Shawn Kenney

M|I|C/A

Human Centered Traffic Study

◉ Research ○ Strategy ○ Design ○ Leadership

Introduction

These are the phrases we use as Human-Centered Designers when discussing the work we do and when we try to sell methodologies we apply to them, like Design Thinking. But over the course of my career, I've found that most of the problems were hard but never really at the level of "wicked." Most of the challenge lay in working in environments where solutions were being proposed before we had a good understanding of the problem we wanted to solve.

For my thesis at the Maryland Institute College of Art (MICA), I really wanted to tackle a problem that I might fail at understanding. I've also wanted to apply Human-Centered Design principles to a problem that wasn't a user interface. Something that, if solved for or at least understood, could impact the quality of life. I had one such problem right outside my front door.

My home in Cleveland was located in an area known as the "Flats," which runs along the Cuyahoga River. The section of the river I was near is technically a federal navigation channel for industrial shipping, and at the foot of my street is a bridge that crosses it. When a ship needs to pass, the bridge closes to vehicular traffic, and the delay can last from a few minutes to over half an hour.

When drivers need to get somewhere and are stuck in a traffic delay, they begin to invent workarounds. One of the more common and dangerous solutions drivers come up with is to drive on the wrong side of the road to avoid it. The problem is, there is a cross street at the foot of the bridge, and so traffic with the right of way would also be using that side of the road.

What could be a "hairier" problem than another car driving right towards you?

Process

When presenting the issue to city leaders, we would get similar responses to those I've heard on past projects in my career. "Well, there could be all kinds of reasons why this happens." "People are all unique; there isn't a way to solve this for everyone." "We certainly can't control bad behavior."

There was only one way to find out. When you live in a neighborhood like this, the "Marine Traffic" app is a must. Marine Traffic shows the location and destination of every commercial vessel on the planet, and the location of many personal watercraft as well. When a vessel was coming, I placed an old iPhone mounted to a Joby GorillaPod around an old fence post at the corner of my house and hit the record button.

I first established driving patterns by recording a number of different sessions across different ships/delay lengths. I recorded from different locations on the street to see if any unique driver behaviors presented themselves and made sure to record unobstructed traffic flows so I could have a baseline for "normal" conditions.

Due to the unique shape of the "Crooked River," there are only so many destinations a driver could go from the foot of the bridge. I observed the larger neighborhood by measuring times to bypass this street and how those times could factor into decision making for drivers.

In addition I conducted a good, old fashioned heuristic review of the street including the signage that was installed by the city to previously solve this issue.

View a Timelapse of Traffic

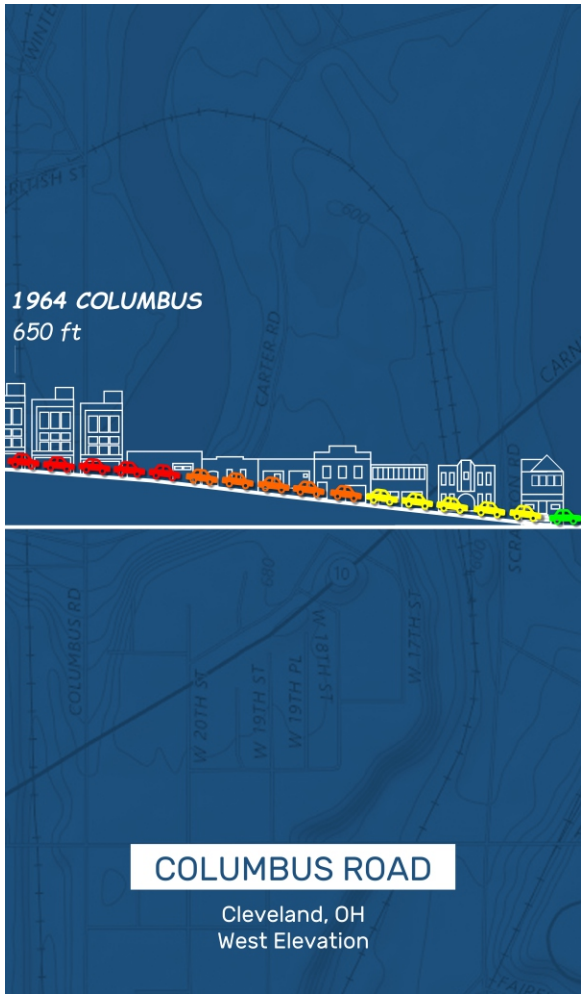
Analysis

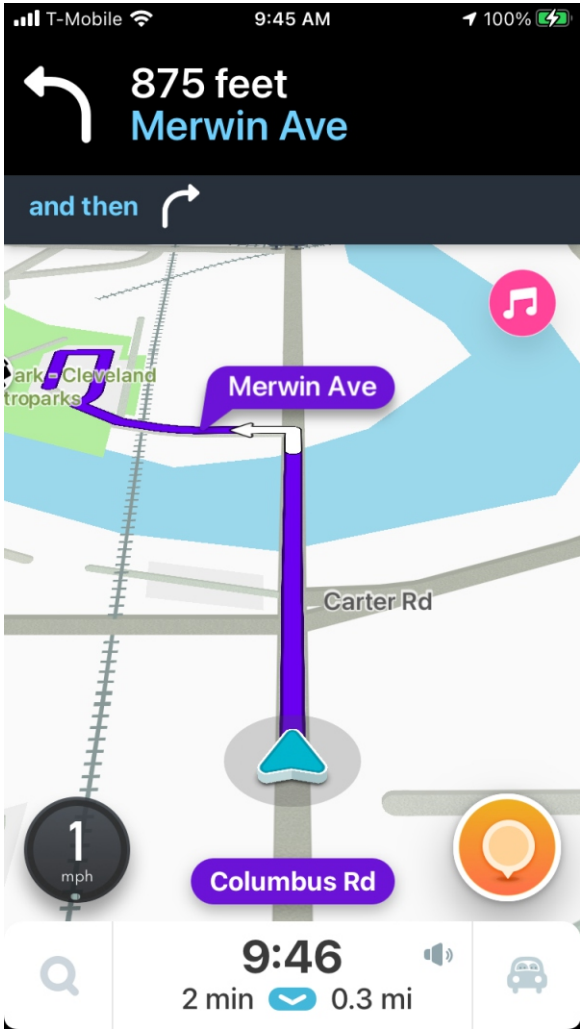
To start, I watched all of my traffic recordings and logged activity into a spreadsheet. This included the length of the delay, the total number of cars on the street, which cars turned different directions on the cross street, how many drove left of center, etc. This data also allowed me to understand the average delay based on the type of ship, ranging from a delay of up to 40 minutes for an industrial vessel to as little as 8 minutes for a pleasure craft.

I took photos at various points on the street during a traffic backup to capture the view from a driver's perspective. Next, I constructed an elevation schematic of the street that I could also use to plot vehicles during a delay. This combined allowed me to identify when driving left of center makes sense and when it became too risky of a move for the driver to make. This allowed me to create a five-step "journey" for a traffic delay on the street, starting with a vessel needing to pass and ending with normal traffic resuming.

To understand how drivers are being communicated to, I reviewed street signage in the neighborhood, including all traffic, parking, and wayfinding-related signs. I conducted a survey of drivers in the area, which was shared on Facebook by local neighborhood associations, to get a sense of sentiment and what behaviors they engaged in during times they faced a delay on the street.

One final assessment was technology, as a common solution to the problem was, "Let Waze handle it." How does Waze actually work? Could Waze notify drivers in time? What if drivers didn't use Waze?





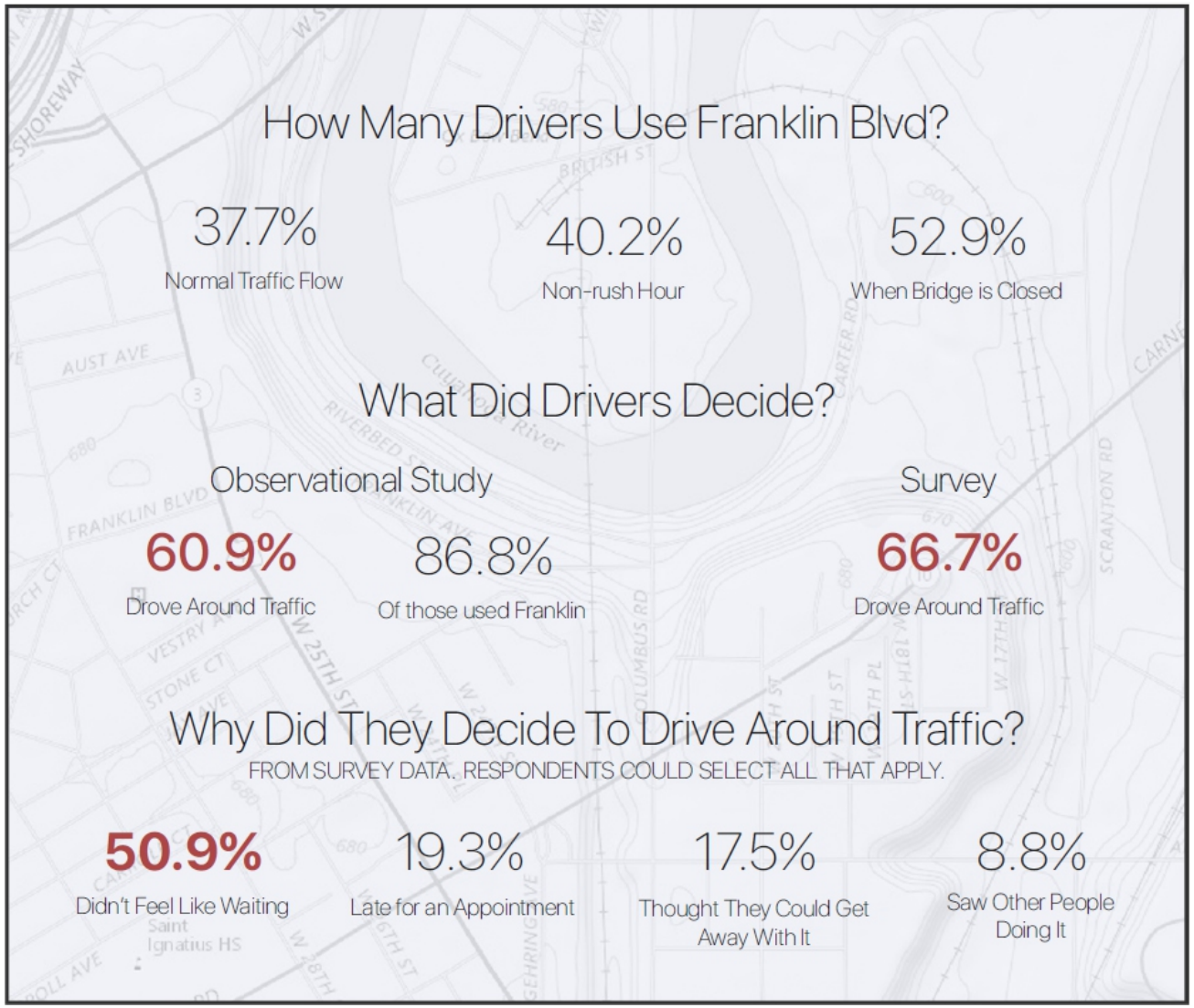
☐ View Columbus Rd. Elevation

Research Findings

The first insight that stood out when analyzing traffic flows was that nearly the same percentage of cars were driving left of center and turning left as there were vehicles turning left during normal driving conditions. The second insight was that these vehicles weren't driving left of center to avoid the bridge. Rather, they were driving left of center to avoid the obstruction in the road; that being the first vehicle to stop and wait.

When watching recordings of traffic, it's clear that traffic will continue to flow as long as a vehicle doesn't stop to wait for the bridge. Once that happens, additional vehicles will stop behind them, placing drivers in a position where they can choose to drive around the backup. If we can find a way to encourage drivers to keep moving, we might be able to reduce or eliminate the problem altogether.

When attempting to speak to drivers who were waiting for the bridge to reopen, a common sentiment that was expressed was that they wanted to watch the ships pass. This really opens the doors for potential design solutions that extend to the physical structure of the neighborhood in addition to the structure of the street, and the signage used to communicate.



Detour Sign Testing

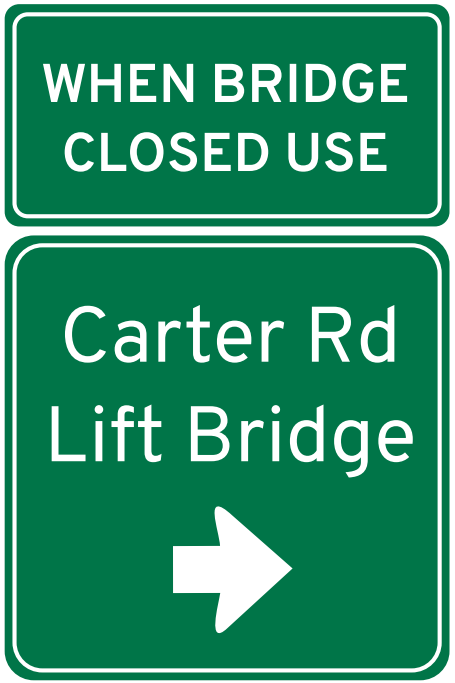
I created a number of sign designs that could be placed at three different locations along the street. Each location had four different messaging variations, which were voted on through a survey. The goal was to test a physical version of each sign and record the traffic patterns to identify any variations from my earlier observations.

The first sign concept was to replace the signage installed by the city at the top of the street. Despite the fact that many survey respondents were unaware that the sign even existed, it was already installed, and I wanted to see if it could be made more effective.

The second sign concept was intended to be mounted on street poles alongside other traffic signs in the area. I knew this had a high likelihood of getting lost in the sea of other signs, so I spent time conducting a separate design study to redesign all the traffic signs on the street.

The final sign concept, which is the only one I was able to test due to time constraints, was intended to be mounted on a neighborhood wayfinding sign already present next to the bridge itself. The theory here was that if a sign could be placed in the line of sight of the first car, the driver might be encouraged to keep moving. This sign was tested in a few locations on the street to measure its effectiveness.

All signs were designed with the intent of following Department of Transportation guidelines for approved fonts, colors and display.



Street Sign Redesigns

As an additional design study, I examined the existing signs communicating to drivers along the street and looked for ways to optimize them to reduce redundancy and visual clutter. Multiple signs were either repeated within a short distance of one another or were contradictory. Within the section of the street where most of the left-of-center driving was taking place, there were 12 different signs communicating information to drivers: 9 for traffic ordinances, 7 for traffic control, and 8 for wayfinding. Many signs were also stacked above one another on the same pole.

Upon closer examination, it became clear that communicating information to drivers is often a “check the box” activity for communities. A speed limit sign is put up here, a no parking sign goes up there, and if someone misses the sign and gets cited, jurisdictions win because they did the bare minimum when posting what drivers need to know. This alone would make for an interesting design problem regardless of the behavior of drivers in this specific situation.

Reflecting on the Project

The biggest constraints I had with this project were time and proximity. During this period in my life, I was splitting time between my home in Cleveland and my apartment in DC while working a full-time job. If I could have benefitted from more time, I would have used it to dig deeper into writing the most effective messaging for my sign concepts and continuing to test where they could be placed for the most effective response from drivers.

As for my desire to identify if human-centered design techniques could be used to solve a “wicked problem” that doesn’t necessarily have a user interface, I feel this project validated that notion. Design principles have broad applicability, which makes sense since design principles predate the user interface. The idea that we can use similar research and design techniques to understand human behavior outside of a human-machine interface scenario potentially opens many avenues for our profession. Service Design as a specialization may be the closest approach to this in our industry today.

Upon completion of my thesis project, I provided results to my neighborhood association and representatives from the City of Cleveland. A year later, I sold my home and completed my transition to the DC area. Currently, there is a large civic park under construction in my old neighborhood, with this intersection being partially closed as part of that work. The latest update I had as of July 2024 was that the traffic flow of this street would be revisited as the project nears completion. The photo to the right was taken Winter 2023.

View the Final Presentation