of relationships to show, it didn't seem feasible to show them all, especially as such a small part of a larger piece. In the end we chose the bar graph of the number of relationships people have to the street, which ended up being far from ideal (see Evaluation, below, for further discussion) but nonetheless communicated our message.

There were a few things that we wanted to do but ran out of time to implement. First of all, the original plan for our Likert visualization was to place each stacked bar on the page using the midpoint of the neutral answer block as its center point (as recommended in (Wexler 2013)), rendering the agreement and disagreement much more starkly and enabling quicker and easier comparisons by the viewer. This remains our biggest regret about the implementation.

We also wanted to make the quote bubbles a varying size to accommodate longer text. Instead, we ended up slicing text off at the first period if it was longer than 140 characters to ensure that the full amount of text would always be contained inside the displaying bubble. (A flaw in this solution is that some respondents wrote some very long responses that didn't contain any periods, but these show up quite rarely, and depending on the terminal punctuation to determine the size of the text slice seemed quite preferable than trying to do it a different way, since this preserves as much grammatical structure as respondents placed in their comments originally.)

We had also hoped to include some visual elements in the "Dueling views" section; we considered bar charts that would appear on click, text with its size scaled to the number of mentions for the idea; and icons conveying the ideas. However, we weren't sure which option would be most effective (or, frankly, effective at all), and we wanted to use our time wisely, focusing on items we felt confident would make a positive contribution to the visualization.

Evaluation

We conducted a survey using www.surveygizmo.com comparing our visualization to the original report from the city. We asked people how long they spent with the report, what the primary findings were, whether or not they felt the findings showed agreement among respondents, how interested they were in the report, and how likely they were to share it with others. We used the tool's page randomization feature to change the order of report presentation and minimize learning or effects or other potential biases in response. The complete survey instrument is in the appendix, below.

We distributed the survey to the listserv of the Greater Mosswood Neighborhood Association. The GMNA listserv is where the original survey and its report came to our attention, and is populated by people who live in the area the intersection of West Macarthur Boulevard and Telegraph Avenue. We also sent it to the I School Noise list, as many current and former I Schoolers are part of the community of Telegraph Avenue in Oakland.

We received 10 complete responses. (Seventeen others began our survey and abandoned it, most after reading the instructions.) Per our goals, we were hoping the survey would show the following with respect to our report versus the original: shorter time spent reading (since we wanted a concise, easily digestible set of information); more clarity about the primary findings (assessed with an open text question and a multiple choice question); and a greater level of interest (assessed via level of interest while reading and likelihood of sharing with others). While the small sample size means that little can be said about statistical significance, we can glean that the results of our evaluation are decidedly mixed. If we had more time, we would visualize these results, as a visualization of the results of a survey comparing two reports on survey results would be quite delightful if for no other reason than the meta-ness of it all. However, text is the expedient way forward here.

Time spent:
- 4 people spent the same amount of time on each
- 2 people spent more time on ours
- 4 people spent less time on ours

Clarity about findings (open text question):
- The answers about the city reports findings were more wide-ranging than the qualitative answers about our report, indicating that our increased focus did have the intended effect

Clarity about findings (multiple-choice question; we were hoping that people would see broad agreement among members of the Telegraph community):

- 5 people saw the same level of community agreement in both reports
- 2 people saw agreement in the city's report but were not sure with our report
- 3 people were not sure in the city's report and reported less agreement seen in our report

Level of interest felt while reading:
- 5 people reported the same level of interest (which was "somewhat")
- 3 people reported an increase of interest from "somewhat interested" to "very interested"
- 1 person reported an increase of interest from "somewhat uninterested" to "somewhat interested"
- 1 person reported a decrease in interest from "somewhat uninterested" to "very uninterested"

Likelihood of sharing the report with others:
- 5 people reported the same likelihood of sharing
- 4 people reported greater likelihood of sharing
- 1 person reported less likelihood of sharing

 In summary, our survey indicates that we succeeded in our goal of increasing engagement with the material, but not with increasing understanding.

We also got feedback informally during the implementation process and at the project showcase. Many of the comments involved clarifying our language; we have incorporated all feedback of this nature as best we could. There are three other responses we received that bear attention. The first is the request for a map, articulated by a few readers. We did consider adding a map, but chose not to for two interlocking reasons: our audience consists of people who spend time on and around Telegraph Avenue in Oakland; this audience knows the area, and a map adds little of value for them. Furthermore, the survey related to all of Telegraph Avenue in Oakland, a three-mile stretch that, if placed on a map at a legible scale, would have taken up a significant amount of real estate on our page, particularly due to the street's north-south orientation. Thus we chose to present the data in that space instead of including a map.

The next item is confusion expressed about the very last chart, "How connected are you to Telegraph?" As mentioned above, this chart is a replacement for our original idea, which worked even less well. We agree that the existing visualization is not illuminating to the reader, but we struggled—and ultimately failed—to find something better.

The last issue has to do with the first pane of data, which the user can filter by mode of transportation. At the showcase, as we observed people using the filter and trying to gauge its effects, it became clear that the way the page shifts upon reloading, and the fact that the two bar charts under the Likert visualization were not visible at the same time, impedes the filter's effectiveness significantly. It would have been much better to implement the filter with a mechanism that animated the transition rather than reloading the page. It would also have been a significant improvement to have all three of the first pane's charts visible on the screen at once, but screen size is a limiting factor.

It also would have been a good idea to have the floating navigation menu highlight the section a user is presently in, to increase usability.

Who did what

Task	Lisa	Molly
Data wrangling	75%	25%
Existing report critique	25%	75%
Exploratory data analysis	50%	50%
Research on related work	50%	50%
Visualization design sketches	50%	50%
Back-end development	90%	10%
Front-end development	10%	90%
Evaluation survey	90%	10%
Write-up	90%	10%

Works Cited

Segel, E.; Heer, J., "Narrative Visualization: Telling Stories with Data," *Visualization and Computer Graphics, IEEE Transactions on* , vol.16, no.6, pp.1139,1148, Nov.-Dec. 2010, http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5613452&isnumber=5613414

Wexler, Steve. "Visualizing Survey Data," Tableau whitepaper, December 2013, http://www.tableausoftware.com/sites/default/files/media/analyzing-and-visualizing-survey-data.pdf

Appendix: Our evaluation survey instrument

Note that Surveygizmo.com has a page randomization feature, which we used to ensure that some respondents viewed the city's report first while others viewed our report first.

The city of Oakland is currently in the process of planning changes and improvements to Telegraph Avenue through the Telegraph Avenue Complete Streets Project.

As part of the Telegraph Avenue Complete Streets Project, the city conducted a survey of Telegraph Avenue neighborhood residents, commuters, workers, business owners, and visitors.

In this survey, you will be asked to look at two different versions of a report on the results of that survey. (Yes, this is a survey about a survey.)

Assess one of the reports

Please follow this link and spend as much time as you are interested in spending reading/viewing the report: http://bit.ly/1ozvV99. (This report is a PDF; the link will lead to a download of that PDF.)

1) Approximately how much time did you spend reading/viewing the report?*
( ) Less than 2 minutes
( ) 2 to 5 minutes
( ) 5-10 minutes
( ) More than 10 minutes

2) Based on the report you just looked at, describe what you see as the Telegraph Ave survey's primary findings.*

3) Based on the report you just looked at, do different groups of respondents (drivers, walkers, transit riders, and bikers) prioritize improvements to Telegraph differently?*
( ) Yes
( ) No
( ) Not sure

4) How interested did you feel while looking at the report?*

( ) Very interested   ( ) Somewhat interested   ( ) Neither interested nor uninterested
       ( ) Somewhat uninterested   ( ) Very uninterested

5) How likely are you to share this report with friends who are interested in the Telegraph Ave Complete Streets Project?

( ) Very likely ( ) Somewhat likely   ( ) Neither likely nor unlikely ( ) Somewhat unlikely
( ) Very unlikely

Assess one of the reports

Please follow this link and spend as much time as you are interested in spending reading/viewing the report: http://bit.ly/1fVjAc7.

6) Approximately how much time did you spend reading/viewing the report?*

( ) Less than 2 minutes
( ) 2 to 5 minutes
( ) 5-10 minutes
( ) More than 10 minutes

7) Based on the report you just looked at, describe what you see as the Telegraph Ave survey's primary findings.*

8) Based on the report you just looked at, do different groups of respondents (drivers, walkers, transit riders, and bikers) prioritize improvements to Telegraph differently?*

( ) Yes
( ) No
( ) Not sure

9) How interested did you feel while looking at the report?*

( ) Very interested   ( ) Somewhat interested   ( ) Neither interested nor uninterested
       ( ) Somewhat uninterested   ( ) Very uninterested

10) How likely are you to share this report with friends who are interested in the Telegraph Ave Complete Streets Project?

( ) Very likely ( ) Somewhat likely   ( ) Neither likely nor unlikely ( ) Somewhat unlikely ( ) Very unlikely

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Thank You!

Thanks for taking the time to answer our survey! We conducted this survey as part of a class project for Information Visualization and Presentation at the UC Berkeley School of Information.

Our project was to redesign the city of Oakland's report on the Telegraph Avenue survey findings for a general (rather than city planning) audience.

If you have any questions about this survey or our project, email lj@ischool.berkeley.edu or mrobison@ischool.berkeley.edu