



Automatic Transmission: An Empirical Study of Data Privacy in the Connected Vehicle Ecosystem

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1. Vehicle Wi-Fi Data Collection



(N = 21)

Real vehicles
2022-2025

Stationary Tests

Idle Baseline
vehicle on -
no activity

Active Test
perform all
possible actions

Driving Test

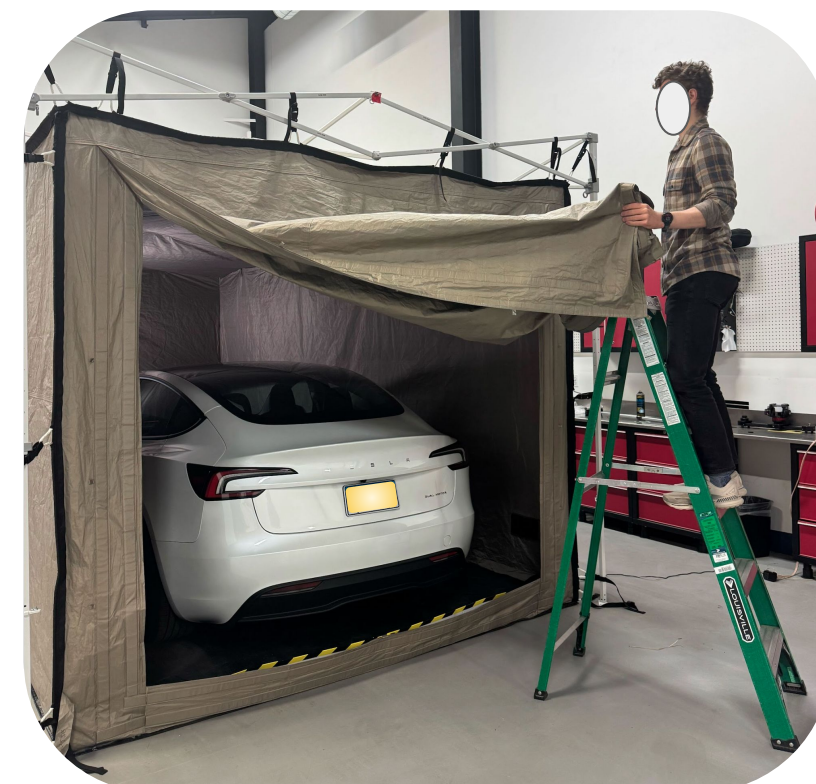
drive 5-45 mph w/
acceleration & hard
braking



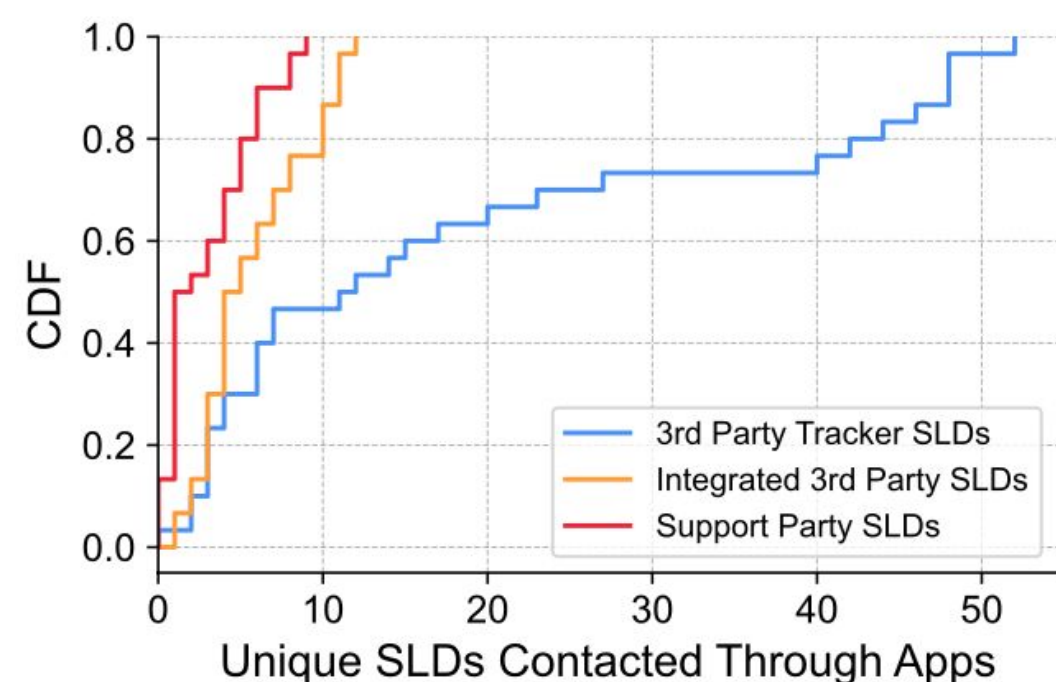
Stationary tests were repeated for the 11
EVs in Faraday tent to block cellular
communication



First study to empirically measure large dataset of real vehicles -
valued at over \$1.2 million



2. Vehicle Companion Mobile Apps



(N = 30)
Apps linked to
real vehicles

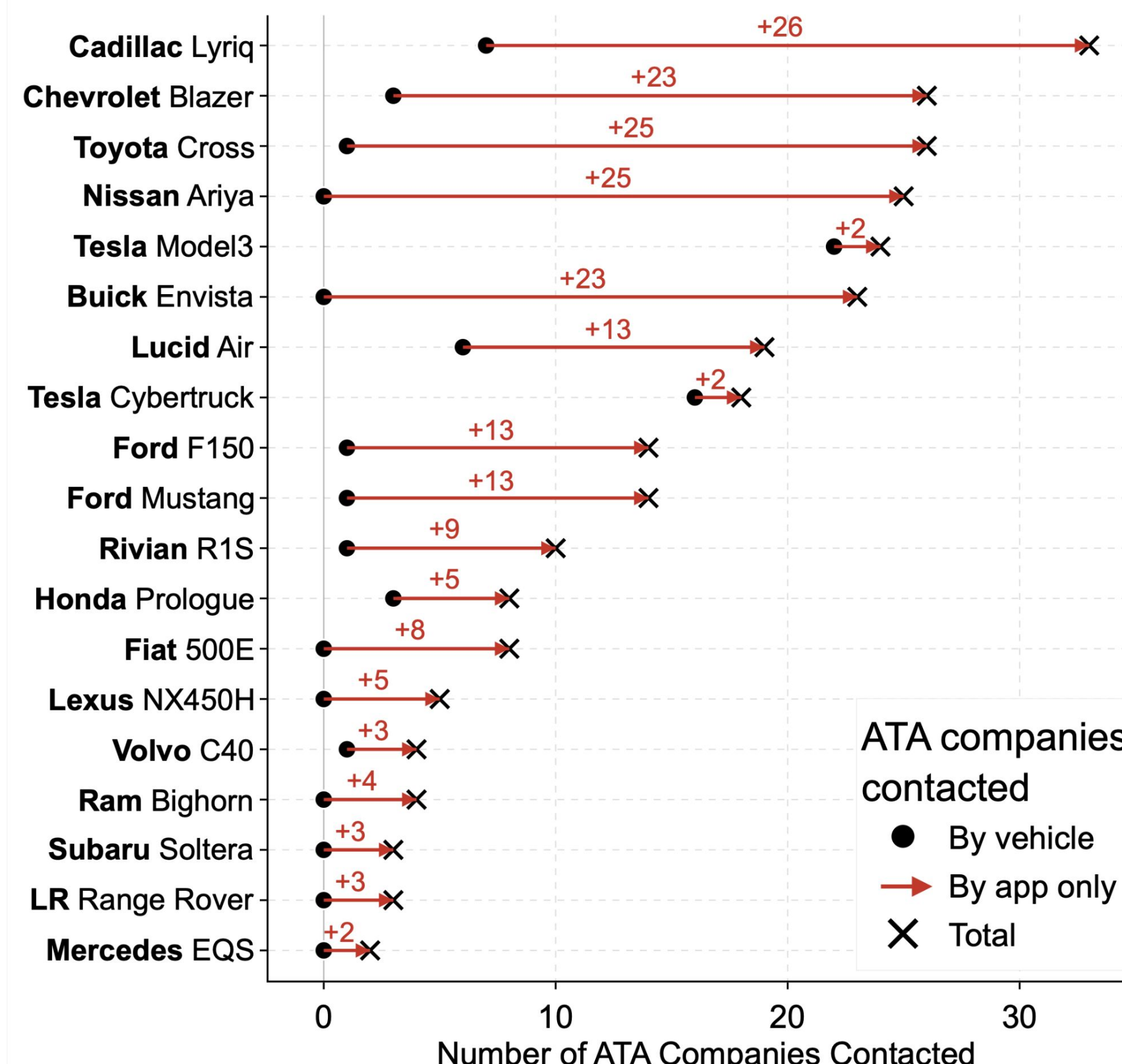
App Name	VIN	Location	Phone	Email
HondaLink	Amplitude	Amplitude*		
Lincoln	ContentSquare			
MyNISSAN	Alchemer			Alchemer
MyCadillac	Adobe, Axiom	ContentSquare		Adobe, ContentSquare
	ContentSquare, FullStory, Google, Meta, Microsoft, Pinterest, Snap, Yahoo			
MyChevrolet	Adobe, Axiom	Adobe		Adobe
	ContentSquare, FullStory, Google, Meta, Microsoft, Pinterest, Snap, Yahoo			
myBuick	Adobe, Axiom			Adobe, ContentSquare
	ContentSquare, FullStory, Google, Meta, Microsoft, Pinterest, Snap, Yahoo			
MyGMC	Adobe, Axiom	ContentSquare	ContentSquare	Adobe, ContentSquare
	ContentSquare, FullStory, Google, Meta, Microsoft, Pinterest, Snap, Yahoo			

7 apps shared VIN with
advertising/tracking/analytics 3rd parties
6 of those shared **VIN + PII** - which identifies the
user across different contexts

What consumer data do vehicles and their companion mobile apps send and to whom?

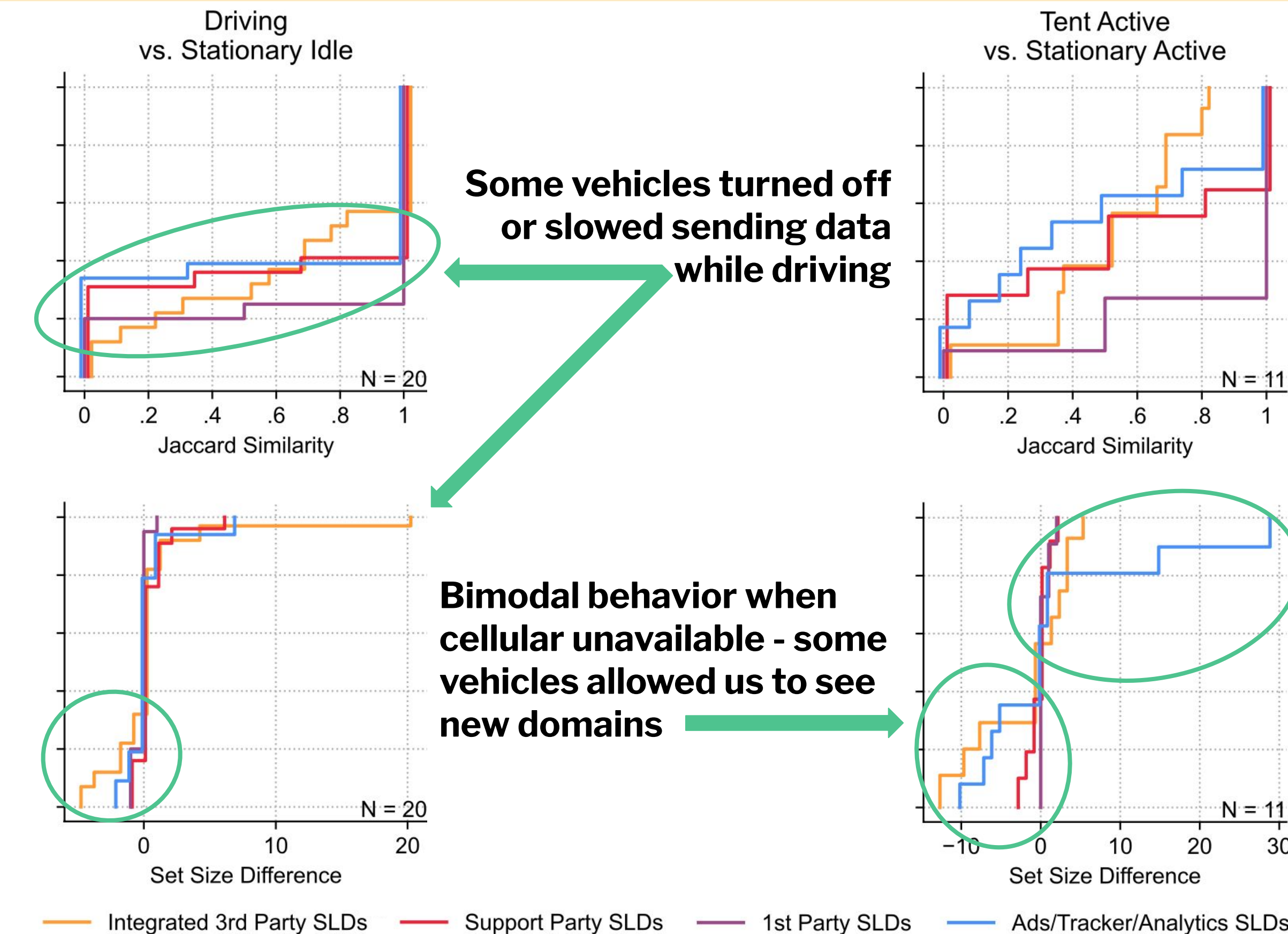
Company Name	Vehicles	Unique SLDs		
		ATA	Integrated	Support
Alphabet Inc	13	11	12	1
Amazon	12	3	7	5
Spotify	8	3	4	0
Liberty Media Corporation	7	0	1	0
Cloudflare, Inc	6	0	1	2
Microsoft	6	2	2	5
TomTom International B.V.	5	0	1	0
HERE Global B.V.	4	0	2	0
Mapbox	4	0	1	0
Meta Platforms, Inc.	3	2	0	0

Vehicles contacted familiar big tech companies for
advertising and tracking



Companion mobile apps increase consumer privacy
risk substantially

Results



Manufacturer Disclosures



17 manufacturer disclosures

no response
(3)

Reliance on
Third Party
Service
Contracts
(14)

"It's the
embedded
browser that the
app relies on"
(5)

Handling Software
Defined Vehicles is
Consumer
Responsibility
(7)