

The Methods Of Human Behavior Control In Traffic Control

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Abstract: Achieving better traffic control is always an enduring issue during these years, however a reasonable answer for this issue has not been got due to a number of factors that are involved in this issue and the complexity of the transport system itself. The key of traffic control is defining person as the object of traffic control, rather than car and traffic lights. Traffic control really works only when the implementation of traffic control could make the traveler's behavior more rational and safer and further format the more safe and effective traffic environment. Therefore, it is critical to undertake a study of human behavior control in traffic control. This study clarified the definition of human behavior in the field of traffic control and conducted a discussion on the controllability of human behavior in order to introduce a concept of traffic behavior control. In addition, according to the application of behavior in other subjects, 'Traffic Man' which is the object of traffic behavior control was introduced and the characteristics of this concept were also be analyzed in this study. Consequently, the main methods of human behavior traffic control were obtained based on the relationship of consciousness and behavior, the aspect of traffic behavior's feedback as well as traffic demand respectively.

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1. Introduction

How to achieve effective and efficient traffic behavior control in the great road traffic system is still a complex problem. A number of factors should be considered. The major one is the differences between people. Because humans are individual organisms of different intelligence not the uniform robot, so the performance of traffic behavior cannot be the same. However, studying each individual's traffic behavior is impossible. Therefore, the aim of traffic behavior control is to achieve the target the general control of typical traffic behavior.

With the continuing development of traffic control, the study of behavior control is increasingly concerned in recent years. As to behavior, different disciplines may have different definitions. The most common one is that behavior refers to a conscious physical activity of intelligent organisms. For the traffic behavior control, this definition means the physical activity under the series of mental activity and consciousness in a particular environment.

2. Traffic behavior

Traffic behavior can be understood as: it originates from separate traffic demand, serves for the purpose of its social existence, with or without traffic tools, accompanied with a series of information and human mental process, and finally achieves traffic movement in certain road traffic environment.

In general, the transport behavior can be

divided into individual behavior and group behavior.

Individual Behavior--- the behavior which individual makes based on its understanding of the current situation and other personal reasons. Specific situation produces a specific stimulus. Because people have different backgrounds, such as age, sex, educational level, attitude, character, etc. So even in the same context, the responses of different people to stimulation may be vary significantly. In the study of traffic behavior control, individual behavior in the society rather than in isolated environment is the study object.

Group behavior--- the behavior which individuals in group perform may be completely different from that they do alone. When an individual joins a group, the individual behavior is converted to group behavior. In order to be integrated into the society, the individual holds the same basic expectations with the group which usually called herd mentality. The main factors of herd behavior are group atmosphere and individual quality. In groups, when individual behavior departs or deviates from the group behavior for the purpose of maximize the individual value, it may need some cost. The more the deviation is, the more cost it needs. Eventually, when the cost is high up to a certain extent, individual behavior returns to the group behavior.

In transportation, such as transportation mode choice behavior, overtaking behavior and parking behavior belong to the individual behavior.

Car-following behavior, travel behavior and pedestrian crossing behavior belong to group behavior. In real life, individual behavior and group behavior cannot independently exist but often intertwined. Therefore, the first step in practice is to determine the dominant behavior and then choose the effective control method.

3. The controllability of traffic behavior

Control can be simply understood as the process of the controller selecting or guiding the controlled-object's movement or change in a certain environment. Figure 1 shows the control system model.

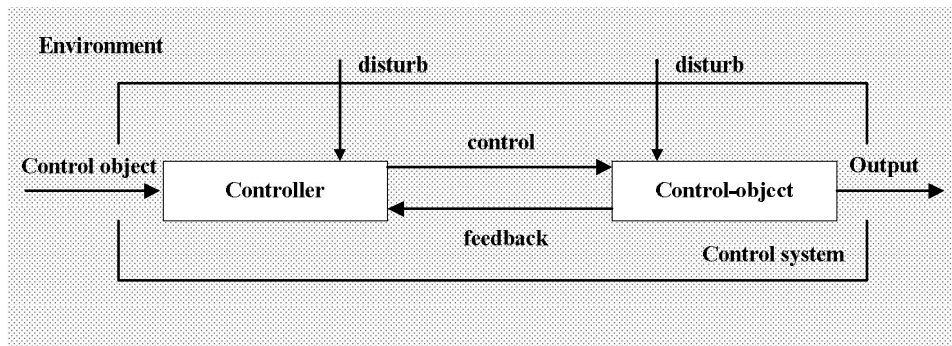


Figure 1 Control system model

Behavior can be controlled. Traffic behavior is social behavior. Its performance is not irregular, sudden, random and reasonless. Instead, traffic behavior was driven by the motivation with clear objectives and close interaction with environment. The controllability of traffic behavior is reflected in the following areas ;

1) The initiative of traffic behavior. The basic expectation of a traveler is obtaining transport services for their own when they are in traffic systems. Therefore, the initiatives always try to adapt traffic to self-centered and minimize traffic constraints. Therefore, the initiative of traffic behavior constitutes the background of traffic behavior uncertainty and becomes the starting point of behavior control.

2) The purpose of traffic behavior. Traffic behavior has subjective point that is the formation of behavior has been driven by the destination. The purpose and needs of traveler are various and adjustable. Therefore, guiding, changing or balancing a variety of needs can change the internal driving force of behavior and then achieve behavioral control.

3) The continuity of traffic behavior. When the behavior dominated by the target reaches before the aim, if the general conditions are not changed, the behavior usually does not end. People continue act and correct it by internal reason in order to keep close to the target.

4) The plasticity of traffic behavior. Every traveler believes that traffic resources are rich while hide security risk. Only flexible behavior can achieve the goal of controlling traffic behavior safely and use resources reasonably. Thus, the change of various environmental and psychological conditions will stimulate the modification and change of people's

behavior, so it can be served as a signal to control the behavior change, and finally adjust the behavioral efficiency and behavioral goals.

5) The motivation of traffic behavior. Human behavior is caused by individual's need and cooperated with the environment throughout the whole process and then maintained by personal motivation and goal-oriented. The motivation indicates that only commuting with environment can change, adjust and control people's behavior.

From the above analysis we can draw a conclusion that traffic behavior can be controlled.

4. The object of traffic behavior control

Traffic behavior can be controlled. The control object is not anyone but only refers to the people who participate in traffic system with their travel purpose. Using 'traffic man' to characterize the object of traffic behavior control, which should have the following assumptions:

1) Social Assumption. Traffic man should be the normal social people with social common sense, basic life pursuit and daily travel by transportation, etc. His requirements to transport are multi-level, not only for fast and convenient but also for security and other needs.

2) Rational Assumption. 'Traffic man' has thinking ability and when he choice the transport behavior his attitude is calm and objective. Before receiving certain traffic signals, he can convert it into the traffic information and then think how to do finally take action. Even act illegal traffic, he also knows the consequences of rational choice.

3) Project Assumption. The road transport

facilities are designed by the general physical characteristics and design engineering properties. Therefore, 'Traffic man' should have the basic characteristics of the traffic engineering design object, such as basic traffic knowledge, recognition of traffic signs and so on.

4) Psychological assumptions. Psychological characteristics of 'Traffic man' is normal and stable, in other words he has the normal process of cognitive and intention.

In previous studies, we refer 'traveler' as the study object of traffic control which usually means the person who travelling by some traffic tool on the road .But as expressed in figure2, this concept does not apply for traffic behavior control. Though travel is the most important part in the whole process, it is not all. Compared to 'traveler', 'Traffic Man' has a clear meaning and wide extension and exists in the whole process. So 'Traffic Man' is an accurate expression of the traffic behavior control object.

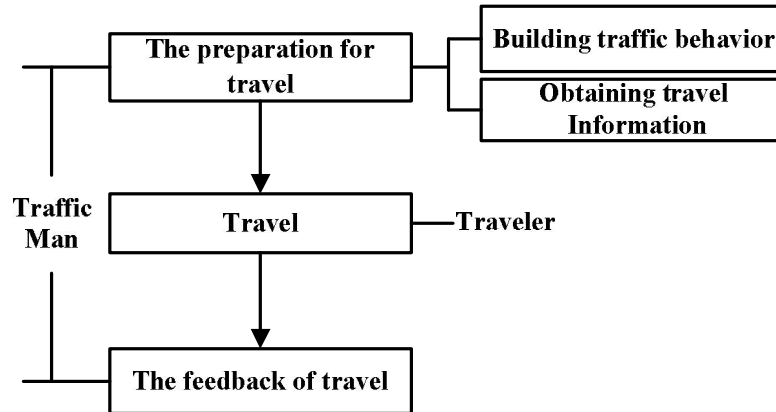


Figure 2 the difference between traffic man and traveler

5. The traffic behavior control method based on traffic behavior consciousness.

5.1. Traffic behavior consciousness

Behavior consciousness is the direct part that people affecting the behavior. It can guide and control human behavior, so it is the 'master switch' when

people select their behavior.

Traffic behavior consciousness can be divided into categories as traffic safety consciousness, traffic law consciousness and traffic order consciousness. The content and the establishment method of three traffic behavior consciousness are shown in Table 1.

Table1 Classification of Traffic Behavior Consciousness

| Traffic Behavior Consciousness | Nature | Methods |
|--------------------------------|---|---|
| Traffic Safety Consciousness | The consciousness of personal survival instinct. It cannot be lost or abandoned, but can be weaken or ignored. | self-consciousness, education, stimulation and , etc. |
| Traffic Law Consciousness | The consciousness of social life fundamental behavior. It can be strengthened and more depended on knowledge. | education, publicity, penalties, rewards, etc. |
| Traffic Order Consciousness | The consciousness of collaborative behavior. It is most vulnerable to disturbance and more depended on human nature | education, returns, personality-upgrading, etc. |

5.2 Traffic behavior and traffic behavior consciousness

Dialectical materialism believes that matter determines consciousness and the consciousness of the

material has a dynamic counter-productive. This is the determined by people's initiative. People's social behavior is a conscious act and also is a variety of activities for living and developing in society. Human

behavior consciousness happens before human behavior. By analyzing the old knowledge memory saved in memory and the new knowledge recently acquired, the brain generates orders, plans, methods and programs which can control human behavior. It is the real objective reflection of the human brain to human life, survival needs and living environment. In other words, behavior consciousness based on cognitive behavioral outcomes (knowledge of the objective world) is the determine tendency of selecting real behavior and the performance of intentions, aspirations and ideas in activities. Therefore, behavior consciousness acts as the guide significance of human behavior. Behavior consciousness is always behind steady human traffic behavior and plays the role of the steering wheel which determines whether and how it happened.

There is no fixed shape of the behavior consciousness that it cannot been seen and touched,

however, the consciousness can be strengthened by a number of measures in order to play the leading role in decision-making process. Modern traffic behavior consciousness refers to the awareness and basic attitude of 'traffic man' about the properties, operating characteristics and social impact of modern urban transportation. As previously mentioned, traffic behavior consciousness can be divided into traffic safety consciousness, traffic law consciousness and traffic order consciousness. The high or low consciousness level directly determines the advantages and disadvantages of traffic behavior. Despite the consciousness exists in the brain, cannot directly seen or controlled, however, the level can be influenced by external factors stimulating people's consciousness and thus achieving behavior control. Figure 3 shows the relationship between traffic behavior and traffic behavior consciousness

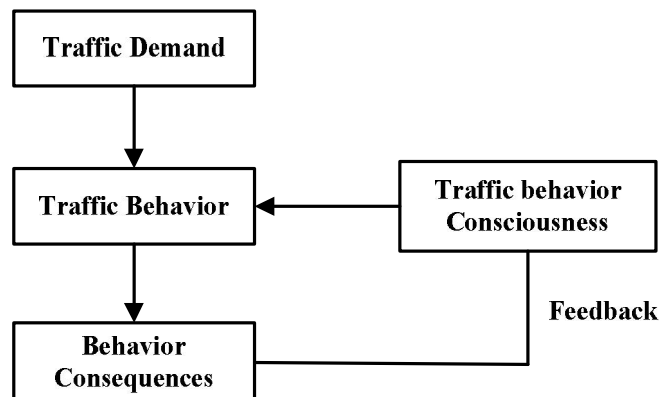


Figure 3. Traffic behavior and traffic behavior consciousness

5.3 The method of traffic behavior

From the figure behavior- consciousness, traffic demand, traffic behavior consciousness and the consequences of traffic behavior will affect traffic behavior, so basic control method can be divided, that is interfere traffic demand, education& publicity and penalties & rewards. As shown in figure 4.

5.3.1 Interfering traffic demand

In traffic behavior control, interfering traffic demand can impact on the generation and the manner, time, location and other characteristics of the generation from the source and structure. It is a method of taking the initiative to control the amount of occurring traffic demand and guide the spatial and temporal distribution of traffic demand, and finally change people's traffic behavior and traffic behavior

ideas by a series of measures. As transportation mode choice behavior for example, when the parking fees is lower, people who often choose car as transportation mode may comprehensively consider bus service, travel costs and other factors to decide travel by car or bus, the choice is random. But when the parking fees is high (especially the price exceeds the heart can accept), the parking fees may be as a major factor in the considering whether by car or by bus, and then select the low-cost bus. It is worth noting that each traffic demand management impacts on the transportation system in different aspects to some extent. In the application, the effects of taking a variety of comprehensively intervention measures not only are simply added but also interact with each other. Therefore, the demand impact of intervention should be preceded by comprehensive assessment.

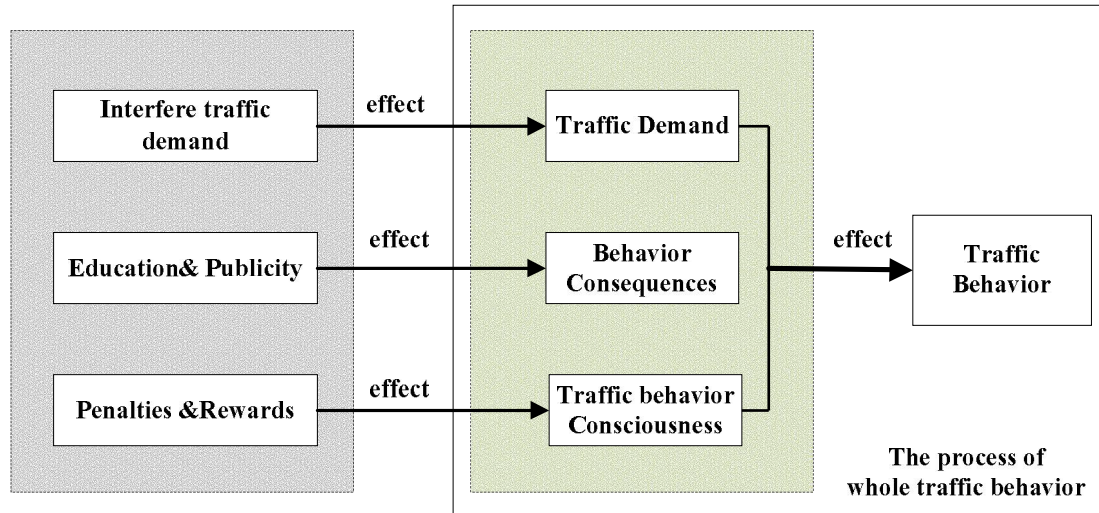


Figure 4. Traffic behavior control

5.2.2 Education & publicity

Education and publicity can impact deeply on traffic knowledge, behavior mode and behavior consciousness through human sensory organs, which make people become elements of the road traffic system to receive system control. The important means of establishing and strengthening traffic behavior consciousness is the traffic safety education and publicity. They are only the tools and the real purpose is building traffic behavior consciousness and making it at high level.

Education is to build knowledge framework for traffic actors. Only storing certain knowledge, the traffic participants likely establish behavior consciousness. In other words, to get traffic participants generate a variety of traffic consciousness the first thing should do is let them know "what is safe", "what the content of traffic laws" and "what is the general order of road traffic". If one person knows nothing about road traffic knowledge, the traffic consciousness does not arise.

Publicity is transmitting certain information intentionally to the public to influent their opinions, attitudes and behavior and so on. The purpose is to stimulate traffic behavior consciousness always at a relatively high level by continuous information and finally guide traffic behavior better.

5.3.3 Punishment & rewards

For traffic behavior is repetitive behavior and learning behavior, so punishing illegal behavior and reward law-abiding behavior can improve behavior mode and finally achieve behavior controlling.

Stimulation can enhance people's consciousness, thereby affect behavior. Punishment or reward for individual behavior is a kind of stimulation.

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There will be feedback and memory when individual under the various stimulations. In the daily traffic, reward those people whose traffic behavior performance are higher than the general level in a period of time can inspire other people to improve traffic behavior and also encourage the individual rewarded to motivate his future behavior more standard and demand strictly on themselves. Punishing those people whose traffic behavior is illegal or accident-caused can lead feedback to individual. This can stimulate he had to go regulate his behavior in traffic environment and get rid of bad practice. But punishment may have a negative effect, for example that someone who was punished for causing a traffic accident may dissatisfy with enforcement and likely not learn lesson, so the punishment not play the role and inappropriate punishment may even cause dislike or conflict which contrary to the original intention with the traffic enforcement. Therefore, grasping the degree and paying attention to the ways and methods to the traffic enforcement is very important, otherwise it will backfire.

6. Conclusion

The object of traffic behavior control is human. Therefore, the study must start from the human characteristics. Traffic behavior happens in a particular road traffic system, while the control method cannot be restricted in this particular system. This article undertook a research of traffic behavior in Management and Economics, then analyzed traffic behavior, the characteristics of the control object and the relationship between traffic behavior and traffic behavior consciousness, and finally raised the traffic behavior control based on traffic behavior consciousness. The main conclusions are listed as following:

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1) From the behavior research of Management and Economics, the definition of traffic behavior was provided. Combining the controller principle and studying from the initiative, purpose, continuity, plasticity and motivation of the traffic behavior draw the conclusion that traffic behavior can be controlled.

2) Traffic behavior can be controlled. The control object is not everyone but the individual who enter the transportation system with some requirements needed to meet. This is called 'Traffic Man'. The assumptions of 'Traffic Man' characteristics were then analyzed and summarized.

3) Through the analysis of the traffic behavior consciousness, the consciousness will be divided into three categories, including traffic safety consciousness, traffic law consciousness and traffic order consciousness respectively.

4) By studying the relationship between traffic behavior and traffic behavior consciousness, the method of traffic behavior control was raised, based on traffic behavior consciousness such as interfering traffic demand, education & publicity and penalties & rewards.

The traffic behavior control method in this article is based on the behavior consciousness, which is only one method of behavioral control. The comprehensive and systematic traffic behavior control method needs to be further explored.

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REFERENCES

- 1 Cai, G. New concept of road traffic safety awareness. *Ergonomics* 2002; 8(2): 50-52.
- 2 Cong, Y. A. Traffic demand management measures and implementation of research results. *Communications Standardization* 2008;12(4)
- 3 Li, B. C. Road traffic characteristics and traffic psychology 2009; Part.1.
- 4 Lu, Y. D. The dialectical relationship between Punishment and social effect in traffic management. Shanghai Public Security College Press 2005;15(5):73-75.
- 5 Hu, Z. Y. "Behavior management. Economic Science Press Beijing 2006;75-80.
- 6 Shan, B. H. Road traffic psychology. Police Education Press, Beijing 1993;50-55.
- 7 Shi, J. J. Principles of traffic behavior control. China Communications Press, Beijing 2009;11-12.
- 8 Shi, J.J. and Chang, S. J. Traffic information and traffic behavior control. *Journal of Shijiazhuang Railway Institute* 2008; 21(4).
- 9 Shi, J.J. and Zhu, L. L. Effect of Traffic Behavior Consciousness on Behavior Control. *China Safety Science Journal* 2009;19(5).
- 10 Zheng, H. W. The Socialization of safety publicity." *Jiangsu Police Education Press* 2006;.21(3): 151-153.