

Behavior and Psychological Analysis of Electric Bike Rider Going Straight to Cross the Street at Signal Intersections

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ABSTRACT

As an important part of China's transportation means, electric vehicles have an important impact on China's traffic environment and traffic safety, and the straight violation behavior of electric vehicles is widespread, which has become one of the main causes of traffic accidents. This paper uses the video method to observe the behavior of electric cyclists crossing the street and study the characteristics, and analyzes the behavior of running a red light in the process of going straight across the street. Using questionnaire survey to collect cyclist's psychological data, understand the different rider in the street psychological state, the classification of various psychological activities, analysis of different psychological activities on the influence of the rider behavior choice, establish behavior and psychological contact, find measures to improve traffic safety, and help for reasonable standardization management.

Keywords: electric rider; street crossing behavior; mental activity

INTRODUCTION

With the rapid growth of the number of electric bicycles in recent years, the traffic conflicts and casualties also increasingly serious[1-2], brought more challenges to urban traffic management and pressure, how to properly handle residents demand between electric contradiction and traffic management, how to do in the case of electric vehicle ownership rising year by year to reduce electric accident rate, improve traffic safety, we need to think and solve an important problem. Therefore, take the electric vehicle cyclists in the process of traffic as the research object, through investigation and observation, analyze the psychology of the cyclists, find out the real reason for the connection between the cyclist's behavior and psychology, and propose the corresponding measures and suggestions to prevent and correct the illegal behavior of the electric vehicle cyclists according to the reasons.

BEHAVIOR CHARACTERISTICS OF THE CYCLISTS

Investigation Method

This paper mainly adopts the method of video survey to collect relevant data, and selects an urban trunk road for shooting. The Angle of shooting should include signal lights, the movement track of cyclists and conflicting motor vehicle flow. The video was shot on working days with good weather conditions. After the video is shot, the data of the cyclists' social attributes, movement behavior, crossing time and intersection signal phase are extracted from the video through indoor playback.



FIGURE 1: South Import Survey Area.

Analysis of The Rider's Behavior

Gender

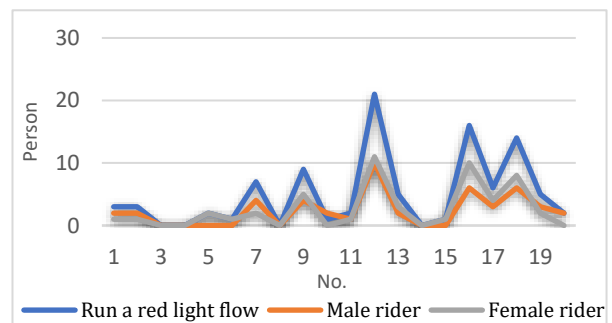


FIGURE 2: Running the Red Light and Crossing the Street Periodically.

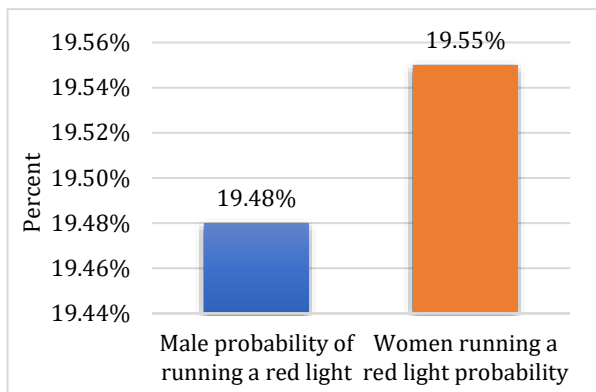


FIGURE 3: Comparison Chart of The Probability of Running a Red Light.

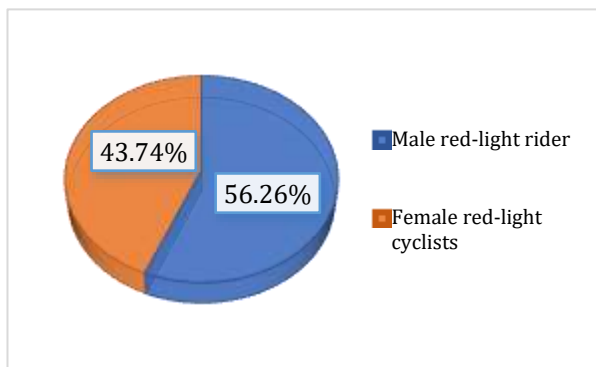


FIGURE 4: Sex Ratio Chart of Running a Red Light.

According to the analysis of different gender data of electric cyclists running straight across the street, the number of women running red lights is slightly higher than men, but the overall number of female cyclists is also higher than men, which does not prove that women have more violations in crossing the street than men. From their respective gender through a red light cyclists accounted for the proportion of their gender, the number of male red light behavior accounted for 19.48% of the total number of men, the number of female red light behavior accounted for 19.55% of the total number of women, men and women riding electric vehicles in the red light rate is equivalent, it shows that the red light behavior is not determined by gender. Gender has no absolute influence on the behavior of running red lights.

Age

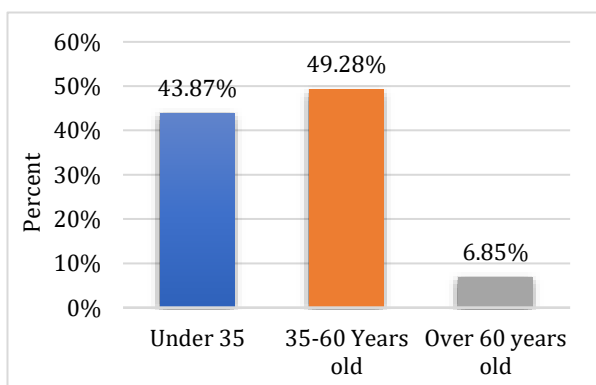


FIGURE 5: Age Range Distribution of Electric Bike Riders Running Red Lights.

Riding electric vehicles through a red-light age interval distribution, will be divided into the age range under 35,35-60,60 years old, through the proportion of the red light mainly age under 35 and 35-60 the two age groups,

because the investigation is the morning peak of working days, from the purpose of travel, the proportion of the largest, this part of the riding electric vehicles travel purpose, time is pressing, makes the behavior of running a red light frequently, especially after 8 o'clock, through the red light increased significantly.

Number of red-light running cycles

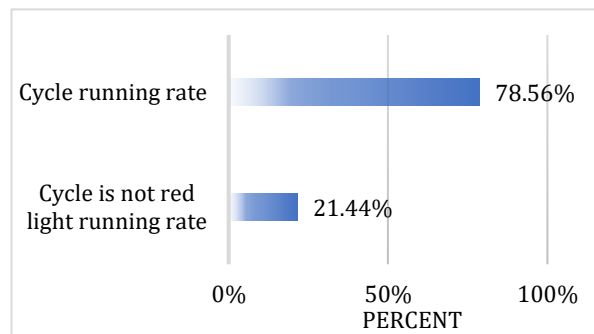


FIGURE 6: Scale Scale of The Red-Light Running Cycle.

According to the cycle of red light running, the specific results are as follows: the number of red-light running cycles accounts for 78.56% of the total. This data shows that the vast majority of signal cycles have the behavior of red light running, and the safety awareness of electric vehicle riders and the quality of compliance with traffic rules need to be improved.

Psychological characteristics of cyclists

Investigation Method

According to the behavioral characteristics obtained from the video viewing, different groups were divided by the video viewing, and questionnaires were distributed by the division of gender, age and other conditions. The collected questionnaires were classified according to the set psychological characteristics, and the comprehensive analysis found out the relationship between behavior and psychology.

Psychological Characteristics of Cyclists

Electric bike riders generally often have 10 psychological states.

- (1) Fear: electric vehicles do not have strict protection facilities, whether from the psychological or physical aspects of cyclists, are easily affected by the external environment, which makes many electric cyclists lack enough sense of security. The closer the motor vehicle is to the cyclist, the higher their psychological fear, the more affected, and the more likely they are to have traffic accidents.
- (2) Beyond the psychology: because electric bicycles have the characteristics of flexibility and convenience, some cyclists in order to fight for time, like to wear empty, see slow super. Sometimes there is obviously no suitable overtaking conditions, just risk overtaking. Such fast beyond driving, easy to cause traffic accidents.
- (3) Discrete psychology: electric cyclists are generally not likely to drive close to others, and usually maintain a certain longitudinal and transverse distance. As a result of discrete, the cyclists walk alone, not each other, and even occupy the entire lane.
- (4) Conformity mentality: as long as one person starts to drive in violation of the laws and regulations and is not stopped and dealt with, the people behind will follow the violators through the intersection, resulting in the original motor vehicle should have had to stop and wait.

This phenomenon will not only destroy the normal traffic order, reduce the traffic capacity, but also increase the risk factor of road operation, and may even cause traffic accidents.

- (5) Habit psychology: People will form their own cycling habits in the cycling day after day.
- (6) Frustration psychology: cyclists will inevitably encounter uncomfortable things in their social life. Different cyclists have different ability to resist setbacks and blows, and their personality tolerance is also different.
- (7) Competitive reason: competitive state of mind is generally more concentrated in the male young cyclists, they are young and competitive, love to compare, eager to win, this is reflected in the driving, is fast driving or even speeding, they enjoy the process of overtaking.
- (8) Attention is easy to distract: electric car cycling does not need to be driven by people's sports, and the cycling process is relatively easy, which is easy to make cyclists' attention inattention. It is easy to be attracted by the surrounding environment and resulting outside traffic.
- (9) Lucky psychology: think that the probability of the accident is very small, their illegal behavior will not cause traffic accidents, even if the traffic accident will not happen to their own body.
- (10) Non-motor violation is not punished psychology: electric vehicle violation phenomenon is widespread, even if the violation, but only to stop, the most criticism education, the lack of strong punishment measures, the price is very limited.

what choices will you make	follow	
	1 People follow	5.68%
	Never follow	77.36%
When meeting with opposite pedestrians and non-motor vehicles, whether you will choose to avoid them	Dodge	66.27%
	Don't avoid	33.73%

When riding an electric car, the green time remaining a few seconds will give up the street, the highest safety consciousness crowd choice is 10 seconds, they want to try to avoid with motor vehicle collision, so that a threat to their own security, and the most adventurous psychology and want to save time to choose 3 seconds, this kind of people too confident about themselves, dare to risk, reluctant to wait, generally such people of red light patience the shortest time, most likely to occur violations. When riding across the street on an electric bike. The maximum waiting time you can tolerate is in a few seconds. The answers chosen are all between 30-90 seconds. After they had thought about their own safety. That 90 seconds is the relatively long red-light time. Beyond this time, most people's psychology began to appear anxiety, impetuous and other emotions. There are also a few people who have very poor patience. With the flexible and fast characteristics of electric vehicles. Make them unable to wait calmly at all, their psychological activities mainly include "too long waiting is a waste of time and life", "there are a lot of things to be busy, Rush asty across the street, not willing to wait ". Some respondents also have relatively high limits of tolerance. They were able to calmly wait for the prescribed red-light time. And have a high awareness of safety and compliance with traffic laws and regulations awareness.

Psychological Activities of Cyclists

TABLE 1: Questionnaire for Straight-Going Street-Crossing Cyclists.

Question	Answer	Scale
When riding an electric bike across the street, the green light time left ___ seconds, you will choose to give up crossing the street	3 Seconds	28.19%
	4 Seconds	14.28%
	5 Seconds	31.57%
	7 Seconds	6.34%
	10 Seconds	19.62%
When riding an electric bike across the street, the maximum waiting time you can endure is ___ seconds	0-30 Seconds	8.25%
	31-60 Seconds	31.79%
	61-90 Seconds	44.88%
When you ride your scooter, you will start crossing the street as many seconds before the red-light countdown	More than 90 seconds	15.08%
	7-5 Seconds	0
	4-3 Seconds	6.53%
	2-1 seconds	14.76%
The green light is on		78.71%
When crossing the street twice, you are located in the waiting area. When the signal light far away from you is green, the signal light closer to you is still red, whether you will pass the first street without vehicles passing in front of you	Pass through	30.74%
	Not go	69.26%
If one of the people waiting with you to cross the street ran a red light,	More than 3 people follow	9.72%
	2-3 People	7.24%

When riding an electric car, will be in the red light countdown how many seconds began to cross the street, most of the respondents have high safety awareness, don't want to because first a few seconds and traffic accident, "anyway, has waited for a long time, not worth the risk for a few seconds", and part cyclists chose a few seconds in advance, their reason is to prepare, through as soon as possible, there is no need to waste time.

When crossing the street for the second time, 69.26% of the cyclists choose not to pass for the first time. They should strictly cross the street at the time allowed by the signal light. Running a red light is too dangerous, and the motor vehicle may have no time to stop, so that a traffic accident occurs. And 30.74% of cyclists choice through, they believe in their speed and technology, also believe that motor vehicles will take the initiative to avoid, but the former traffic regulations for motor vehicle drivers have higher requirements, whether pedestrians or non-motorized east allowed, motor vehicles have the responsibility to avoid, which makes more cyclists dare to violate the street.

When someone runs a red light. In the question of whether it will follow, 77.36% of the cyclists chose not to follow. They all have a high safety awareness. Their psychological activities are "to ensure their own life safety is the most important", "cannot violate the traffic laws and regulations". They think they can't follow the violation. This is irresponsible for their own life safety. Some people themselves are not firm enough, being influenced by other cyclists. Their mental activity is generally such. "Crossing the street without waiting, And I chose to wait, Isn't that a loss? " The motor vehicle will stop seeing the person in front of it. There's no danger of me crossing the street behind him. " Someone already broke the rules, it doesn't matter to add me one.

"The 22.64% of respondents who choose to follow are vulnerable to the influence of herd mentality, but the degree is different, and 5.68% of respondents are easy to be affected by people to cross the street.

In meeting with pedestrians and non-motor vehicles, will choose to avoid the problem, 66.27% of people choose to avoid, avoid conflict, threaten their own safety, these people in the process of cycling is the first life safety, safety consciousness is high, 33.73% of people chose to avoid, they because they are in accordance with the traffic regulations to ride, if conflict, should be to the responsibility of pedestrians or non-motor vehicles, should be the other choose to avoid, their psychological activity performance is strong, self.

CONCLUSION

1. After arriving at the intersection, electric car cyclists will first make an observation of the traffic conditions at that time, and then make their own choice. Their choices are basically in three categories: crossing the street, illegally crossing the street, and waiting.

- a) When the rider has the right of way at the intersection, cross the intersection;
- b) when the rider reaches the intersection, the signal light is red or the traffic is empty, wait for the crossing at the right time;
- c) the rider at the threat of conflict with the motor vehicle.

If it is a red light or no traffic, there are two main behaviors for pedestrians crossing the street: continue to wait for the right of way or violate the street. Riding scooter whether to choose illegal crossing the way affected by various factors, cyclists their own traffic literacy, time tension, the intersection of traffic factors, whether to take illegal psychological is relatively complex, influence factors are more, such as rider quality, the urgency of crossing the street, intersection traffic conditions, the surrounding environment, etc., the pedestrian violates the traffic signal through the road and signal setting is unreasonable, pedestrians waiting for over waiting for the limit has a lot to do.

2. In the analysis of the video data, it can be seen that when going straight across the street, the behavior of running the red light mainly focuses on the signal light is about to turn green and running the red light. A small number of red-light running behaviors occurred just after the green light, and fewer red-light running behaviors occurred in the middle of the red-light time.

The questionnaire survey shows that it is more inclined to run the red light when the red light is about to turn green. Most of the reason is that when pedestrian lights are about to turn green, vehicles will slow down or even stop, safer.

Another reason is that they will have more time to cross the street when the green light, the cyclists will be impatient and want to cross the crosswalk earlier and faster.

In the course of the questionnaire survey, 21.29% chose to cross the street in advance, and 78.71% chose to obey the traffic rules and regulations, which was more in line with the actual violation rate and the distribution of violation types

3. As can be seen from the video data, both men and women who run red lights are not more than 20%, respectively 19.48% for men and 19.55% for women. Most of them can still strictly control themselves and cross the street at the right time according to the requirements of traffic laws and regulations.

The results of the questionnaire show that the respondents who choose not to run the red-light account for the majority of the total number of respondents surveyed. These psychological activities of cyclists who can obey the traffic rules mainly include to ensure their own life safety, obey the traffic rules, self-warning not to take risks and not take any chances. This shows that electric cyclists who do not run red lights are higher than those who want to cross the street. In the real cyclists should show that most cyclists can follow the traffic lights, which is consistent with the situation reflected in the video data.

The psychological activities of cyclists who run a red light are mainly to transcend the psychology, fluke mentality and herd mentality. Under the influence of these psychology, riders on electric bikes choose to cross the street by running a red light

To sum up, in the analysis of the behavior and psychology of the electric cyclists going straight in the signal intersection, it is found that most of the electric cyclists will abide by the laws and regulations, but there are still a few cyclists running red lights, which is related to the psychological characteristics of fluke psychology and the psychology of no punishment for non-motorized violations.

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