

# Propensity towards Ownership and Use of Automated Vehicles: Who Are the Adopters? Who Are the Non-adopters? Who Is Hesitant?

Tho V. Le, Giovanni Circella, and Grant Matson

Presented at the 2020 *Transportation Research Board Meeting*

# California Mobility Panel Study

Survey: 2018

N = 2,336 California residents

Survey questions:

If self-driving vehicles were available, how likely would you be to own a personal self-driving vehicle and/or use self-driving services (such as a driverless taxi)?

<i>I would...</i>		<i>Very unlikely</i>	<i>Somewhat unlikely</i>	<i>Neither unlikely nor likely</i>	<i>Somewhat likely</i>	<i>Very likely</i>
a.	Be one of the first people to buy a self-driving vehicle.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
b.	Eventually buy a self-driving vehicle, but only after these vehicles are commonly used.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
c.	Use a driverless taxi alone or with others I know.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
d.	Use a driverless taxi or shuttle with other passengers who are strangers to me.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

Ownership

Usage

# Methodology

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- Kmeans clustering

$$\sum_{i=1}^n \min_j \left( \|x_i - \mu_j\| \right)^2$$

minimize the within-cluster sum-of-squares (wcss)

$$\mu_j = \frac{1}{|S_j|} \sum_{x_j \in S_j} x_j$$

update the centroid  $\mu_j$

where data point  $x_i$

candidate cluster centroids  $\mu_j, j = [1, |K|]$

$S_j$  is a set of data points for each  $j^{th}$  cluster

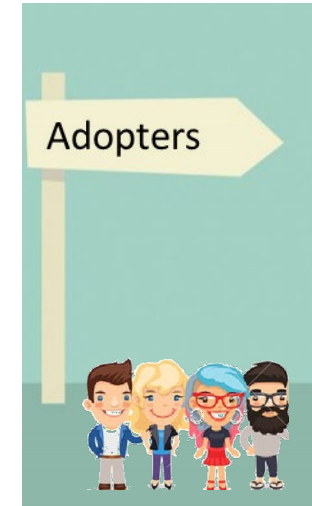
- Elbow method for identifying the optimal cluster number.

# Variables

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- **Socio-demographic characteristics**
- **Household size**
- **Residence type** and housing tenure
- **Attitude towards AVs**
- **Attitudinal variables**
- **Key life-events**
- **Current travel choices** for commute trips
- **Current travel choices** for leisure/ shopping/ social trips
- **Current travel characteristics**
- **Propensity towards AV adoptions**

# Who are the adopters?



Tech mavens/ Travelers

Multitaskers/  
Environmentalists/  
Impaired drivers

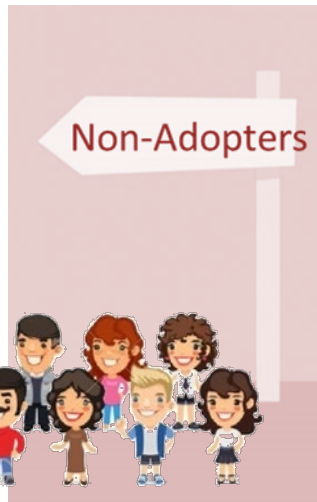


Captive Car-users

Life in Transition

Suburban Dwellers

Public/ Active Transport Users



Car enthusiasts

# Who are the adopters?

- Middle age men
- Advanced education
- Very high income
- Larger household size
- Grew up: suburban; live: urban
- Owning their house
- Tech mavens
- Familiar to AV concept
- Utilize time during commute
- Travel more under fatigue/  
influences
- Enjoy traveling more by using AVs

Tech mavens/  
Travelers

Likely

Source: Le, T.V., Circella, G., & Matson, G. (2019). Propensity towards Ownership and Use of Automated Vehicles: Who Are the Adopters? Who Are the Non-adopters? Who Is Hesitant? Presented at the 2020 *Transportation Research Board Meeting*, Washington DC. Paper number 20-03064.

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- Utilize time during commute
- Travel more under fatigue/ influences
- Enjoy traveling more by using AVs

Tech mavens/  
Travelers

Likely

- Younger men
- Advanced education
- Tech mavens
- Grew up/live: urban
- Own their house
- Driving impaired
- Frequently use public transport
- Familiar to AV concept
- Utilize time during commute
- Travel more under fatigue/ influences
- Environmentally-friendly lifestyle

Multitaskers/  
Environmentalists  
Impaired drivers

Likely

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# Who are the non-adopters?

- Seniors
- Average income
- Grow up/live: suburban
- Non-tech mavens
- Limited knowledge about AVs
- Worry about safety of AVs
- Love driving and controlling a car
- Do not support for environmentally friendly lifestyle

Car enthusiasts

Unlikely

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# Who is hesitant?

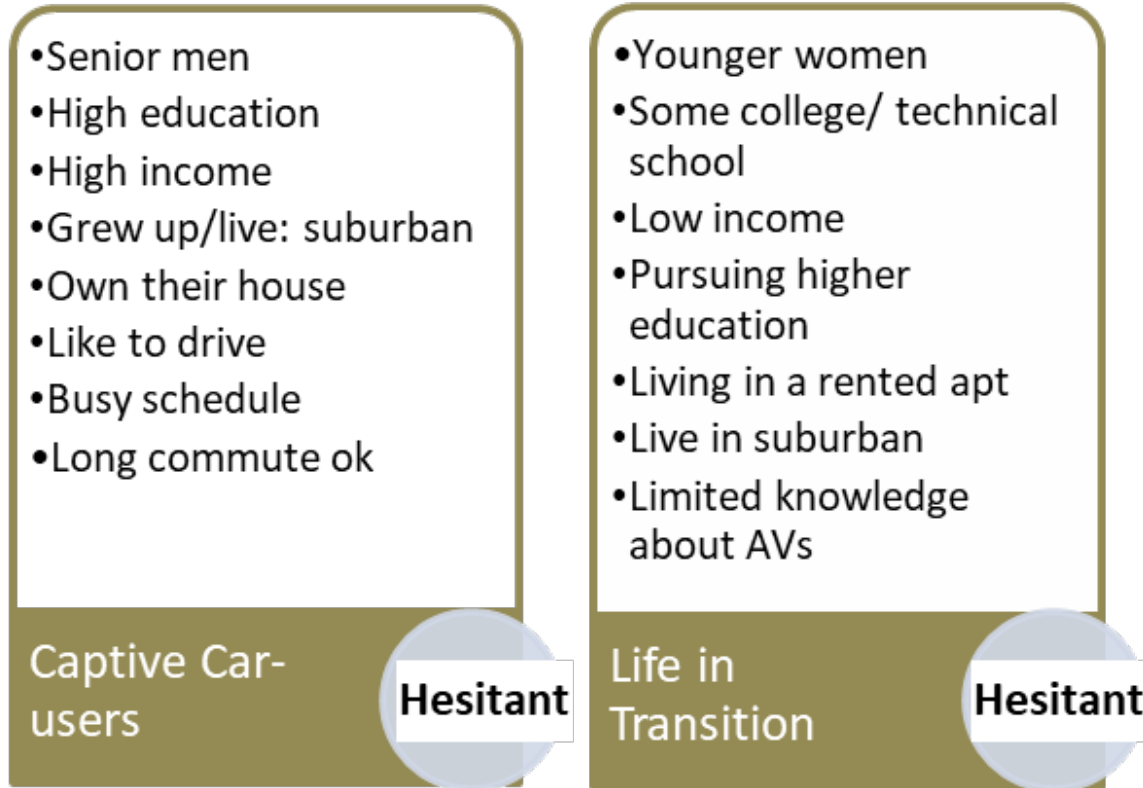
- Senior men
- High education
- High income
- Grew up/live: suburban
- Own their house
- Like to drive
- Busy schedule
- Long commute ok

Captive Car-  
users

**Hesitant**

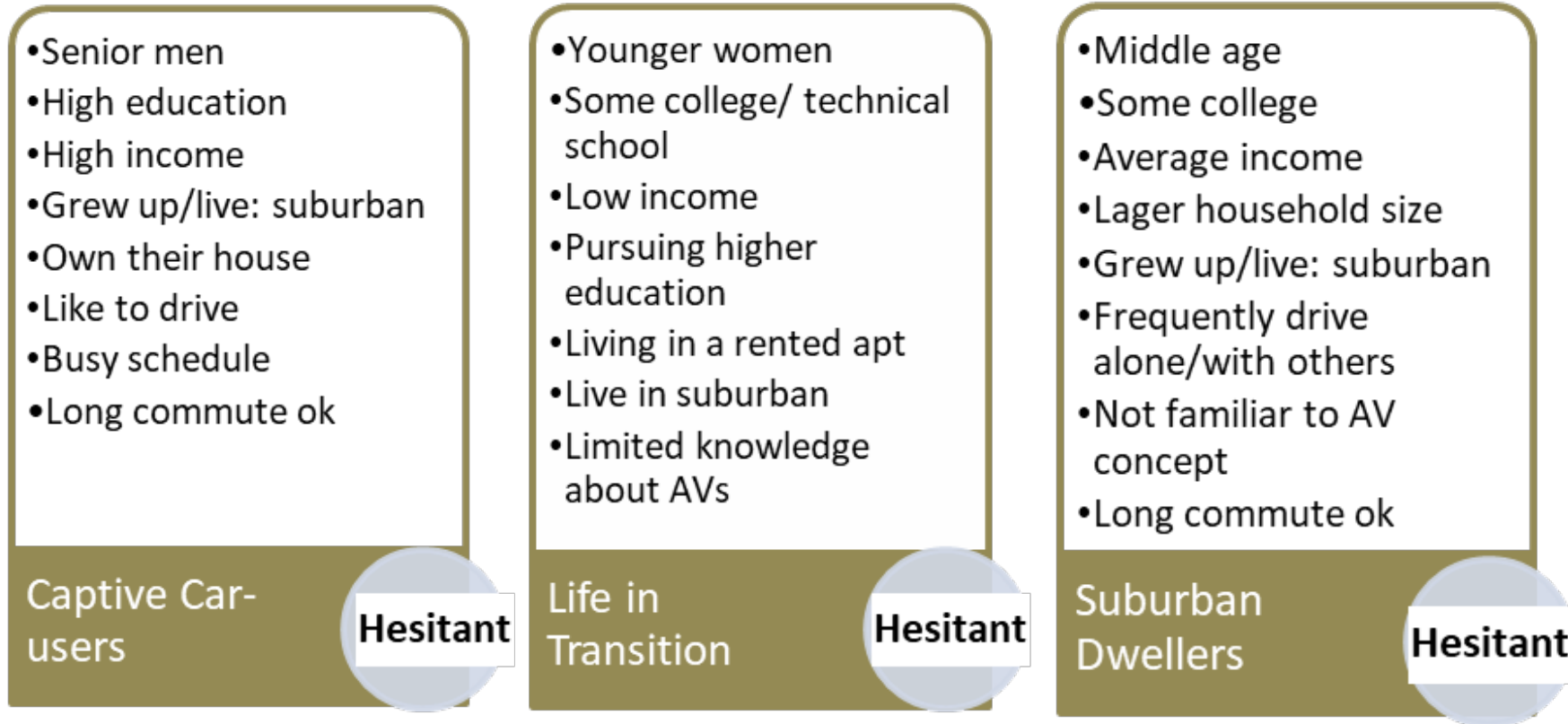
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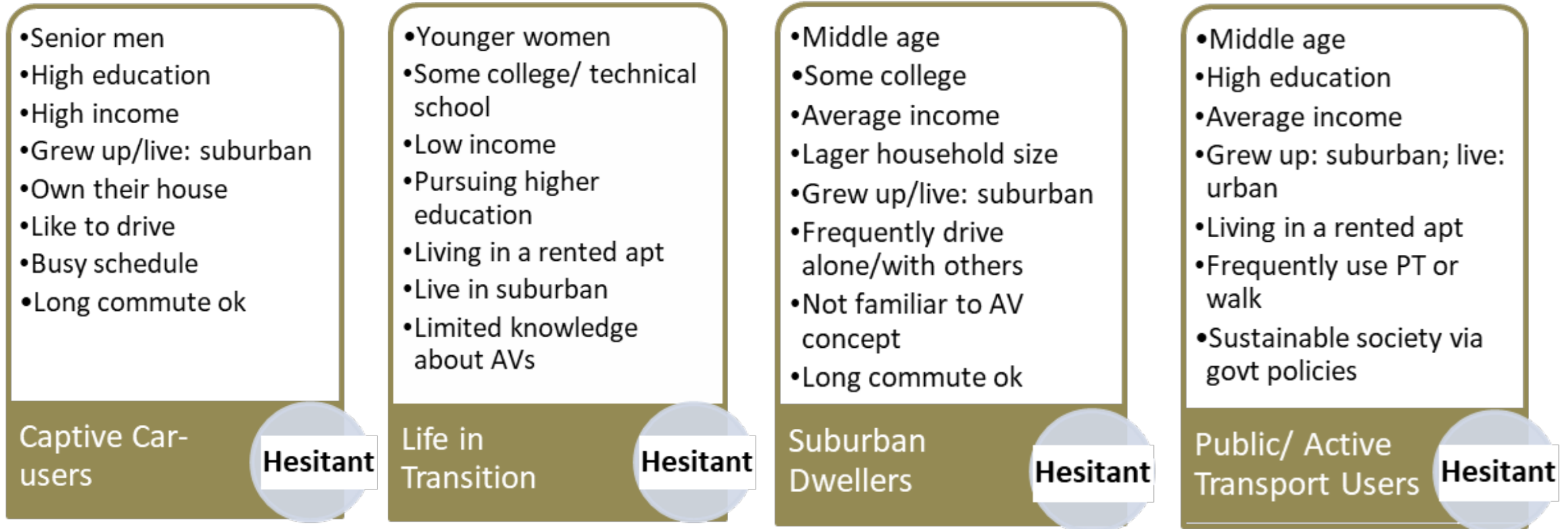
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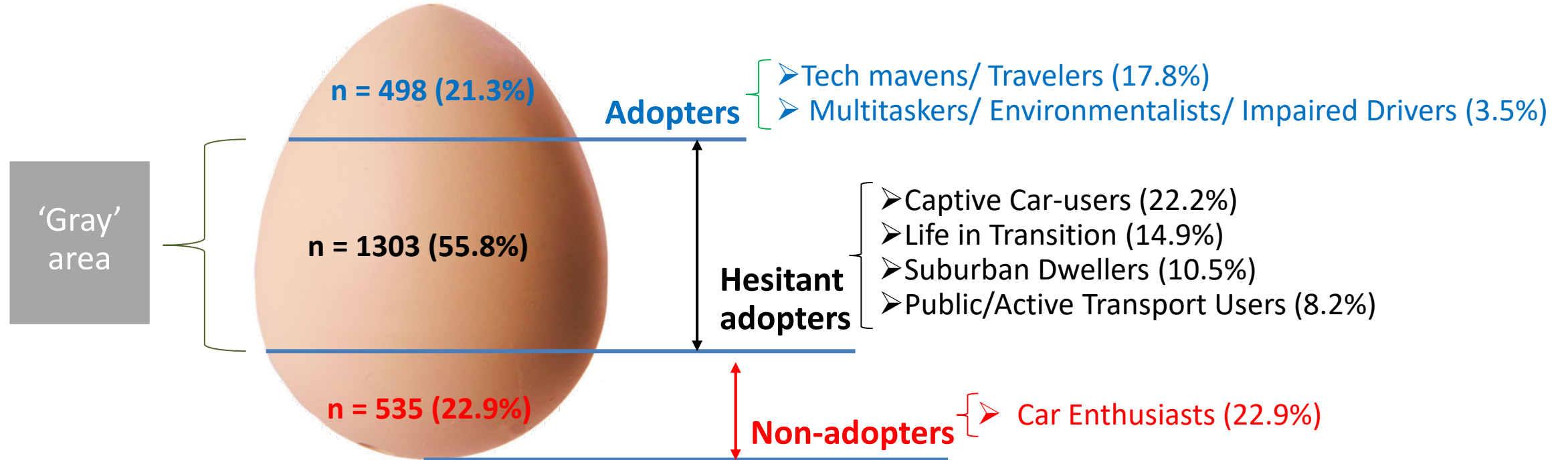
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# Will the 'gray' area be potential markets?



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**Thank you!**

Questions and comments

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