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前　言

交通专业英语是为了满足高等院校交通类专业英语课程教学的需要编写的。通过对本书的学习，使学生能够掌握必要的专业词汇、培养学生专业英语阅读能力及专业英语口语能力，使英语学习与专业词汇有机的结合在一起。使用对象为已完成基础英语课程学习的交通类本、专科生和研究生，也可供有关专业技术人员自学使用。

本书题材选自正式出版物，选题广泛，涉及交通理论、交通安全、汽车故障诊断等交通方面的诸多问题。在编写过程中吸取了我国相近学科专业英语教材的优点和基础英语课程教学的经验。本书在符合专业英语教学需要的同时，试图使读者在有限的篇幅内了解现代交通方面的主要内容，并通过口语练习提高快速阅读专业资料的能力。

本书包括阅读（Text）、口语（Oral English）和词汇（Vocabulary）三个大部分，其中阅读共14篇，口语11项，词汇4类。

本书阅读部分（Unit1 ~ Unit10）由张莉编写，阅读部分（Unit11 ~ Unit14）及词汇由东北林业大学张丽莉编写，口语部分由黑龙江省教育学院胡珀编写。全书由东北林业大学张莉副教授担任主编并负责编写，东北林业大学关强教授担任主审。

在本书的编写过程中，得到了东北林业大学各部门的帮助和支持，同时引用了所列参考文献中部分内容，在此一并致以衷心的感谢。

由于作者水平有限，加之时间较为仓促，本书难免存在缺点和错误，恳请读者提出宝贵意见。

编　者

2008年7月

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Unit 1 Introduction of Traffic Flow Theory

It is hardly necessary to emphasize the importance of transportation in our lives. In the United State, we spend about 20 percent of Gross National Product (GNP) on transportation, of which about 85 percent is spent on highway transportation (passenger and freight). We own and operate 150 million automobiles and an additional 50 million trucks, bringing car ownership to 56 per hundred populations (highest in the world). These vehicles are driven an average of 10 000 miles per year for passenger cars and 50 000 miles per year for trucks on a highway system that comprises more than 4 million miles. The indices in other countries may be somewhat different, but the importance of the transportation system, and especially the highway component of it, is just the same or even greater. While car ownership in some countries may be lower, the available highway network is also smaller leading to similar or more severe congestion problems.

Traffic flow theories seek to describe in a precise mathematical way the interactions between the vehicles and their operators (the mobile component) and the infrastructure (the immobile component). The latter consists of the highway system and all its operational elements: control devices, signage, markings, etc. As such, these theories are an indispensable construct for all models and tools that are being used in the design and operation of streets and highways. The scientific study of traffic flow had its beginnings in the 1930's with the application of probability theory to the description of road traffic and the pioneering studies conducted by Bruce D. Greenshileds at the Yale Bureau of Highway Traffic; the study of models relation volume and speed and the investigation of performance of traffic at intersections. After WWII, with the tremendous increase in use of automobile and the expansion of the highway system, there was also a surge in the study of traffic characteristics and the development of traffic flow theories. The 1950's saw theoretical developments based on a variety of approaches, such as car-following, traffic wave theory (hydrodynamic analogy) and queuing theory.

By 1959 traffic flow theory had developed to the point where it appeared desirable to hold an international symposium. The First International Symposium on The

Theory of Traffic Flow was held at General Motors Research Laboratories in Warren Michigan in December 1959. This was the first of what has become a series of triennial symposia on The Theory of Traffic flow and Transportation. The most recent in this series, the 12th symposium was held in Berkeley, California in 1993. A glance through the proceedings of these symposia will provide the reader with a good indication of the tremendous developments in the past 40 years. Since that time numerous other symposia and specialty conferences are being held on a regular basis dealing with a variety of traffic related topics. The field of traffic flow theory and transportation has become too diffuse to be covered by any single type of meeting. Yet, the fundamentals of traffic flow theory, while better understood and more easily characterized through advanced computation technology, are just as important today as they were in the early days. They form the foundation for all the theories, techniques and procedures that are being applied in the design, operation, and development of advanced transportation systems.

It is the objective of this monograph to provide an updated survey of the most important models and theories that characterize the flow of highway traffic in its many facets. This monograph follows in the tracks of two previous works that were sponsored by the Committee on Theory of Traffic Flow of the Transportation Research Board (TRB) and its predecessor the Highway Research Board (HRB). The first monograph, which was published as HRB Special Report 79 in 1964, consisted of selected chapters in the then fledgling Traffic Science each of which was written by a different author. The contents included:

Chapter 1. PartI: Hydrodynamic Approaches. PartII: On Kinematic Waves; A Theory of Traffic Flow on Long Crowded Roads.

Chapter 2. Car Following and Acceleration Noise.

Chapter 3. Queuing Theory Approaches.

Chapter 4. Simulation of Traffic Flow.

Chapter 5. Some Experiments and Applications.

A complete rewriting of the monograph was done by Gerlough and Huber (1975) and was published as TRB Special Report 165 in 1975. It consisted of nine chapters, as follows:

Chapter 1. Introduction.

Chapter 2. Measurement of Flow, Speed, and Concentration.

Chapter 3. Statistical Distributions of Traffic Characteristics.

Unit 2 Preferences and Behaviors of Pedestrians and Cyclists by Age and Gender

Preferences and behaviors of older pedestrians and cyclists (women and men, 70 years and above) in cities were studied by means of a questionnaire, and was compared to a group of people aged 40—49. The older respondents appreciate pedestrian crossings, signalized intersections and cycle paths significantly more than the younger respondents do. To a larger extent they feel that it is dangerous to cross the road where these facilities are missing. The older pedestrians also find the presence of a pavement very important on their route, whereas the younger pedestrians more often focus on a fast passage. Differences in preferences and behaviors within the group of older respondents can be related to differences in health and physical abilities rather than to differences in age and gender. The older road users seem to be more influenced by the fact that an action is illegal than the younger road users are. In several instances they more often give this reason for refraining from an act than the younger respondents. They also more often use the argument that they act in a specific way, because it makes them feel safer, and finally they more often express doubts about their own abilities.

Although older drivers have been studied in various research projects in recent years, older pedestrians and cyclist have been a low priority issue for traffic safety research. It is obvious that the number of older road users will increase and it is therefore crucial to focus on this group of vulnerable road users and to focus on the special needs that older women and men require. Also, as it is very important for older people to keep up their mobility, and in this way enhance their quality of life.

In general, older people become less agile and their reaction time increases. These age-related changes influence all daily actions, including behavior in traffic. However, the age-related deficiencies appear at different ages for different people, and people differ in their awareness of their own deficiencies. On the other hand, older people often cope better with traffic than should be expected, because they

have a lifelong experience and to some degree are able to compensate for their problems in traffic. In Denmark, pedestrians aged 70 and above account for more than 20% of the total number of injured pedestrians in traffic accidents and older cyclists account for about 7%. Most of these accidents take place within urban areas, which will therefore be the focus of the present study. The injury rate—number of injury accidents per inhabitants in an age group—for pedestrians aged 70 and above in urban areas in Denmark is about four times that of 40—49-year old pedestrians. The injury rate of older cyclists is approaching a factor. However, one of the reasons for the enhanced risk of older people is their fragility, leading to a higher proportion of personal injuries and fatalities. This means that in spite of all possible countermeasures to be introduced, older road users, and especially the unprotected older road users will still remain overrepresented in serious injury accidents.

Previous research has shown that older pedestrians have problems when crossing wide streets or intersections with dense traffic because it is difficult for them to overlook traffic from various directions in the same time. Furthermore, it is difficult for older pedestrians to assess the traffic in the farthest carriageway. The problems regarding cyclists are found in complex locations and in dense traffic as well as in intersections both when cycling ahead and turning left. Older cyclists often do not watch out for traffic from behind and have problems maneuvering the bicycle. Furthermore, research points at the fact that younger road users tend to underestimate the accident risk for older road users. Therefore, it is important to increase the awareness of the enlarged traffic risks of older road users and the knowledge of the mechanisms that are the background for older road users' traffic behavior.

The aim of this study was to increase knowledge regarding older pedestrians' and cyclists' behavior in traffic and their preferences as to traffic conditions relating to safety and comfort in urban areas. These factors may influence their daily travel and may be connected to traffic safety risks. The differences between men and women have been studied, and also the differences between older people and people aged 40—49 years. This knowledge is an important background for decisions concerning the order of priority of implementing countermeasures and the estimation of measures that to a high degree aim at reducing the number of traffic accidents with older pedestrians and cyclists. This knowledge is also important for the establishment of an infrastructure that ensures both the mobility as well as the safe-

ty of the future older pedestrians and cyclists in cities.

The risk perception and behavior of pedestrians and cyclists in cities was studied by means of a questionnaire. The questionnaire was sent to 850 older people and 850 people aged 40—49 in each of two provincial cities in Denmark during 2001. The respondents were randomly selected from addresses within a well-defined area of the cities and excluded persons living in nursing homes. Gender was not used as selection criteria, resulting in a greater sample of women than men. A few persons from each group of the sample could not be contacted because they had moved or died.

The definition of older road users as people aged 70 or above was based on an analysis of accidents with personal injuries, which compared road users aged 40—49 with older road users. The analysis showed that compared to people aged 40—49, statistically significant differences in crash circumstances were mostly found in the group of road users aged 70 and above. In this age group pedestrian accidents, for instance, were more frequent, and accidents more often happened in day time/daylight and in dry roads, indicating differences in travel pattern in this age group compared to road users under the age of 70. The group of 40—49 years old road users was chosen because of its low accident rate (per inhabitants in the age group) compared to other age groups.

In total, 1 017 older people and 888 persons aged 40—49 returned a filled in questionnaire including information on the gender. However, a few questionnaires were excluded from further analysis because the persons were not able to leave their house on their own.

Three questions about preferences as a pedestrian and as a cyclist in their hometown were asked in the questionnaire:

(1) Which of the following statements is most important for your well being as a pedestrian/cyclist in your hometown?

(2) Which of the following traffic situations do you regard as being the most dangerous when you are walking/cycling in your hometown?

(3) Which of the following conditions are most important for your route choice when walking/cycling in your hometown?

The respondents were asked to choose as a maximum three of eight optional statements that were given in each of the questions regarding walking and cycling and regarding behaviors in specific traffic situations.

The questionnaire also included questions on how often the respondents behave in a certain way in four different traffic situations as a pedestrian as well as in four situations as a cyclist and the reasons for their behaviors. Finally, the questionnaire included various questions regarding the respondents' travel as pedestrians, cyclists and car drivers in their hometown as well as their health conditions, e. g. use of glasses and stick and the degree of their physical abilities.

Statistically significant differences between the proportion of older and younger respondents as well as between the proportion of women and men regarding their answers to the questionnaire are based on x^2-tests ($P < 0.05$). In the relevant figures the order of the various statements is shown according to the ranking of the statements of the older women. Statistically significant differences between women and men, both in the group of older respondents and younger respondents are marked in the figures with an asterisk (*). Statistically significant differences between the older and younger group are marked in the beginning of the text with a triangle (Δ).

The analyses also control for the effect of various background variables, such as travel pattern and health conditions. Statistically significant differences related to this background information are based on regression analyses (SAS software, proc logistic, and $P < 0.05$). These analyses have been carried out separately for the older and the younger respondents. A regression analysis was also carried out on the total sample.

The results reflect differences and similarities regarding the preferences and behaviors of the older and the younger respondents as well as of women and men. Furthermore, the analyses assess the degree to which the health conditions and physical capability of the older road users influence their preferences and behaviors. The regression analysis on the total sample showed that the differences between older and younger respondents found in the x^2-test are also significant when background variables are taken into account.

Results from the questionnaire show that about 85% of the older pedestrians walk in their hometown on a regular basis, that is at least once a week, compared to 95% of the younger respondents. About one-third of the older respondents walk on a daily basis and this percentage does not vary between women and men. However, only half of the older respondents leave their house during dark hours, and these are mostly men and older people with a good health.

A fairly high percentage (40%) of the older respondents is active cyclists in their city, and most of them ride their bicycle at least once a week, a significantly higher proportion than the older women cycle. The majority of the younger respondent's cycle (85%), irrespective of gender.

About 90% of the younger respondents have got a driving license, irrespective of gender. Also 90% of older male respondents have possessed a driving license, but about one-third have given it up. There is a marked gender difference in this generation: only 60% of the older women have possessed a driving license, and half of these have given it up.

However, 90% of the men and 80% of the women in both age groups who are in possession of a license drive on a regular basis, that is at least once a week. 41% of the younger drivers drive every day, compared to 30% of the older car-driving respondents.

In total, 41% of the older men use all three modes of transport but only 9% of the older women. The corresponding figures for the younger group are 77% for men and 68% for women. Compared to men, women in both groups more often than men walk and cycle but do not drive. Walking is the only active mode of transport for half of the older women and 22% of the older men, compared to 5% for both men and women in the younger group.

The results of this study contributes to a better understanding of the problems concerning the behaviors of older road users and should be considered when implementing physical countermeasures as well as campaigns and information for older road users. It stresses the needs for changing the environment in order to enhance the traffic safety for the older road users without reducing their mobility and possibilities for social activity.

Unit 3 Effects of Stimulus Type, Duration and Location on Priming of Road Signs: Implications for Driving

This study is concerned with the priming function of road signs and its effect on participants' behavior. Traffic signs are the most frequent visual aids that are used to regulate, warn, or guide the road users so as to provide safer traffic environments. By preparing the driver for a subsequent behavior necessitated by the road layout ahead the road signs facilitate the reaction required for the appropriate action. This, in turn, decreases the amount of decision and response times of the drivers. The decrease in response times becomes vital especially when road signs indicate hazards ahead. This facilitation initiated by the road signs is explained by the priming effect. Research has conveyed that when drivers are prepared in advance for the subsequent road conditions their responses are faster and safer. It is clear that prior knowledge provided by traffic signs is indispensable for safer driving. According to Canfield traffic signs are most effective when they command attention, convey a clear message, and give adequate time for proper response. In that sense, strengthening the priming function of road signs could greatly benefit drivers' behavior and safety. Besides catching attention, a road sign must be processed correctly so as to incite the proper reaction. In traffic environments, the correct processing is bound to the exposure time and location of the sign. While the time of exposure or stimulus duration corresponds roughly to the driver's speed, the correct stimulus location is usually determined by the driver's habitual inclination to see the traffic signs on the near-side of the car.

In the light of these findings, the current study aims to investigate the modification of drivers' response times due to stimulus type, location and duration through the application of the priming paradigm. In the following paragraphs, a short overview of some of the published findings related to these factors is presented.

(1) The priming function of road signs

The unconscious information conveyed by the traffic signs has been likened to