

Social Dilemma:
Commuting by Car Versus
Taking Public Transportation

Executive Summary

This essay will examine the social dilemma of commuting by car versus taking public transportation. Public transportation represents a choice that is better for a community overall from a sustainability perspective. However, commuting by car remains a more attractive and convenient option for many people. Exploring this social tension through the lens of game theory, we see that individuals have incentives to defect (commute by car) rather than to cooperate (use public transportation.) This is true even though the community as a whole is better off when large numbers of people cooperate than if large numbers of people defect (Dawes et al, 2000). A payoff matrix will help to explore some of the motivations of individuals and large groups of people to either defect or to cooperate. We will then examine successful strategies for encouraging the use of public transportation and supporting the common good.

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Introduction

Successfully addressing major community sustainability themes like transportation requires cooperation by large numbers of people. Using public transportation might be better for the community as a whole, but it comes at a cost to the individual preference for car travel. And traveling by car offers benefits to the individual, but comes at a cost to the community. What incentives prompt individuals to either defect and commute by car or to cooperate and use public transportation? What motivates large numbers of people to make that same choice? And are there ways to get greater cooperation and thereby have more people make the sustainable choice of commuting on public transportation?

Social Dilemma Assessment

There are a host of positive attributes associated with public transportation including greater safety than car travel, reduction of carbon footprint, reduced congestion and even reduction of health risks related to a sedentary lifestyle (APTA, 2017.) And the greater the cooperation/utilization, the more sustainable public transportation is. It becomes a reinforcing loop as greater ridership creates a more viable system, with greater levels of service, more amenities and more options. As systems become more mature and more reliable, they also begin to address some of the major reasons people defect and opt for commuting by car. And yet, in a car oriented society like the United States, it is generally more convenient and preferable to

commute by car than it is to take public transportation. The payoff matrix in Figure 1 helps us to understand what motivates individuals and large numbers of people to make the choices they do with this social dilemma, and illustrates how individual interests can vary from the collective interest.

	Cooperate Large numbers of people take public transportation	Defect A large number of people commute with cars versus public transportation
Cooperate Individual who takes public transportation	<ul style="list-style-type: none"> • Feel it is better for the environment • Believe it helps to minimize congestion • Believe public transportation is reliable • Believe travel time is shorter 	<ul style="list-style-type: none"> • Enjoys leaving the driving to someone else • Wants to set a good example • Wants to support ridership to help system • Wants to engage in other activities like reading
Defect Individual who takes private car	<ul style="list-style-type: none"> • Car is more convenient option • Believes car has less travel time variation • Car is more private • Car is more flexible with multiple destinations • Protection from weather • Greater safety 	<ul style="list-style-type: none"> • Feels that public transportation is not reliable • Feels that routes do not serve their needs • Feels that public transportation is unsafe • Feels that public transportation has a social stigma • Feels that schedules don't meet needs

Individual Cooperates, Large Numbers of People Cooperate

The upper left quadrant of the payoff matrix in figure 1 represents a win/win scenario for a community: both the individual and large numbers of people cooperate and prefer public transportation. Research has shown that this preference is driven primarily by three factors, any two of which in combination are effective in supporting the public transportation preference. First is the belief that public transportation delivers a shorter average commute than a car. Second is the belief that public transportation is at least as reliable as a car in terms of limiting how much that commute varies from the norm in terms of time. In other words, if travel time varies the same or less than that if a car is used, then the preference is supported. Reducing the variability of travel time and creating greater certainty over the commute has very practical implications like making appointments, getting to work and other time related commitments. And finally, there is a social belief that cars pollute the environment more than public transportation (Van Vugt et al, 1995) In general, public transportation has a lower environmental impact than driving a car. Train travel, for example, can produce less than half the greenhouse gas emissions as driving a car with an average of 1.58 passengers. And where cars do provide a more sustainable option, it is generally because of light ridership on the public transportation system (Chester et al, 2009).

Individual Defects, Large Numbers of People Cooperate

The lower left quadrant represents the scenario where an individual defects and opts to use a car to commute while large numbers of people still cooperate and use public transportation. Logic dictates that this choice would be driven in part by the inverse of the beliefs articulated

above: public transportation takes longer than a car, is less reliable in terms of time variability, and that cars do not pollute more than public transportation. Given the basic human psychological need for certainty, the variability element alone can undermine cooperation. (Kahneman & Tversky, 1979). Added to that bias would be protection from weather and a greater sense of security. And opting for a car opens the door for more flexible travel schedules including when one travels, stops one can make along the way, and the amenities one can enjoy like music and climate control. With the advent of cell phones, the privacy commuting by car affords also adds the nuance of greater productivity and social connection.

Individual Cooperates, Large Numbers of People Defect

The upper right quadrant represents the scenario where large numbers people defect from public transportation while an individual cooperates. An individual opting in with this scenario might be driven by social concerns such as wanting to set a good example, wanting to be a good environmental steward, or simply wanting to support the transportation system through ridership. There are also people who enjoy leaving the driving to someone else, especially in a modern context with the availability of wifi on trains and buses. This makes public transportation a very attractive option for those working, reading or even napping on their commute.

Individual Defects, Large Numbers of People Defect

The lower right quadrant represents the worst outcome for a community where both the individual and large numbers of people defect and opt out of public transportation. This choice is related to beliefs and assumptions articulated above where the individual defects, and can also

include beliefs such as poor route planning in the system, the feeling that public transportation is unsafe and even that public transportation carries a social stigma (Schweitzer, 2014). Higher defection and less utilization can lead to undermining of the public transportation option which represents the more sustainable community option.

Fostering Cooperation

Within the context of the classic prisoner's dilemma, it's not in any individual's interest, outside of altruistic intentions, to cooperate and commute with public transportation. With more flexibility, greater control over travel outcomes, personalized comfort and greater safety, the preference to defect is strong. This is well illustrated in the payoff matrix in figure 1.

Understanding the key variables underlying both an individual's and large numbers of people's decision to defect and commute by car can lead us to solutions for encouraging cooperation and the use of public transportation. So how might communities encourage greater cooperation for the common good and encourage greater utilization of public transportation?

While the payoff matrix illustrates the tendency of the individual to defect, there are effective methods for getting cooperation, several of which are outlined in Martin Nowak's book *Super Cooperators* (Nowak, 2011) These approaches offer insights, supported by the following examples, as to how cooperation might be leveraged to encourage greater adoption of public transportation. Nowak discusses several general ways to inspire cooperation and two ways we achieve this specifically in human society.

Direct Reciprocity or Tit for Tat

This strategy implies that it's in the best interest of individuals to cooperate versus defecting because they encounter each other frequently. This can be captured in the phrase "as long as you participate, I will. If you opt out, I will too." The On the Move Riders Clubs in Los Angeles County provides an example of this strategy within the public transportation conversation. With special interest clubs, the program creates social context and a frequency that could support this strategy.

Indirect Reciprocity or Reputation

This strategy relies more on an individual's reputation becoming known for cooperating. Developing this reputation inspires cooperation in others because they believe the individual will cooperate with them. This is exemplified in the example of a city councilman riding public transportation and publicizing his use with the intent to inspire ridership and to provoke improvements in the system (Merck, 2018).

Network Reciprocity

In this scenario, individuals will decide to cooperate based on how successful people in their network are. This strategy can be represented by employers subsidizing public transportation options by giving employees bus passes. This strategy has been used effectively in Portland, Oregon; Boulder, Colorado; and Santa Clara County, California (Tumlin et al, 2003).

The more successful fellow employees are using this benefit, the more likely others in the group will do so as well. And if one group of employees has a higher rate of participation, it could lead to group benefits like higher productivity and happier employees in one employer versus another.

Kin Selection

Kin selection relies on levels of relatedness to inspire cooperation, and is connected to feelings one has for family. The closer one is, the more influential they can be. Modeling by parents would be an example of leveraging this model of cooperation for influencing others.

Laws and Prohibition

This strategy relies on making certain behaviors or choices illegal in order to leverage cooperation. An example of this would be blood alcohol limits targeting the consumption of alcohol and the subsequent operation of motor vehicles.

Incentives

The final strategy focuses on creating incentives to induce cooperation. An example of this would be creating dedicated lanes and coordinated signal lights for Bus Rapid Transit lines.

Conclusions

Game theory, as exemplified by the prisoners dilemma and the payoff matrix, illustrates the natural tendency of individuals to defect from cooperation when it comes to commuting by car or taking public transportation. Given that public transportation is the more sustainable option for commuting, it's important to address this natural drift towards defection leveraging the

strategies discussed above. A thorough understanding of both the tendency to defect along with the strategies to encourage cooperation can lead to more informed policies designed to support greater participation in public transportation.

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