To Stop or Not to Stop?
An Analysis of Cyclists' Compliance or Noncompliance with Stop Signs

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ABSTRACT

Why do people obey or not obey laws? Sociologists and legal scholars have found a number of factors that contribute to compliance or noncompliance with the law and it seems that different contexts and locations cause people to behave differently. This study adds to the current body of legal research by examining the reasons behind cyclists' compliance or noncompliance with traffic laws. It uses data from a sample of university bicyclists who were asked about their cycling habits when approaching a stop sign. Cyclists took part in preliminary interviews that were analyzed with an interpretive approach to discover the reasons they gave for their behavior. A larger sample of cyclists completed a self-reported survey and these data were assessed to see the extent to which the survey data mirrored the interview responses. The results of this study help identify why people do or do not obey cycling laws and contribute to our understanding of legal compliance.

Introduction

Law is one of the basic institutions of society. It is the set of rules, explicitly written or implicitly understood, that governs how citizens behave and interact with one another (Glendon 2004). Studying the law can help us understand how a society functions, from the loosely-defined norms of pre-history to the strictly detailed law of modern day. Arguably, law is fundamental to our current bureaucratic, democratic society and thus, understanding it is integral to understanding our society.

But how can we best study legal realities? Simply reading legal texts gives us only a small fragment of what the law truly is because much of law is socially constructed (Berger and Luckmann 1966). In the United States, people elect representatives who create laws that citizens as a whole agree to obey. But law is only as "real" as people decide that it is.

Consider money. A dollar bill is simply a scrap of paper inscribed with numbers, images, and color. A one-dollar bill and a one-hundred-dollar bill are similar in size, shape, color, and design; yet, these two pieces of paper are worth considerably different amounts. The two bills are only worth different amounts because people agree that one is worth more than the other. If they go to buy something with these bills, people know that whomever they encounter will have the same understanding of the value of each respective bill as we do. People will not argue over the value of the bill, only the value of the item being purchased. Thus, the bills have a "real" value only because everyone in the society agrees on that value.

Similarly, law is an agreed-upon institution that can influence behavior because people agree to follow the written laws made by their representatives. But how does a particular law become "real" after it has been made official by the government? First, citizens must be made aware of it. This can occur through official governmental statements, media sources, or simply word of mouth. The next essential step is that the citizens must agree, even if they oppose the law, to obey it because it has been made official. This implicit agreement gives the law much of its power. Law enforcement agencies help enforce a law by sanctioning particular individuals, but no law enforcement agency is capable of enforcing a law if the vast majority of citizens refused to obey it.[1]

Traffic law is a particularly interesting area of law to study because it is present in the everyday lives of many citizens. Traffic law is well advertised on television, radio, the internet, and print media, and it is a staple of our education system. Traffic laws are also

[1] Dictatorial societies must rely on intimidating or scaring the public when citizens as a whole do not agree to obey the law. Even the most extensive law enforcement system could not control the entire population.

common in people's everyday discourse, whether they are discussing what another citizen should have done legally or updating their own body of information about traffic laws. Citizens must negotiate traffic laws in their daily routines and make several decisions every day about following these laws. The amount of knowledge that the average citizen possesses and the frequency with which they access this information are significant because it ensures that most traffic law violators are not breaking the law because of insufficient understanding.

So what are some of the causes behind traffic law violations, particularly by cyclists? An observational study conducted on the University of California Los Angeles campus found 28 of 100 automobile drivers stopped at a stop, compared with only 1.4 bicyclists (DeVeauuse et al. 2010). My research focuses on the factors that may influence cyclists' decisions about obeying traffic law. Using data gathered at University of California Davis through preliminary interviews and subsequent self-reported surveys, I examine the relationships between cyclists' reported concerns when cycling and their compliance with traffic law. In particular, I examine associations between obeying stop signs and concerns about police presence, tickets or warnings from the police, presence of other cyclists, being late, safety, weather conditions, and the time of day. I also assess whether age, gender, and cycling experience affect a cyclist's compliance with stop signs.

Theoretical Orientation

Many theories in socio-legal research have attempted to explain noncompliance with law. I focus primarily on three explanations for people's behavior in relation to the law: rational choice theory, habits, and social norms.

Rational choice theory assumes that individuals act rationally when they choose behaviors that maximize gains and minimize losses, thereby maximizing their subjective utility (Ulen 1999). People can evaluate situations, gather information, weigh the pros and cons of behavioral choices and then make a decision. Thus, a person's choice to offend can reflect his or her individual thinking process and evaluation of the situation (Cornish and Clarke 1987). Rational choice theory predicts that individuals should be dissuaded from breaking the law when sanctions are more costly than benefits. An extensive body of research supports some of the claims of a rational choice approach to crime (McCarthy 2002). For example, sanctions have been found to be an effective deterrent for sexual offending (Bachman, Paternoster, and Ward 1992) and corporate crime (Paternoster and Simpson 1996), however, individual-specific characteristics (such as age, gender, and intelligence) may also play a role in a potential offender's decision (Nagin and Paternoster 1993). For cycling, the most common sanction is a ticket or warning from police.

Sanctions and other costs, are only one half of a rational calculus and people's decisions to follow or break the law are also influenced by instrumental benefits. They may, for example, ignore laws about stopping when they see it as inconvenient, or if they are late. Conversely, they may follow traffic law when they are concerned about their own or others' safety. Such instrumental concerns have been found to be significant motivators for shoplifting and tax fraud (Kroneberg, Heintze, and Mehlkop 2010), violent and property crimes (Cohn and Rotton 2003), and homicide (Salfati 2000).

An extension of rational choice theory, the Bayesian learning model suggests that people's information about each specific legal situation is limited so their behavior will change as they gain more information about a situation (Breen 1999). In research on

juveniles, Matsueda and colleagues (2006) found that adolescents perceptions about the likelihood of arrest changed with their and others' experiences with offending and arrest. In terms of cycling, people's information about sanctions may change with the amount of time they have spent cycling because over time they will be gathering new information about the specific costs and benefits of stopping, and the probability of obtaining these.

Years of cycling may, however, also reflect the development of habitually following traffic laws without reflection. If following law in general is a habit, then knowing about a law will automatically influence citizens' behavior. People may obey law that is salient in their lives, using it as a "focal point" to orient their behaviors; as a result, they may follow new laws not because they see the law as individually beneficial but instead because they have developed a habit of following the law (McAdams and Nadler 2008). Likewise, habit may encourage people to obey laws even when they have incomplete information about laws or the legal situations they encounter (McAdams 2000). Traffic law especially may be followed out of habit because of its centrality in the lives of most citizens. It may be easier and more common for cyclists to simply follow the law on a routine basis than to reevaluate the utility of offending every time they reach a stop sign.

Norm-following may also explain citizens' behavior in relation to the law. Social norms are guidelines or rules for citizens that are enforced by the community, usually through the use of social punishments or rewards (O'Donnell 2007). Some research has supported the idea that these norms are created using the society's morality as a base, encouraging citizens to follow norms because it is the "right" thing to do (Gezelius 2007). Some researchers have speculated that social norms are strongest among non-offenders, suggesting that low or the absence of support for norms increases a person's rate of

offending (O'Donnell 2007). Citizens may also be less likely to offend if they expect others to comply with the norm. For example, Feld and Tyran observed the effects of "mild law" by constructing an experiment in which participants were given a certain allocation of goods and asked to designate them as either public or private goods (2006). They found that subjects were more likely to allocate public goods in the "mild law" condition when they expected others to do the same. Thus, citizens may be more likely to follow laws if they think other members of the community are also following the law.

A norm-following explanation for compliance with traffic laws relies on the assumption that laws are formalized social norms. An example of this may be smokers obeying "no smoking signs." Most smokers in our society today smoke in designated areas because it is "polite," or because they will suffer social backlash from other citizens if they do not. They are less concerned about the formal sanctions of the state and more concerned about the communal sanctions of others. In a longitudinal study consisting of panels and interviews, Hargreaves et al. (2010) found that surroundings communities stigmatized smoking more after legislation was passed banning it in public places. This indicates that social norms and law may work in concert to elicit "proper" behavior from citizens. In terms of traffic law, the presence of other cyclists may heighten their awareness of normative expectations about following traffic law.

I applied these three theoretical orientations to predict the results of my study: rational choice theory, habits, and social norms. Rational choice theory claims that sanctions should deter cyclists from running stop signs. Alternatively, cyclists could obey stop signs because of the behavioral habits they have formed. Social norms may also play a role in cyclists' decisions to comply or not comply with stop signs.

Methodology

Data

This study integrates interpretive and quantitative analyses to uncover the reasons behind cyclists' compliance and noncompliance with stop signs. I collected data using a two-part process consisting of preliminary in-person interviews and self-report surveys. Interpretive analyses of the 15 interviews I conducted revealed many reasons for cyclists' varying responses to traffic laws and I incorporated these into my survey. I gathered survey data from 87 respondents and used these data to estimate correlations between the various reasons people offer for their cycling behavior and their compliance with stop signs. I used the correlation results as a guide for estimating multivariate OLS regression equations.

Sample Studied

Both the interviews and the surveys were conducted on the campus of University of California Davis (UC Davis). The location of the research significantly influenced the attributes of the sample. Primarily, the subjects I interviewed and surveyed were between the ages of 17 and 24. The vast majority of the subjects were affiliated with the university, mostly as undergraduate or graduate students. The population's general interest in research and learning may have accounted for the extremely high response rate during the interviews and the survey report rates.

The demographics of the sample however, also created problems for my analysis. For example, I measured age in my survey with a question that divided people into the following age groups: 17-20, 21-22, 23-25, 26-30, 36-40, and 41 or older. Unfortunately, the vast majority of surveyed people fell into the first two age categories thereby limiting

my opportunity to assess the relationship between age and compliance. Collecting data in Davis may also have affected my results. Boasting the National Bicycling Museum as well as extensive bike paths and bike-friendly roads, the city of Davis has an extensive bicycling population. During the collection of data, I informally observed the cyclists of Davis and noticed that they frequently employ hand signals, obey road signs, wait for pedestrians, and generally follow the bicycling "rules of the road." Frequently during interviews and while filling out surveys, people made clear distinctions between their cycling experiences before and after moving to Davis, citing how cycling is a more prevalent aspect of their lives since moving to Davis. This bicycling-savvy aspect of the sample may make this research less relevant for cyclists from other places; nonetheless, it does contribute to our understanding of the underlying meanings behind cyclists' compliance with traffic law.

Preliminary Interviews

I conducted interviews on the UC Davis campus on two separate days while classes were in session. The first set of interviews took place on a Wednesday at eight in the morning at the Memorial Union (MU), a centralized building on campus that, among other things, houses dining facilities, a post office, the campus bookstore, a travel agency, and several campus organizations' offices. I approached cyclists who were parking a bike and asked if they would participate in an interview. I conducted eleven semi-structured interviews that included a standard set of questions and follow-up questions that each interview inspired (see appendix A-1). The interviews ranged from two to eight minutes in length with an average of 3.8 minutes.

I conducted the second set of interviews on a Friday at two in the afternoon at the Silo building on campus. The Silo is a central building on campus with dining

accommodations and is near several lecture halls. I did four interviews, ranging from three to seven minutes in length with an average of 4.6 minutes.[2] I asked the same set of questions I used in my earlier interviews. I conducted all of the interviews myself thereby minimizing differences in the social interaction of the interview. I used information obtained from the preliminary interviews to design the questions I used in my surveys. The interpretive analysis of the interviews allowed for an in-depth understanding of people's thoughts about cycling, stop signs, and noncompliance; it also informed the creation of survey questions that I used to estimate the associations between compliance and factors that influence it.

Surveys

I distributed surveys over several days in randomized locations. Twenty on-campus sites were chosen based on several factors: the frequency of bicycle traffic needed to be high enough to ensure a large sample; the site needed to have a centralized bicycle parking area where surveys could be distributed; and the location needed to far enough away from other chosen locations to ensure diversity of participants.[3] I assigned each potential site a number from 1 to 20. Over four weeks, I visited seven sites using a list randomly generated with a web-based random number generator.[4]

I distributed 87 surveys at the seven sites over the course of four weeks. I approached people who had an apparent affiliation with cycling (e. g., arriving on a bike,

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[2] One interviewee declined to be recorded so the exact length of that interview is unknown. However, I took notes during this interview and information from it is included in the analyses of the interviews.

[3] See Appendix A-4. Very few campus locations were excluded based on this criterion due to the incredibly large number of cyclists on campus.

[4] http://www.random.org/integers/

leaving on a bike, and walking with a bike).[5] After completing a survey, some cyclists stayed to discuss cycling habits and the research. Some of the insights provided by these informal, impromptu interviews inform the conclusions reached in this study.

Potential Error

Both random and systematic error may adversely affect data. The effect of random error in my data are hopefully minimized by the size of my sample (N=87). To minimize systematic error regarding law violations, I distributed anonymous, self-reported surveys. I also asked about a less serious form of law violation to encourage honesty in responses. The survey was short (taking approximately 1-2 minutes to complete) to help participants give honest, thoughtful answers and to reduce the possibility of bias due to fatigue or loss of interest.

There are, however, other possible sources of systematic error in my data. Systematic error may have been present in both the interviews and the surveys in that a certain type of cyclist may have been excluded from the research because that type of cyclist refused to be interviewed or surveyed (i.e., response bias). However, my use of several research sites to gather data hopefully minimized this possibility. As noted earlier, many of my participants were from the lower end of my age scale, possibly reducing the representativeness of my sample to the population as a whole. Sampling on a university campus likely increased the proportion of participants who are involved in post-secondary education and who are from a higher socio-economic class. Choosing Davis as a research site may have also introduced systematic sampling error: as noted earlier, Davis has large

[5] Surveys were frequently filled out by cyclists while they were still on their bikes or leaning on their handlebars. Twice, I was asked to hold a cyclist's bike while s/he filled out a survey.

number of cyclists and a well-established cycling culture so the people I sampled may have systematically different views of cycling practices (such as stopping behavior).

Finally, I may have introduced systematic measurement error into some of the questions used in my study. In my survey, the first question was open-ended and asked participants to fill in the number of years they had been cycling. A number of participants asked for clarification about whether the question was referring to how long they had been cycling *since coming to UC Davis* or how long they had been cycling all together. I clarified that the purpose of the question was the latter; however, participants who did not ask for clarification may have also misinterpreted the question. While the majority of participants answered this question with a number, a few responses were qualitative, including "a long time," "a lot," and "since I was little." I treated these entries as missing.

Measures

I measured several variables in my research. The most important theoretical variables included police presence, concerns about a ticket or warning from police, and presence of other cyclists. The measure presence of police can be defined as police officers being present at the stop sign when the cyclist approaches it. Another factor regarding state sanctions was concerns about ticket or warning from police, or the amount the cyclist thought about possible sanctions from police officers when approaching a stop sign. Presence of other cyclists measured the effect of other cyclists on the respondent's stopping behavior. Concerns about being late refers to the cyclist's own traveling schedule (e.g. when they needed to be where) and how that affects their behavior at a stop sign. The respondent's safety refers to the cyclist's own safety while other cyclists' safety refers to the safety of other people around the cyclist. Weather conditions measured the conditions

of the road and visibility due to weather while time of day measured the same conditions due to time of day (nighttime versus daytime).

These factors were measured using a Likert scale. Participants were given instructions to rate each variable on what degree the variable "affect[s] your stopping behavior at stop signs when you are cycling." I used a Likert scale from 1 to 10, with 1 being "does not affect behavior" and 10 being "greatly affects behavior" to measure the different factors that cyclists might consider when encountering a stop sign.

The independent variables measured were frequency of rolling stops and frequency of complete stops. Both of these variables were measured using a five point Likert scale from "never" to "often."

I also include several control variables. As noted earlier, age was measured by asking participants to identify their age group from six choices (17-20, 21-22, 23-25, 26-30, 36-40, 41 or older). I quantified gender with female being 1 and male being 2. For "average weekly cycling," participants were given five groups to choose from: less than 30 minutes, 30-59 minutes, 1-2 hours, more than 2 hours but less than 3 hours, and over 3 hours. For "years spent cycling," participants were required to write in how many years they had been riding. The variable "confidence when cycling" was measured using a five-point scale from not very confident to extremely confident.

Analysis

The interviews were analyzed interpretively. I recorded all except one interview. I then listened to these recordings and reviewed notes I had taken to determine what factors appeared to be influencing cyclists' stopping behavior. I added the variables "time of day" and "weather" to my survey because interviewees consistently mentioned them.

Interviewees also seemed to appreciate how short the interviews were so I attempted to make my survey very short and easy to complete.

For my survey data, I relied on Excel for my descriptive and bivariate correlation analyses. I utilized STATA to conduct a multivariate regression on my data. STATA was also used to standardize the coefficients and find the robust errors of my multivariate regression analysis.

Results

Descriptive Analysis

Less than 2.5% of my data was missing on any one variable. In my data set, 71.3% of participants were between the ages of 17 and 20, 14.9% were between 21 and 22, 5.8% were between 23 and 25, 4.6% were between 26 and 30, and 1.2% of participants were 41 or older. The data set consisted of 54.0% women and 43.7% men. The mean weekly cycling time was approximately 2 hours per week with a standard deviation of 1-2 hours and a range of less than 30 minutes to over 3 hours per week. The average number of years spent cycling was 9 years with a standard deviation of 7.9 years and a range of 54.8 years. I measured cycling confidence on a Likert scale from 1 to 5, with 1 being "not very" or "never" and 5 being "extremely" or "often." The mean for cycling confidence was 3.6 with a standard deviation of 1.0.

I also measured frequency of rolling stops and frequency of complete stops on a Likert scale from 1 to 5, with 1 being "not very" or "never" and 5 being "extremely" or "often." The mean for frequency of rolling stops was 4.1 with a standard deviation of 1.1 and a range of 4. The mean for frequency of complete stops was notably lower at 3.4 with the same standard deviation and range.

Recall that I measured the factors that cyclists might consider when encountering a stop sign with a scale in which 1 signifies that the factor does not affect behavior and 10 indicating that it greatly affects behavior. The highest means were for factors related to sanctions: presence of police and concerns about a ticket or warning from police. The lowest mean was time of day, indicating that this variable may have been accidentally covered by other measures or time of day is not a large concern for cyclists approaching stop signs. The mean for presence of police was 8.6 with a standard deviation of 2.2 and a range of 7. The mean for concerns about receiving a ticket or warning from the police was 8.0 with a standard deviation of 2.3 and a range of 9. The mean for concerns about being late was 7.6 with a standard deviation of 2.1 and a range of 9. The mean for presence of other cyclists was 6.9 with a standard deviation of 2.3 and a range of 9. The mean for factors regarding the respondent's safety was 7.6 with a standard deviation of 2.0 and a range of 7. The mean for factors regarding other cyclists' safety was 7.8 with a standard deviation of 2.1 and a range of 9. The mean for weather conditions was 6.94 with a standard deviation of 2.3 and a range of 9. The mean for time of day was 5.9 with a standard deviation of 2.5 and a range of 9.

Bivariate Analysis

I conducted bivariate analyses using Pearson Correlation Coefficients of the relationships between variables and evaluated the significance of these coefficients using a p-value of .05 or less (or a two tailed t-test value of 1.96 or higher).

My bivariate analyses indicate that age is not correlated with making a complete stop; it is however, significantly and negatively correlated ($r= -0.311$) with making a rolling stop. Years spent cycling is not related to either making complete or rolling stops.

In my analysis of confidence about cycling ability and stopping behavior, I found a significant positive correlation (r=0.249) between level of participant's confidence and making a complete stop. I did not find any significant positive correlation between these two variables in my multivariate analysis. I also did not find any significant correlation between confidence and making a rolling stop.

I also found a significant positive correlation (r=0.133) between the respondents' safety and making a complete stop. This correlation was not significant for making a rolling stop. I did not find any other significant correlations with participants' stopping behavior. For the full results of my bivariate analyses of stopping behavior, see figure 1-1.

Figure 1-1[6]		
Independent Variable (x)	Complete Stop (y)	Rolling Stop (y)
Age	0.1338	-0.3114*
Gender	-0.0521	-0.1590
Average Weekly Cycling	-0.0059	0.0751
Years Spent Cycling	0.3999	-0.0271
Confidence when Cycling	0.2490*	-0.1617
Presence of Police	-0.0809	0.0740
Concerns about Ticket or Warning from Police	0.0267	0.0432
Concerns about being Late	-0.0515	0.0414
Presence of Other Cyclists	0.0323	0.0147
Respondent's Safety	0.1333*	-0.0198
Other Cyclists' Safety	0.0076	0.0381
Weather Conditions	0.0528	-0.0173
Time of Day	0.0263	0.0108

[6] * indicates significance using a p-value of .05 or less and a t-test of 1.96 or higher for all tables.

I found several significant correlations between years spent cycling, age, and gender and the different concerns that cyclists consider when approaching a stop sign. In my bivariate analysis of years spent cycling, I found a significant negative correlation of -0.0836 between years spent cycling and time of day. I also found a significant negative correlation (r=-0.086) between years spent cycling and concerns about being late. This correlation did not hold true for my bivariate analysis of age and concerns about being late. Finally, I found a significant negative correlation (r=-0.118) between years spent cycling and concerns about a ticket or warning from the police. For the full results of my bivariate analysis of years spent cycling and cyclists' concerns, see figure 1-2.

Figure 1-2	
Dependent Variable (y)	Coefficients
Presence of Police	-0.0440
Concerns about Ticket or Warning from Police	-0.1181*
Concerns about being Late	-0.0860*
Presence of Other Cyclists	-0.0481
Respondent's Safety	0.0305
Other Cyclists' Safety	0.0177
Weather Conditions	-0.0347
Time of Day	-0.0836*

My bivariate analysis of age and concerns when stopping revealed only one significant correlation. This was a negative correlation (r=-0.593) between age and concerns about a ticket or warning from the police. For the full results of my bivariate analysis of age and cyclists' concerns, see figure 1-3.

Figure 1-3	
Dependent Variable (y)	Coefficients
Presence of Police	-0.0986
Concerns about Ticket or Warning from Police	-0.5931*
Concerns about being Late	-0.3936
Presence of Other Cyclists	-0.1174
Respondent's Safety	0.1659
Other Cyclists' Safety	0.0313
Weather Conditions	-0.0164
Time of Day	-0.1847

Similarly, my bivariate analysis of gender and concerns when stopping also yielded one significant correlation. This was a negative correlation (r=-1.107) between gender and concerns about a ticket or warning from the police. For the full results of my bivariate analysis of gender and cyclists' concerns, see figure 1-4.

Figure 1-4	
Dependent Variable (y)	Coefficients
Presence of Police	-0.1019
Concerns about Ticket or Warning from Police	-1.1070*
Concerns about being Late	-0.4787
Presence of Other Cyclists	0.5196
Respondent's Safety	0.1260
Other Cyclists' Safety	0.2777
Weather Conditions	-0.0963
Time of Day	-0.4658

Multivariate Analysis

My multivariate of complete stops revealed several associations when I controlled for other variables (see figure 2-1), including associations that were not significant in my bivariate analysis. My multivariate analysis reveals a significant positive association

(B=0.199) between concerns about a ticket or warning from the police and making a complete stop, independent of the variables other cyclists' presence, other cyclists' safety, gender, and age. However, I also found a significant negative association (B=-0.183) between police presence and making a complete stop. This negative association may indicate that cyclists use a Bayesian learning model, changing their behavior as they notice the relative infrequency of police at stop signs.

Only one of my measures of instrumental variables concerns about the weather is significantly associated (B=0.169) with making a complete stop; note that this bivariate association is not significant, but controlling for other variables, highlights its association. Interestingly, controlling for other variables also changes the association between stopping and a concern for other's safety from positive to negative. This may suggest that people will be more likely to stop in concern for others safety when other factors like bad weather or a dangerous time of day are also considering their decision. When concern for others is the only factor, however, they may be more likely to assume other people can care for themselves.

My multivariate analysis yielded only one consistent effect involving rolling stops: age is significantly and negatively related to rolling stops (B=-0.328) net of controls. The different effects found in complete stops versus rolling stops may be due to the definition of a "stop." Respondents may have been confused about what a "rolling stop" entails. This may account for the wide variety of responses in the surveys and the lack of statistically significant results for rolling stops.

Figure 2-1			
Independent Variable (y)	Coefficient	Standard Coefficient	Robust Error
Age	0.1887	0.1614	0.1033
Gender	0.0059	0.0027	0.2300
Presence of Police	-0.1834*	-0.3572*	0.0664
Concerns about Ticket or Warning from Police	0.1985*	0.4161*	0.0615
Concerns about being Late	-0.0990	-0.1903	0.0581
Presence of Other Cyclists	0.0975	0.2054	0.0590
Respondent's Safety	0.1015	0.1880	0.0537
Other Cyclists' Safety	-0.1103	-0.2100*	0.0534
Weather Conditions	0.1690*	0.3433*	0.0500
Time of Day	-0.0325	-0.0747	0.0465

Discussion

Law can reveal a great deal of information about our society. The laws we make often correspond to the values of our society. Compliance with law is an affirmation of those values while noncompliance is a deviation from them. Studying what leads to compliance or noncompliance helps inform researchers about this deeper acceptance or rejection of societal norms.

The majority of respondents had been cycling for approximately half of their lives and were confident about their cycling abilities. I found that participants as a whole were more likely to make a rolling stop than a complete stop, a finding that matched interviewees' responses in the first phase of my research. When respondents reported their level of concern about different factors when stopping, the highest means were related to factors associated with police enforcement. Presence of police had the highest mean (8.6) while concerns about a ticket or warning had the second highest mean (8.0).

These two factors also had smaller ranges, revealing a high level of consensus among the population. The next highest means were for the following variables (arranged highest to lowest): other cyclists' safety, respondent's safety, and concerns about being late. Time of day had the lowest mean (5.9), despite indications from the preliminary interviews that time of day was a salient factor for many cyclists. This may be explained by the ambiguity of the phrase "time of day."

Bivariate results primarily supported rational choice theory explanations for stopping behavior. I found a significant negative correlation between both age and years spent cycling and concerns about a ticket or warning from police. These results reveal that as cyclists become more experienced, they are less likely to let concerns about a ticket or warning affect their stopping behavior. This may be because tickets and warnings are not as common as people believe so as cyclists become more experienced, the threat of sanctions ceases to be an important factor. This would support the theory of Bayesian learning and the view that people continue to update their information about offending and then modify their behavior to maximize utility. Experienced cyclists learn that sanctions are infrequent so they may offend more because when weighing the pros and cons of stopping, disobeying the law yields greater utility in their analysis of the situation.

The positive correlation between confidence about cycling and coming to a complete stop also supports rational choice theory. Several interviewees from the first phase of my study mentioned the difficulty of gaining momentum on a bicycle after stopping. This may explain why more confident cyclists are more likely to stop and less confident ones are less likely; stopping on a bicycle requires a certain level of skill. This finding supports an instrumental orientation to rational choice theory. Cyclists are

analyzing their abilities and weighing their options to make a rational choice about whether or not to stop.

Multivariate results were more varied in their support of the different explanations for stopping behavior. The negative association between making a complete stop and police presence supports rational choice theory and Bayesian learning. Cyclists who are primarily concerned about the actual presence of police when deciding whether or not to stop are less likely to stop. The police are not often present when a cyclist encounters a stop sign so that cyclist does not stop very often. As the cyclist learns that he will not suffer a sanction for offending, he continues to run the stop sign. Thus, the fact that stopping and police presence are negatively associated supports the theory that Bayesian learning affects offenders' behavior in relation to the law.

The positive association between coming to a complete stop and weather concerns supports an instrumental orientation to rational choice theory. This indicates that cyclists may have been concerned with the instrumental problem of their ability to stop in different types of weather. Combined with data from the preliminary interviews, these results reveal how cyclists are evaluating the particular situation they find themselves in (rain, wind, excessive heat, etc.) and taking the action that most benefits them. Thus, rational choice theory seems to explain non-offenders' behavior as well.

The multivariate results also lent some credence to the norm-following explanation for behavior. I found a positive association between making a complete stop and concerns about receiving a ticket or warning from police. Non-offenders in this case may have obeyed the law because they knew breaking the law was "wrong" and felt uneasy about disobeying this law because of the social backlash (a warning). They may obey the law

because it is a norm in our society to obey laws and not doing so would be socially uncouth and unacceptable.

The multivariate results did not support the habit-forming explanation for stopping behavior. A negative association between making a rolling stop and age and years cycling reveals that with increased experience, cyclists are less likely to make a rolling stop. Because I did not find a positive correlation with age or years cycling and making a complete stop, these results seem to show that more experienced cyclists are less likely to stop at stop signs. A habit-forming explanation would predict that cyclists continue to stop with similar frequency, no matter the amount of time they have been cycling, because they form a routine around non-offending and continue to stop due to that habit. My results indicate the opposite: the longer a respondent has been cycling, the more likely he is to no longer obey stop signs. This further supports the rational choice theory explanation for offending.

My study seems to most support the rational choice theory explanation for offending or non-offending behavior. The data supported both Bayesian learning and instrumental orientations to this theory. The multivariate analysis also revealed some support for norm-following explanations for non-offending. My study did not support the habit-forming explanation for stopping behavior.

Conclusion

Because law is the foundation of modern life, understanding citizens' behavior toward it is essential to understanding society. Why do people comply or not comply with law? I draw on three theories that offer answers to this question: rational choice theory, norm-following, and habit formation. I researched these explanations for behavior by

studying reports of UC Davis cyclists' stopping behavior My analysis primarily supported rational choice theory, including instrumental and Bayesian learning models. Some support was also found for the norm-following explanation. My research provided little support for the habit formation explanation for people's' behavior.

The primary limitation of my study lies in the method of data gathering. I measured cyclists' behavior by their responses, rather than actually observing the frequency of stopping behavior. An observational study may reveal new insights into the actual level of compliance with stop signs. To further explore Bayesian learning, a longitudinal study could study changes in behavior toward the law. Research on compliance would also benefit with the use an interpretive approach that studies people's views about *others* breaking the law, thus revealing new insights into the norm-following explanation, or their *own* offending routines, giving researchers in-depth information about offenders' thought processes. Better understanding offenders' thought processes could also help us better apply rational choice theory to offending behavior.

Signifiers, signs, or symbols reminding citizens of the sanctions against offending are another avenue of law that could be explored. Specifically, traffic law violation rates could be compared across counties with different average numbers of these signifiers posted on their highways. Surveys could then be distributed, asking citizens how signifiers affect their orientation to the law. This multifaceted approach would study both the actual effect on citizens' behavior (traffic law violation rates) and citizens' subjective analysis of signifiers' effect (surveys). Such research could also study a much larger more representative sample. Multifaceted approaches like this (and my own study) reduce the

possibility for methodological error, giving researchers a more accurate understanding of the social world.

Appendix: Data Collection Instruments

Interview Questions

Introduction:

-My name

-Undergraduate student at UC Davis working on my honors thesis

-Thesis is about cycling habits

-Could I take a few minutes of your time to interview you about cycling?

-If you do not have time right now, could I meet with you for five minutes at another time?

Interviewee Rights:

-You have the right to stop the interview at any time for no reason

-All of the information you provide will remain completely anonymous

Taping:

-Would it be okay with you if I taped our interview?

-(If no to first question) Would it be all right with you if I took notes during our interview?

-(If no to both questions, write down answers immediately after interview)

Questions:

-How many years have you been riding a bike?

-How would you rate yourself as a cyclist? How confident are you in biking?

-How many hours did you cycle in the past week?

=> How much more or less was that compared to an average week?

-How often do you come to a full stop for stop signs when you are cycling?

-What things influence your decision to stop or not stop at an intersection where there is a stop sign?

-What things do you think would increase the likelihood that you would stop you encountered a stop sign?

-How many cyclists do you know or have you seen get a ticket for not stopping at an intersection?

-Have you ever gotten a warning from police or a ticket for not stopping at an intersection while cycling?

=> If yes, when and where?

-What is your gender?

-What is your age?

-What is your occupation?

Do you have any other thoughts about cycling that you want to share with me?

End of Interview:

-Thank you for your time

-If interviewee is interested in learning results => Not publishing my research, however, I will be presenting it at the UC Davis Undergraduate Research Conference on Saturday, April 27th, 2013 between 9am and 12pm in Wellman Hall

UC Davis Sociology Honors Project Bicycling Survey

1. How many years have you been riding a bicycle? Please provide a number. _____ years

2. During an average week, how often do you currently ride a bicycle? Please circle one.

Less than 30 minutes 30 min – 59 min 1-2 hr More than 2, less than 3 hr Over 3 hr

3. How confident are you while riding a bicycle? Please circle one.

Not very Somewhat Confident Very Extremely

3. How often do you come to a complete stop (with at lease one foot on the ground) for stop signs while riding your bicycle? Please circle one.

Never Rarely Sometimes Occasionally Often

4. How often do you slow down or do a rolling stop for stop signs while riding your bicycle? Please circle one.

Never Rarely Sometimes Occasionally Often

5. How much do the following factors affect your stopping behavior at stop signs when you are cycling? Please circle one of the following with 1 being "does not affect my behavior at all" and 10 being "greatly affects my behavior".

Presence of police

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Presence of other cyclists

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Your safety

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Others' safety

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Weather conditions

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Time of day

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Concerns about a ticket or warning from the police

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

Concerns about being late

Does not affect behavior Greatly affects behavior
1 2 3 4 5 6 7 8 9 10

6. What is your gender? F M

7. What is you age? Please circle one.

17-20 21-22 23-25 26-30 36-40 41 or older

Thank you for your participation. If you would like me to email you my findings, please provide an email address.

_____

Survey Sites

1. Young Hall
2. Hunt Hall
3. Veihmeyer Hall
4. Wellman Hall
5. West side of the Memorial Union
6. Shields Library
7. Student Community Center
8. Sterer Hall
9. Sciences Lab Lecture Hall
10. Bike Barn
11. Chemistry Building
12. Roessler Hall/Bainer Hall
13. Mathmetical Sciences
14. Mrak Hall
15. Wright Hall
16. Olson
17. Tercero Dining Commons
18. Segundo Dining Commons
19. Cuarto Dining Commons
20. ARC

Works Cited

Bachman, Ronet, Raymond Paternoster, and Sally Ward. 1992. "The Rationality of Sexual Offending: Testing a Deterrence/Rational Choice Conception of Sexual Assault." *Law & Society Review* 26(2):343-372. <http://www.jstor.org/stable/3053901>.

Berger, Peter L. and Thomas Luckmann. 1966. *The Social Construction of Reality*. England: Penguin Books. <http://amstudugm.files.wordpress.com/2011/04/social-construction-of-reality.pdf>.

Breen, Richard. 1999. "Beliefs, Rational Choice and Bayesian Learning." *Rationality and Society* 11:463-479. doi:10.1177/104346399011004005

Cohn, Ellen G. and James Rotten. 2003. "Even criminals takes a holiday: Instrumental and expressive crimes on major and minor holidays." *Journal of Criminal Justice* 31:351-360.

Cornish, D. B. and Clarke, R. V. 1987. "Understanding Crime Displacement: An Application of Rational Choice Theory." *Criminology* 25:933–948. doi:10.1111/j.1745-9125.1987.tb00826.x

DeVeauuse, Natasha, Kathy Kim, Corinne Peek-Asa, David McArthur, and Jess Kraus. 1999. "Driver Compliance with Stop Signs at Pedestrian Crosswalks on a University Campus." *Journal of American College Health* 47(6):269-274. doi:10.1080/07448489909595658

Feld, Lars P. and Jean-Robert Tyran. 2006. "Achieving Compliance when Legal Sanctions are Non-deterrent." *Scandinavian Journal of Economics* 108(1):135-156. doi:10.1111/j.1467-9442.2006.00444.x

Gezelius, Stig S. 2007. "Three Paths from Law Enforcement to Compliance: Cases from the Fisheries." *Human Organization* 66(4):414-425.

Glendon, Mary Ann. 2004. "The Rule of Law in the Universal Declaration of Human Rights." *Northwestern University Journal of International Human Rights* 2(5). <http://www.law.northwestern.edu/journals/JIHR/v2/5>.

Hargreaves, Katrina, Amanda Amos, Gill Highet, Claudia Martin, Stephen Platt, Deborah Ritchie, and Martin White. 2010. "The social context of change in tobacco consumption following the introduction of 'smokefree' England legislation: A qualitative, longitudinal study." *Social Science & Medicine* 71:459-466. doi:10.1016/j.socscimed.2010.04.025

Kroneberg, Clemens, Isolde Heintze, and Guido Mehlkop. 2010. "The Interplay of Moral Norms and Instrumental Incentives in Crime Causation." *Criminology* 48(1):259-294.

McCarthy, Bill. 2002. "New Economics of Sociological Criminology." *Annual Review of Sociology* 28:417-42. doi: 10.1146/annurev.soc.28.110601.140752

Matsueda, Ross L., Derek A Kreager, and David Huizinga. 2006. "Deterring Delinquents: A Rational Choice Model of Theft and Violence." *American Sociological Review* 71:95-122.

McAdams, Richard H. 2000. "An Attitudinal Theory of Expressive Law." *Oregon Law Review* 79:339-390. <http://papers.ssrn.com/pape.tar?abstract_id=253331>.

McAdams, Richard H. and Janice Nadler. 2008. "Coordinating in the Shadow of the Law: Two Contextualized Tests of the Focal Point Theory of Law Compliance." *Law & Society Review* 42(4):865-898.

Nagin, Daniel S. and Raymond Paternoster. 1993. "Enduring Individual Differences and Rational Choice Theories of Crime." *Law & Society Review* 27(3):467-496. <http://www.jstor.org/stable/3054102>.

O'Donnell, Patrick S. 2007. "Social Norms & Law: An Introduction." *Theory and Science* 9(2). <http://theoryandscience.icaap.org/content/vol9.2/Odonnell.html>.

Paternoster, Raymond and Sally Simpson. 1996. "Sanction Threats and Appeals to Morality: Testing a Rational Choice Model of Corporate Crime." *Law & Society Review* 30(3):549-584.

Salfati, C. Gabrielle. 2000. "The Nature of Expressiveness and Instrumentality in Homicide: Implications for Offender Profiling." *Homicide Studies* 4:265-293. doi:10.1177/1088767900004003004

Ulen, Thomas S. 1999. "Rational Choice Theory in Law and Economics." *Encyclopedia of Law and Economics on line*. <http://www.ppge.ufrgs.br/DIREITO-ECONOMIA/disciplinas/3/ulen-2000.pdf>.