Critical Perspectives on the Impacts of AVs on Future Travel Demand

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Shared mobility, electrification and autonomous vehicles are bringing big changes in:

- Transportation supply
- Transportation demand

Need for rigorous research and impartial policy analysis to understand the impacts of these revolutions, and guide industry investments and government decision-making.
WHERE TO:
3REVOLUTIONS CONFERENCE
WHEN:
Feb 26th - 27th 2018
ADDRESS:
UC Davis
ARC Ballroom
232 Shields Ave, Davis, CA
The adoption of AVs will likely lead to large impacts on:

- **Transportation supply**
  - E.g. increased capacity through platooning vehicles at higher speeds, etc.

- **Transportation demand**
  - Increased flexibility in scheduling trips
  - Reduced effort and stress associated with driving
  - Ability to use time productively while traveling
  - Increased availability of personal vehicles for the mobility-limited (including the temporarily impaired, e.g. due to drinking)
  - Repositioning trips undertaken with no passengers (zero-occupancy vehicles)
  - Effects induced by the increased supply
  - (among others...)
Impacts on Individuals’ Behavior

- AVs will change the way we travel, participate in activities, interact with others...
- Potential impacts on land use/residential location
- Impact on congestion/people livability
- Impact on the transportation industry (and beyond)
- Potential substitution with other means of travel
- Potential induced demand
- Important policy implications!

Acknowledgements: Joan Walker, Yoram Shiftan, Dimitris Milakias and Siva Srinivasan
Behavior is a Key to Impact

• AVs can lead to desirable outcomes:

  all will share...

  OR

• AVs can result in the nightmare of transportation planners:

  all will travel more...

• There is a pressing need to understand what policies/scenarios will affect the use of AVs
Behavior is a Key to Impact

• Unfortunately, it is difficult to predict the future of mobility after AV adoption, as they are not currently available on the market yet!

• Need for rigorous research and impartial policy analysis to understand the impacts of these revolutions, and guide industry investments and government decision-making.
Typology of Research Objectives

- Ownership/Use
- Travel behavior/Mode choice
- Activity participation/Lifestyles
- Land use effects /Residential location

Various research approaches, including:
- Stated preference (SP) studies
- Driving simulators and controlled testbeds
- Simulation based/scenario analysis studies

Pilot Study: AV Shuttle in The Sustainable City, Dubai

Sustainability Research and Training Program (SRTP) in Dubai

AV Shuttle Test (*scheduled to launch in March 2018*)
Projecting Travelers into a World of Autonomous Vehicles: The “Chauffeur” Experiment

Principal Investigators: Giovanni Circella (UC Davis), Joan Walker (UC Berkeley)

The study investigates AV impacts on individuals’ and households’ travel choices.

To mimic life with an AV, we provide a chauffeur service for each household.

We track travel before, during and after the experiment with smartphone app, GPS tracking, surveys and interviews.
Naturalistic Experiment

- **Future of Interest:** a fully autonomous vehicle

- **Simulation of Future:** a personal driver

  - Don’t have to drive the car
  - Full multitasking
  - No parking worries
  - Can send on errands

![Image of a man driving a car](image1)

![Image of a woman using a smartphone in a car](image2)

![Bar chart showing average VMT per subject](chart)

- 83% increase in VMT
AV Likely to Increase Vehicle Miles Traveled

**FUTURE OF INTEREST:**
a fully autonomous vehicle

**SIMULATION OF FUTURE:**
a personal driver

Don’t have to drive the car
Full multitasking
No parking worries
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Results from pilot study

For more details:
Emission Impacts of Connected and Automated Vehicle Deployment in California

- Evaluate future scenarios of C/AV deployment
- Investigate ranges of potential VMT, GHG, and criteria pollutant emission impacts
- Project builds on knowledge from leading research in the field
The role of policy is fundamental. The introduction of AVs has potential for large increase in vehicle miles traveled and use of private cars.

AVs can be part of policies for *transportation sustainability*, for example through forms of *shared ownership* and *shared use* of AVs.

However, massive adoption of a shared-ownership and shared-ride models is not likely without strong policies and incentives that encourage it.

The overall effects of AV deployment will depend on the policies and regulations that are implemented

- Including restrictions on the road network, regulations on users, ownership models, taxes and incentives, traffic regulations and parking requirements.

- Growing opportunities for *blending of public/private transportation* and microtransit.

- Important role of policies to align with societal benefits... and space for research partnerships to generate knowledge in this area!
Among others, the following policy concepts can support VMT and GHG containment goals:

1. *Deploy driverless vehicles as shared use vehicles, rather than privately owned*
2. *Ensure widespread carpooling*
3. *Deploy driverless vehicles with zero tailpipe emissions*
4. *Take advantage of opportunities to introduce pricing*
5. *Increase line haul transit use rather than replacing it*
6. *Ensure driverless vehicles are not larger or more energy consumptive*
7. *Program vehicle behavior to improve livability, safety and comfort on surface streets*
The Role of Policy

Available online at: https://3rev.ucdavis.edu/
Thank you for your attention!

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