"I didn't know I was that much of a bad boy": Surprise about Driving Data

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INTRODUCTION

- **Vehicles collect rich sensor data**, but drivers often lack awareness of what's tracked, or how it's used.
- **Surprise is a key privacy trigger**, emerging when actual data practices violate user expectations, revealing hidden or unexpected inferences.

GOALS

- **Investigate people's understanding of the data collected by their cars.**
- **Examine how their existing knowledge shapes their perceptions of driving data privacy.**

METHOD

Participants

- 40 recruited: 39 completed the study
- Age range: 24 - 80 years
- Gender: 23 female, 16 male

Data Collection

Each participant used an OBD-II adapter to log driving data for 12 weeks.

Driving Reports

- Participants received personalized driving reports with visualizations.
- 30%: Individual-only reports
- 70%: Comparative reports with:
  - Aggregate driving trends for all
  - Third-party context (e.g., crime stats, Street View, speed limits)

Interview

- ~90 min Zoom interviews
- Follow-up questions probed understanding and reactions.

Analysis

- Used an iterative, inductive approach.
- Two researchers coded emerging themes.

DISCUSSION

- **Memory–Data Mismatch & Bias**
  Participants were surprised by mismatches between memory and data. Each reflects behavior with its own bias.

- **Limited Recall & Context vs. Measurement**
  Focused driving narrows memory. People recall meaning; machines record details.

- **Surprise Signals Privacy Concern**
  Unexpected data makes it hard to anticipate or control privacy outcomes.

- **Design for Transparency**
  Tools should highlight unnoticed data and align with how people perceive their actions.
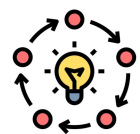
FINDINGS

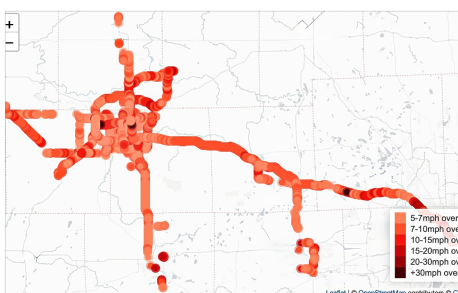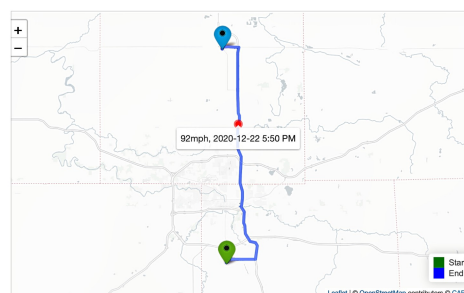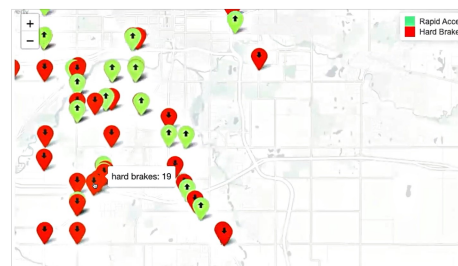Figure 1. Hard braking and rapid acceleration map for Participant 32.

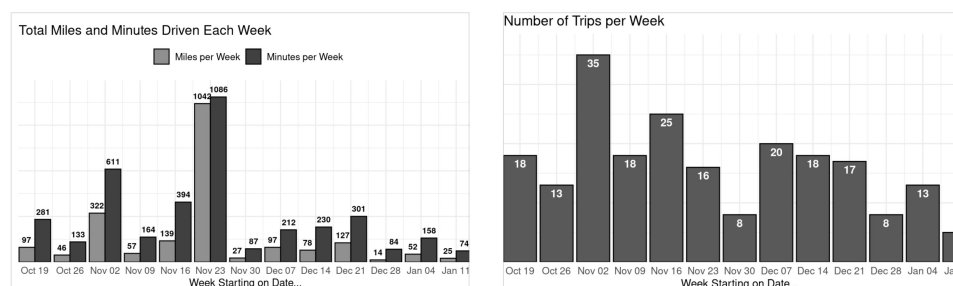Figure 2. Fastest speed (left) and speeding map (right) for Participant 02.

Figure 3. Weekly miles and minutes (left) and trip counts (right) for Participant 09.

Not Surprising

- Not surprised when data matched memory

"I assumed it would break down all my trips, track all my trips that I took, and I thought there would be some things about braking and acceleration " P05, FM, 54 y.o.

"I'm not surprised of any of the information [...] it's pretty much position, time, velocity, acceleration and gas volume in the car, right? " P03, M, 37 y.o.

"The braking does not surprise me at all. I love the brake pedal." P02, FM, 28 y.o

Surprising - Mismatch with Recollection or Intuition

- When their memory didn't match the data.
- Often happened:
  - Hard braking
  - Speeding
  - Driving frequency.

"I drove 2,123 miles and averaged 163 miles a week. Gosh, that's more than I think, but I do it in like 10 to 15 minute chunks, so I don't really realize." P09, FM, 29 y.o.

"[...] you had a 502 hard brake events, 76 rapid acceleration events. Bullshit." P03, M, 37 y.o.

"124 places. [...] I feel like I barely leave the house. This tells me otherwise." P02, FM, 28 y.o

Surprising - Revealing Routine and Lifestyle Patterns

- Surprised that data revealed routines and locations, not just driving behavior

"You can really pinpoint a lot of information about a person's habits in a week's time, or even in a day [...] You can get a good idea of how they work nights or what their lifestyle is like." P20, FM, 49 y.o.

"I'm just surprised at how this device has access to all that information, and knows all this information, and how smart it is" P08, Female, 32 y.o.

Surprising - Perceived Inaccuracy of data

- Questioned data that was unexpected, conflicting, or unclear.

"I'd kind of like to know what a hard stop is. [...] my hard braking wasn't standing on the brakes or anything squealing or anything like that. " P10, FM, 60 y.o.

"Wow, that's high. That doesn't seem right, I don't think your machine was working. 88 is really high, I don't speed very often, or ever really." P35, M, 35 y.o.

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