EFFECTIVE CYCLING INSTRUCTOR'S MANUAL

Sixth Edition

JOHN FORESTER, M.S., P.E.
Founder of the Effective Cycling League

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John Forester, MS, PE
7585 Church St., Lemon Grove, CA 91945-2306
619-644-5481

1 General Information

1.1 Significance of the Effective Cycling Instructional Program

You, the reader, may have opened this Manual simply to learn how to teach traffic-safe cycling skills, either to yourself or to others. after all, much of the reputation of Effective Cycling is in the traffic-cycling portion. However, the Effective Cycling Instructional Program has far more significance than just a method for instructing a few cyclists. It has a vital part in the ideological struggle to preserve cyclists' right to operate safely and effectively as drivers of vehicles, the method called vehicular cycling. You, as a prospective instructor, have probably already recognized the need to spread vehicular-cycling skills through effective instruction. However, you probably have not yet recognized the greater significance of the Effective Cycling Program itself.

American society has never recognized that vehicular cycling is the safe and proper way to cycle. Instead, it has always insisted that cyclists' prime duty is to stay out of the way of same-direction motor traffic, the method of cringing along the side of the road that is called cyclist-inferiority cycling. The traffic laws were equivocal about this, requiring that cyclists operate as drivers of vehicles (if they didn't, they would cause collisions) but with only second-class rights, as if cyclists were trespassers on roads owned by motorists. Child cyclists obeyed this instruction, but then, becoming adults, switched to driving. The few adult cyclists learned to operate as drivers of vehicles, and this did not matter much, because otherwise lawful cyclists were rarely prosecuted for disobeying the special bicycle restrictions thought fit for children.

These adult cyclists who operated in the vehicular manner organized themselves into local cycling clubs and a national organization, the League of American Wheelmen. These cycling organizations promoted cycling simply because their members enjoyed cycling. Because vehicular cycling was better than cyclist-inferiority cycling, vehicular-cycling skills spread naturally among the members. The organizations believed in cyclists' legal rights to operate as drivers of vehicles, but only rarely was there need to formally support this position.

Then, in the 1960s, American society became concerned that the growing numbers of adult cyclists might plug up the roads and inconvenience motorists. Then, in the early 1970s, American society adopted its bikeway program to physically impose cyclist-inferiority cycling on all cyclists. American society managed to impose this discriminatory bikeway program upon cyclists because everybody except adult vehicular cyclists believed that cyclist-inferiority cycling is absolutely necessary to make cycling safe.

The cycling organizations opposed this imposition. The opposition has two main parts. The engineering part demonstrates that vehicular cycling is safer and better than cyclist-inferiority cycling on bikeways, and, indeed, that vehicular-cycling skills are still necessary with bikeways. The other part, Effective Cycling, demonstrates that practically all people can learn vehicular-cycling skills with a reasonable amount of effort. This is direct disproof of the cyclist-inferiority claim that vehicular cycling requires extreme strength, courage, and skill. As an Effective Cycling Instructor, you need to always remember that proving that vehicular cycling skills can be learned by almost everybody is a vital part of the Effective Cycling Program.

The cycling organizations might have survived this challenge and continued operating as vehicular cyclists in parallel with the societal norm of cyclist-inferiority cycling. If that had occurred, there would be no crisis today.

However, this did not occur. The cycling organizations became overwhelmed by the influx of ideologically active members who promoted bicycling as the cure for motoring. These members chose to advocate cyclist-inferiority cycling on bikeways, either because they believed that this was necessary for cyclist safety, or because they recognized that their target audience, the motoring public, believed this. The League of American Wheelmen changed its name to the politically-correct name League of American Bicyclists, and the Effective Cycling Program went down the drain.

The LAB has shown temporary inclinations toward reform, but nothing permanent; the anti-motoring bicycle advocates have always regained control. There is now no organization through which vehicular cyclists are able to oppose the nationwide norm of cyclist-inferiority cycling on bikeways. You will read in this *Manual* of the Bicycle Transportation Institute as being that organization. However, that organization, designed to protect and advance the interests and the activities of vehicular cyclists, in the way that a reformed League ought to operate, has not come

into being. Possibly a reformed League will reform itself accordingly, possibly not. For the moment, as an instructor, consider that you are in the forefront of vehicular-cycling activity and do your best to protect and advance it.

You have two equally important responsibilities. You have the responsibility towards your students of teaching them how to operate properly in traffic and how to enjoy their cycling activities. You have the responsibility towards lawful and competent cyclists of demonstrating that your instruction has taught proper traffic-cycling skills to your students. There is only one way to carry out these two responsibilities. You have to teach the full range of traffic-cycling skills, and you have to test your students according to a test procedure that provides a quantitative measure of their traffic-cycling skills. Testing according to the Cycling Proficiency Test and recording the results on the Cycling Proficiency Score Sheet for each cyclist provides the data that demonstrate the practicality and the effectiveness of Effective Cycling Instruction. The accumulation of such data in a central repository is absolutely necessary to provide the evidence that the right to cycle according to the rules of the road for drivers of vehicles must be preserved. Without such evidence, it is unlikely that that right will survive societal pressures against it.

1.2 Instructional Material

The *Effective Cycling Instructor's Manual* is the companion volume to *Effective Cycling*, containing the program for teaching Effective Cycling at all levels. This program has been administered since 2000 by the Bicycle Transportation Institute, after having been administered in a less effective way by the League of American Bicyclists.

Effective Cycling can be taught only by highly qualified instructors because it is based on the vehicular-cycling principle, a principle that directly conflicts with both the popular cyclist-inferiority superstition and the typical governmental bicycle transportation programs. Because the vehicular-cycling principle is based on scientific knowledge while the cyclist-inferiority superstition is just that - a superstition - the effective cycling instructor needs much more than an expert knowledge of cycling and of instructional technique. He or she needs to understand all three subjects:

1: Scientific methods and criteria
2: Psychology of superstitions, and the
3: Rationales for governmental programs.

This volume contains the information that the instructor needs to first become qualified to teach and then to teach Effective Cycling. It expands on the information on accidents that is in *Effective Cycling* because the safety of cyclists is a matter of great public concern. The instructor must have accurate knowledge about accidents to cyclists in order to correct the mistaken notions that are so prevalent among those who may consider sponsoring or taking a course but are deterred by fear of accidents. It states why the Effective Cycling Program is needed, and it compares that program against typical "bike-safety" programs that are based on the cyclist-inferiority superstition and also against the "on-bike" programs that have tried to imitate Effective Cycling without committing themselves to the vehicular-cycling principle or to effective instructional techniques.

Having covered the background knowledge, the Instructor's Manual then discusses the qualification process, the methods of organizing courses, and of course the instructional techniques, materials, and lesson plans for courses at three school levels and the adult level. There is a chapter on testing students, and a closing one on special instructional problems that frequently arise.

Naturally, the instructor also needs to know the cycling skills and knowledge that are contained in Effective Cycling, for in teaching no amount of technique can replace mastery of the subject; the instructor must have both. For the instructor who is also interested in the science of cycling transportation and in governmental actions regarding cycling, the most useful book is Forester's *Bicycle Transportation*, published, as is *Effective Cycling*, by The M. I. T. Press. For the instructor who is also interested in the science of bicycles as machines, the two most interesting books are Sharp's *Bicycles and Tricycles*.(originally published in 1896) and Whitt and Wilson's *Bicycling Science*, both now available through The M. I. T. Press, which with these four books has the best list of serious and accurate books on cycling.

Finally, the *Instructor's Manual* guides and encourages the instructor with the many statements of Effective Cycling philosophy that appear wherever appropriate in the instructions. To be successful, the instructor must recognize that the Effective Cycling Program is deliberately designed to challenge the prevailing cyclist-inferiority superstition, but he must carry out that challenge with a good-humored, easy-going but competent manner that puts people at their ease and dissipates their

fear of traffic.

2 Effective Cycling Training: What It Is and Why We Need It

2.1 Safe, Useful Cycling: the Prime Objective of the Effective Cycling Courses

Every Effective Cycling Course has one prime objective that overshadows everything else. That objective is to develop in the students a level of cycling skills that enables each student to safely undertake a range of trips that are useful to him or her (considering the age of the student), and to have each student demonstrate that he or she has those skills by successfully completing a driving test under traffic conditions of the specified degree of difficulty. To provide a simple example, consider a course that teaches driveway exiting, stop signs, and right turns, but not left turns, either because these are considered too difficult, or because the course has insufficient time. Such a course is unethically incomplete and dangerous, because the students will find that practically any trip they desire will include left turns. They will be making left turns without the benefit of the instruction, no matter what their diplomas proclaim or their parents believe.

For all students, even those at the very elementary level, development of the traffic skills also involves the development of an understanding of how the traffic system operates. The students are never taught, “This is how bicycles operate;” they are always taught, “This is how drivers operate.” When a student learns that traffic exiting a driveway must yield to traffic on the roadway because the roadway traffic will not stop, he has learned both sides of the issue, yielding when exiting a driveway, continuing when on the roadway. The students learn the traffic operational rules not by verbal rote, but by practicing them, just as they do for any other activity. That is what develops the understanding of how the traffic system operates, without which no safety program will have significant effect. Cycling according to the rules of the road for drivers of vehicles is called vehicular cycling (VC).

2.2 Cyclists’ Confidence in the Vehicular-Cycling Principle: the Secondary Objective of the Effective Cycling Courses

Nearly all Americans, which means most of your incoming students, believe that same-direction motor traffic is the greatest danger to cyclists. Therefore, cyclists should stay as much out of its way as possible and need the protection of bike lanes and bike paths to be safe. This is the cyclist-inferiority superstition (CI). Some people prefer to call this superstition the cyclist-inferiority taboo. Taboo and superstition operate in practically identical ways. This suits motorists who wish cyclists out of their way, and it also motivates bicycle activists who believe that people will not cycle without bikeways.

To achieve, and later maintain, the understanding of how the traffic system operates requires that the cyclist (at least, those above the elementary ages) understand that vehicular cycling is contrary to society’s opinions and to the government’s bicycle policy. Because most people believe in the cyclist-inferiority superstition, government bases its bikeway-building bicycling policy on it. The VC principle holds that cyclists fare best when they act and are treated as drivers of vehicles; the CI superstition holds that doing so is difficult and dangerous.

Confident belief in the vehicular-cycling principle is necessary both for safe and competent cycling and for defending cyclists’ rights to ride safely and competently. This subject will be discussed later in the *Manual*. For the moment, the instructor must remember that developing confidence in the vehicular-cycling principle is just as necessary as developing the skills that are based upon it.

2.3 Subsidiary Objectives of the Effective Cycling Courses

Cyclists need to know many different things and practice many skills to get the greatest pleasure and use from cycling:

1: Mechanical skills: Selecting and maintaining bicycles.

2: Physical skills: Cycling gracefully and easily, getting the most speed and distance for the least effort.

3: Traveling skills: Going to new places near and far, up the valleys, over and down the mountains, carrying the necessities.

4: Environmental skills: How to handle rain, cold, heat and darkness.

5: Traffic skills: How to ride in traffic safely and effectively, on all types of road and with all levels

of traffic.
6: Physical conditioning: Developing one's speed and endurance for both cycling and health.
7: Competitive skills: Learning when and how to apply one's physical condition to go faster or further.
8: Family cycling skills: How to continue cycling with a young family, how to raise cycling children.
9: Political skills: How to defend and advocate the right kind of cycling, how to tell fact from superstition, friends from enemies.

Effective Cycling training for adults may cover any or all of these subjects, while training for children generally is limited to mechanical and traffic safety for reasons of time. The goal of the Effective Cycling Program is to teach people all that they need to know to cycle every day that they wish, for any purpose that they desire, under all conditions of weather, terrain and traffic.

2.4 Typical Levels of Cycling Skills

With the recent successes of Americans in cycle racing and the enormous growth of cycling for aerobic development and the triathlon competitions, you may think that Americans cycle quite well. A few at the top do so, but most cycle poorly, with excessive fatigue, too many mechanical troubles, excessive fear of imaginary accidents but far too many accidents that are easily avoidable. And, generally speaking, they advocate programs and policies that make things worse rather than better. The simpler of these errors are caused by simple ignorance, not knowing the correct methods. The more complicated are caused by superstition, strong beliefs about the nature of cycling in traffic that are contrary to known facts but are nonetheless obeyed in the mistaken belief that the violator will certainly be killed by a car.

At a top estimate, of the 100 million Americans who say that they ride bicycles, no more than 100 thousand ride even moderately well, and probably the correct figure is less than half of that. When only one percent or less of cyclists ride properly, the training system has failed. Does this matter? If the failures were concentrated in long-distance touring or in competition, there would be little social effect beyond the unhappiness of unsuccessful athletes, but the reverse is true.

Athletic cycling, competitive or for self-development, has been the most successful part, while transportation, safety and public policy have been miserable failures. Americans cycle far less than would benefit them individually, partly because of fear and partly because of social disapproval. About 80% of accidents are caused by cyclist ignorance, and the public policy has been one of keeping cyclists frightened, ignorant and subservient to motorists. These are failures of the first importance, and Effective Cycling training is the best (although not the only) corrective measure that is available to us.

2.5 Reducing the Accident Rate

Two different comparisons suggest that reasonable cycling skill reduces the accident rate by about 80%. American members of the League of American Wheelmen have an accident rate only about 20% of that of the general public. British members of the Cyclists' Touring Club reduce their accident rate by about 80% in four years of membership. In short, the experience of cycling with better-skilled cyclists teaches better cycling with a much lower accident rate.

2.6 Contribution of Instruction

Instruction in any subject teaches the knowledge and skills that have been learned in the past through trial and error. "Experience teaches slowly, and at the cost of mistakes." (1)

The function of instruction is to convey in short time the knowledge and skills that were learned slowly in the past; it provides the results of experience without either the time used or the accidents incurred while obtaining that experience. The Effective Cycling Program does not teach anything new; the skills and knowledge that it imparts have all been learned and proved by cyclists and by scientists and engineers of various disciplines. Naturally, the Effective Cycling Instructor plays a key part in instruction. Unless the Instructor knows much more than just the outline of the course, he cannot place the items of knowledge in their proper perspective, or teach the skills in their relevant environments.

2.7 Responsibilities of Instructors

Effective Cycling instruction is not merely a matter of informing willing or not-so-willing students of the content of a set curriculum. Today, the instructor must often get the program started in the area by persuading people that it is necessary and possible. He must find organizations willing to sponsor and house the classes.

Because traffic-safe cycling is a controversial subject, he must present his case diplomatically

but soundly, to both sponsors and to students, if success is to be achieved. Because participation is voluntary, he must cover the subject matter and maintain standards while still keeping the interest and enjoyment of the students. It takes a well-informed, well-trained, vigorous and perceptive man or woman to do that job.

The Instructor Training and Certification Program will help you become a well-qualified, competent instructor of cycling, and later to keep your competence and knowledge up to date. The Bicycle Transportation Institute aims to assist you in establishing classes, both directly and by improving the public acceptance of Effective Cycling training. Since most training of cyclists is poor but publicly accepted while the Effective Cycling Program is excellent but controversial, the BTI insists upon continued high standards and excellence.

Only in that way can the program do its job. These high standards give value to the emblems and certificates earned by instructors who complete their training by successful performance in difficult examinations. And in turn, all these characteristics give value to the emblems and certificates earned by your students who complete their training by successful performance in the real-world driving test that you will give them in actual traffic conditions. The real test always is cycling itself.

1. James Anthony Froude

3 The Psychological Position of Cyclists in America

3.1 The Cyclist-Inferiority Superstition

Almost all adult Americans strongly believe the cyclist-inferiority superstition (CIS). This is the feeling that cars belong on the roadway and the cyclist does not, that cars are deadly dangerous, that same-direction motor traffic is the greatest danger to cyclists, so that the cyclist must stay far out of the way of cars. I often express this as: “The cyclist who rides in traffic will either delay the cars, which is Sin, or, if the cars don’t choose to slow down, will be crushed, which is Death, and the Wages of Sin is Death.” Because the cyclist doesn’t belong on the road, riding there is something you should not do. Doing what you shouldn’t produces the sense of guilt, and guilt means that you deserve to be punished. The punishment that you deserve for cycling on the roadway is death. That feeling, that belief, is a very powerful psychological condition. In many people it fits the definition of a phobia.

The CIS affects people both when they are cycling and when they are motoring, even when thinking about either. It dictates how they feel about cycling and about how cyclists ought to ride, including the facilities and laws that should be provided for cyclists. The hold that the CIS has upon the American public explains why it is that a governmental bicycling program, bikeways, that was designed to make motoring more convenient by clearing the roads of cyclists, is believed to be the pre-eminent bicycle safety program. The vehicular cyclist looks at that program and jeers, knowing that it is all wrong and based on completely incorrect theories. However, the person who still believes the CIS cannot see the governmental bikeways program for what it is, and believes that it makes cycling safe.

The CIS makes it more difficult to teach cycling to adults than to teach motoring, because the cyclist is always bothered by feelings of guilt and danger that don’t reflect reality. It is not until he gets over the CIS that he is comfortable and competent while riding in traffic.

3.2 The Importance of Overcoming the Cyclist-Inferiority Superstition

The CIS makes it very difficult to defend cyclists’ right to operate as drivers of vehicles, because the public believes that cycling as a driver of a vehicle is deadly dangerous. Therefore, the public believes the nonsense that bikeways both make cycling safe and eliminate the need to operate as drivers of vehicles. That nonsense is the prime driving force behind the governmental bicycling program, the prime force making cycling less useful, less efficient, and less safe.

There are two very important reasons why the Effective Cycling Instructor must overcome the CIS in his students.

1: As long as a student feels the emotions created by the CIS, he will not ride properly and he cannot feel confident and comfortable on the road.

2: Only those people who have overcome the CIS (or the few who never suffered from it) can promote the right kind of cycling program and fight to defend cyclists against the current governmental bicycling programs.

3.3 Methods of Overcoming the

Cyclist-Inferiority Superstition

There is only one known method of overcoming the CIS: successful experience in traffic of gradually increasing difficulty. We discovered this truth though hard experience. Later, we discovered that this is in accordance with the standard knowledge about phobias. In more general terms, successful exposure to the feared condition in sequences of gradually increasing intensity, is the only known method of overcoming phobias, the only successful treatment for them.

The Effective Cycling Instructor needs to be aware of this emotion in his students and develop his teaching sequence accordingly. Even if he has a class of accomplished motorists, who really ought to know almost all that is necessary about operating in traffic, he must not take them out into intense traffic without some practice in easy traffic in the weeks before. I say weeks before, because, for many people, it takes several successful weekend training classes in easier traffic, and perhaps some personal experience over the intervening weekdays, for them to be ready to take on fast, intense traffic, no worse than that in which they have been motoring daily. I know of several failures from attempts to hurry the course faster than the students can change their feelings.

Of course, if the class consists of cyclists who are already reasonable traffic cyclists, who really want to sharpen their traffic skills and learn other skills such as touring, then the instructor can start training them in the best ways to operate in intense traffic; they won't need the usual time to change their emotions. Therefore, I am quite comfortable teaching a one-weekend course to club cyclists, because I know that they will be able to learn what I teach, won't be held back by unjustified fears and worries. But I won't ever try the same schedule for students who are not already traffic cyclists, because all that I will accomplish is to frighten them some more.

4 Accident Statistics and Prevention

4.1 Accident Statistics

Because so much of the concern about cycling, and about Effective Cycling in particular, is about accidents, the instructor must be well-informed about accident statistics and able to persuade concerned people to believe truths that they do not expect.

The first thing to do is to learn the material in the chapter on accidents in *Effective Cycling*. The most important conclusions to be drawn from this information are:

1: There are many types of accidents
2: Car-bike collisions are not the most frequent type
3: Being hit from behind by a car is a very infrequent type of accident
4: Most accidents are caused by cyclist error
5: Those cyclists who would appear to be most cautious have the higher accident rate, while those who appear to take greater risks have the lower rate
6: Cyclists learn through experience to avoid about 80% of accident situations

Here are some data that are not in *Effective Cycling*, but come from my *Bicycle Transportation*. Table 1:, Rank Order of Urban Car-Bike Collision Types gives the relative percentages of each type of car-bike collision for urban areas, which is the area for which people are concerned. These data are taken from the Cross study, but are reclassified to show urban areas only and to separate the accidents caused by different riding actions.

Table 1: Rank Order of Urban Car-Bike Collision Types

Code	Collision Type	Rank	Percent
5c	Cyclist on proper side runs stop sign	1	9.3
23c	Motorist turning left hits cyclist head-on	2	7.6
9w	Motorist restarting from stop sign hits wrong-way cyclist	3	6.8
18t	Cyclist turns left in front of overtaking car	4	6.1

Types with less than 1% omitted.
Codes: Numbers are as in Cross study.
c= correct roadway position
s=sidewalk cycling
w=wrong side of road
t=cyclist swerve

Table 1: Rank Order of Urban Car-Bike Collision Types

Code	Collision Type	Rank	Percent
6c & 7c	Cyclist hit as traffic signal changes	5	5.9
24c	Motorist turns right	6	4.8
1c	Cyclist exists residential driveway	7	4.3
9c	Motorist restarts from stop sign	8	4.2
2c	Cyclist exits commercial driveway	9	3.9
3s	Cyclist on sidewalk turns to exit driveway	10	3.0
5w	Wrong-way cyclist runs stop sign	11	2.6
26w	Wrong-way cyclist hit head-on	12	2.6
8s	Motorist exiting commercial driveway hits cyclist on sidewalk	13	2.4
25c	Uncontrolled intersection collision	14	2.2
8c	Motorist exits commercial driveway	15	2.1
Bc	Cyclist runs red light	16	2.1
19t	Cyclist turns left from curb lane, hits car from opposing direction	17	2.1

Types with less than 1% omitted.
Codes: Numbers are as in Cross study.
c= correct roadway position
s=sidewalk cycling
w=wrong side of road
t=cyclist swerve

Table 1: Rank Order of Urban Car-Bike Collision Types

Code	Collision Type	Rank	Percent
10w	Motorist exiting commercial driveway hits wrong-way cyclist	18	1.9
13c	Motorist overtaking does not see cyclist	19	1.9
8w	Motorist exiting commercial driveway hits wrong-way cyclist	20	1.5
24w	Motorist turning right hits wrong-way cyclist	21	1.5
16c	Motorist overtaking too closely	22	1.4
20t	Cyclist swerves left	23	1.3
21t	Wrong-way cyclist swerves right	24	1.3
36	Miscellaneous	25	1.3
23s	Motorist turning left hits cyclist riding in opposite direction on sidewalk	26	1.2
27c	Cyclist hits slower car	27	1.1

Types with less than 1% omitted.
Codes: Numbers are as in Cross study.
c= correct roadway position
s=sidewalk cycling
w=wrong side of road
t=cyclist swerve

The effect of age and experience on the car-bike collision frequency is graphically shown in Fig 1: Typical Car-Bike Collision Types Arranged by Median Age of Cyclist.

The crux of the problem for most people who worry about bicycle safety is that they believe that an aggressive style of riding causes cycling accidents, and they equate Effective Cycling with that aggressive style. They are so imbued with the

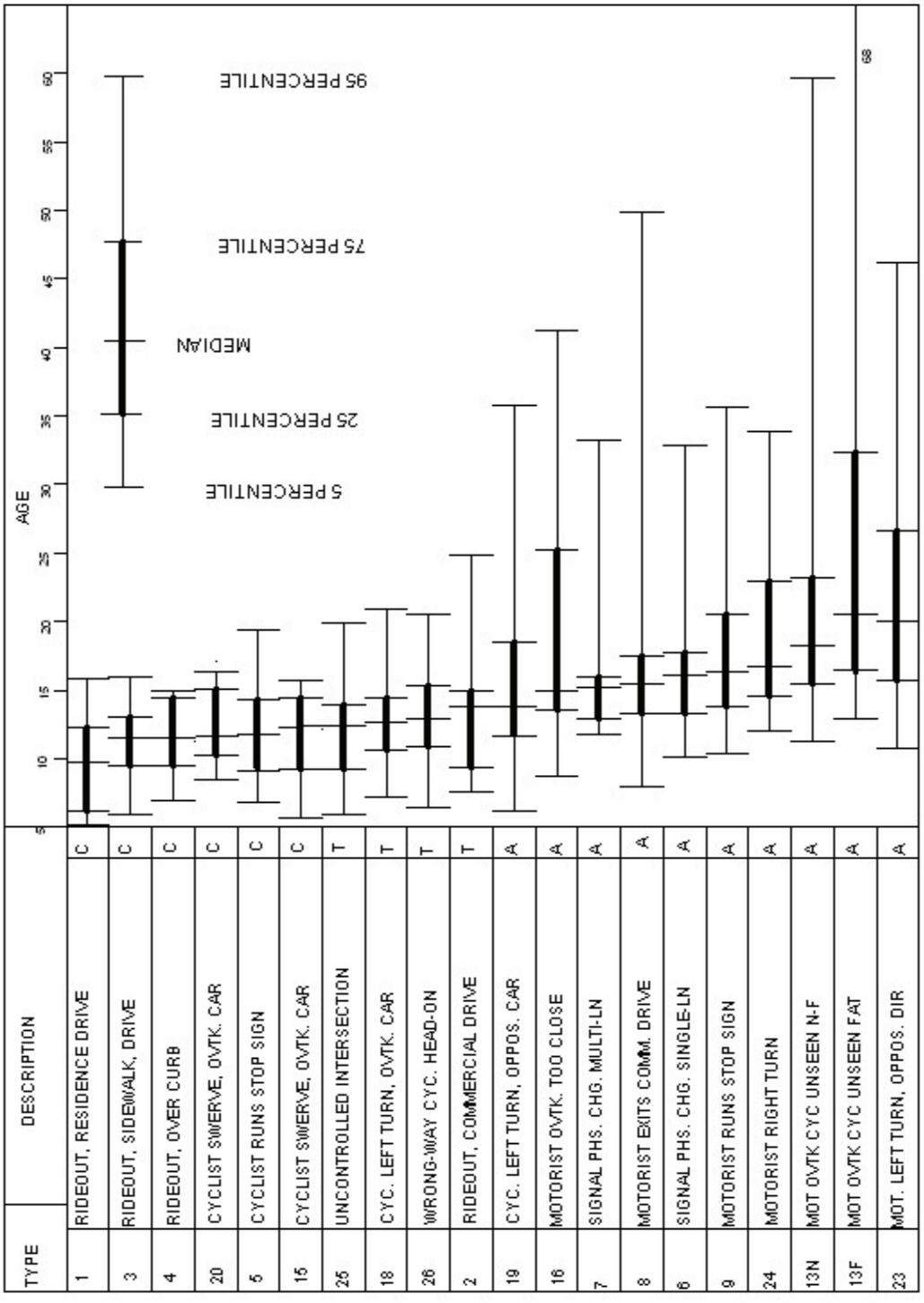

Fig 1:Fig 1: Typical Car-Bike Collision Types Arranged by Median Age of Cyclist.

notion that cyclists must stay away from traffic that they consider any deviation from that rule to be aggressive, a form of fighting with cars that the cyclist cannot win. The age pattern of car-bike collisions shows an entirely different picture. If there is any kind of aggression by cyclists against motorists, it would have to be getting in front of motorists so they have to stop or swerve to prevent a collision. That means, such actions as entering the roadway without yielding, swerving in front of an overtaking car, running stop signs to force motorists to wait, and the like. As the car-bike collision age pattern shows, these are all actions of children that older cyclists quickly learn to avoid. As for simply cycling straight along the roadway, no matter how much motor traffic there is, that cannot be considered to be aggressive at all. Effective Cycling teaches cooperation with how traffic operates; it does not teach violating or fighting the traffic system.

The instructor must handle that problem gently, acting in an obviously gentle manner to defuse the charge of aggressiveness. He must also identify the major types of car-bike collisions, giving percentages to show his knowledge, and for each type point out that the Effective Cycling method takes the cautious approach. Effective Cycling technique never requires the cyclist to ride into trouble; whenever the cyclist may cycle into conflict with any other lawful driver, it always requires him to look and wait.

Then there is the person who believes that traffic volume is itself a great danger. He or she will say that nobody should ride a bike on X street because there are so many cars there. Of course, what he means is that there are many cars overtaking cyclists, and he believes that the greatest danger to cyclists is same-direction motor traffic. Look at Table 1:, Rank Order of Urban Car-Bike Collision Types. Same-direction traffic appears only in ranks 19 and 22; it cannot be a major danger. However, this argument is harder to handle, because Effective Cycling does not take explicit steps to prevent a lawful cyclist who is proceeding straight ahead from being hit from behind. It doesn't do so because the steps that might be taken are worse than the minute hazard (in daylight) of being hit from behind. Probably the best answer is a combination one: we don't take students out in heavy traffic until we are sure that they will not swerve about, we require that they ride far enough right to let motorists overtake easily, we teach them how to handle all the traffic situations that they are likely to meet, and this particular danger is of very low importance, being (in daylight) more than 20 down from the top of the car-bike collision list.

You should also know the relative importance of the various causes of injuries and deaths to cyclists as shown in Table 2:, Factors Responsible for Cycling Injuries and Deaths, because most people have a very distorted view of these. As you can see, the popularly-believed causes of motor traffic and defectively-designed roads are low on the list, while the topmost one, by far, is cyclist error and the next is road-surface defects.

Table 2: Factors Responsible for Cycling Injuries and Deaths

Factor	Percent
Cyclist error	50
Road surface defect	20
Motorist error	8
Bicycle equipment failure	6
Pedestrians	4
Dogs	2
Insufficient signal clearance time	1
Road design defect	<0.5
Road capacity overload	<0.5
Undetermined	8

You may be asked questions of the opposite type, such as why you don't schedule your rides on the favorite bike path. There are several answers to that question.

1: The class is intended to teach traffic safety, and the place to learn traffic safety is in traffic.

2: The class is intended to teach useful cycling, traveling by bicycle, and the typical trip is unlikely to go where there are bike paths.

3: Such places are dangerous and there is no technique available for counteracting those dangers. The dangers are both from motor traffic and from non-motorized traffic.

This discussion has focused on the concerns expressed to you, rather than on the concerns

that

you may have in the conduct of the course. This is because there is little reason to consider accident rates or types in the conduct of the course. So long as you ensure that your students are ready to take the next step in training before you introduce them to its conditions, there is no reason to believe that any one situation is significantly more dangerous than another. You base your choice of routes and situations on their skill, not on relative dangerousness. The skilled rider in difficult conditions is safer than the unskilled rider in easy conditions, as the statistics show. That relieves you of a considerable burden.

4.2 Accident Prevention

The more positive aspect of studying accident statistics is the design of accident prevention programs and prediction of their results. As is shown in Table 3:, Estimated Reduction in Injuries, and Table 4:, Estimated Reduction in Deaths, Effective Cycling is by far the most promising of all the bicycle-safety programs that have been devised. It addresses the correct aspects of the problem, which most others don't, and it does so in the best manner that we know. The next-best is the wearing of helmets, largely because of the very large proportion of deaths that it ought to prevent.

Table 3: Estimated Reduction in Injuries

Program	Injuries Reduced, per year
Effective Cycling course	100,000
Intersection Improvement	8,000
Dog Leash Laws	8,000
Bicycle Mechanical Repair	4,000
Helmet Wearing	3,000
Headlamps and Rear Reflectors	2,000
Roadway Widening	2,000
Bikeways, optimistic	2,000
Bikeways, realistic	-X0,000

Table 4: Estimated Reduction in Deaths

Program	Deaths Reduced, per year
Effective Cycling course	500
Helmet Wearing	300
Roadway Widening	180
Headlamps and Rear Reflector	160
Intersection Improvement	100
Dog Leash Laws	80
Bicycle Mechanical Repair	30
Bikeways, optimistic	180
Bikeways, pessimistic	-X00

5 Educational Programs Compared

5.1 Conventional Bike-Safety Courses

The instructor needs to recognize the differences between bike-safety education and Effective Cycling training. Knowing the differences will enable him to explain them and it will also help him to teach people whose opinions have been formed by conventional bike-safety education. The instructor needs to know the problem, and bike-safety education is a large part of the problem.

The conventional bike-safety program has consisted of a classroom lecture, frequently accompanied by a film, and a workbook containing pictures and sentences of doubtful accuracy or relevance. Some of these programs are addressed to elementary-school students, others to middle-school students. The worst are so inaccurate and misguided that it is impossible to relate them to any useful standard. Even the better ones are a litany of mistakes. For example, practically all say to stop at stop signs without saying what to do next. Practically all illustrate the left-turn signal from the rear and show the cyclist looking straight forward. Many illustrate curb hugging (for example, swerving out to the curb between parked

cars). Many advise walking one's bicycle across intersections, and those that don't, show the cyclist looking both ways at every intersection with the implied duty to yield to all traffic, even if the cyclist has the right of way. Most illustrate left turns from the curb lane without looking behind. Every one that I have seen advises reliance on reflectors instead of headlamps for nighttime protection.

The films are just as bad, although one would think that the difficulties of making such dangerous films would have alerted the producers to the deficiencies of the subject matter. The main point of one film was advising against "riding fast", illustrated by a prominent entertainer acting the fool by dodging incompetently between lanes rather than riding safely in the lane appropriate for his speed. This was followed by siren sounds, if I remember correctly. Another showed cyclists turning right onto a busy street after signalling a right turn but without checking for traffic coming from their left. They could have been hit as the film was being shot!

Even the American Automobile Association publishes defective materials. It published a poster of a cyclist making a left-turn signal with the cyclist looking straight ahead, and its film *Only One Road* advised cyclists to ride between right-turning cars and the curb.

Even a person experienced in such matters frequently cannot figure out a program's intended message. These programs are hodgepodges of confused thoughts. If somebody with my experience cannot figure them out, how can the students? For example, in most programs it is obvious that cars are considered dangerous and powerful, so that cyclists must stay out of their way. Yet the same programs advise their students to stick out their left arms and force their way through traffic, trusting to the motorists to protect them.

What message can be deduced, or will the students deduce, from such a presentation of unlawful and unsafe behavior? It is the vociferously defended belief that sticking out the left arm has the magical power to make it safe to turn left from the curb lane without looking. That is the only obvious belief that fits the instructions, so as the students try to build a picture of the world that they can obey, which is how this kind of instruction works, that is the belief that they construct. They are not yet sufficiently aware of human motives to deduce that the basic motivation for bike-safety instruction is to preserve the supremacy of motorists rather than to protect themselves.

The confused state of adult thinking about cycling shows that confusion is the main product of "bike-safety" education. The only other concept that I can logically develop from the typical presentation is this: Cars are usually terribly dangerous and will get you if they can, so you must stay out of their way as much as possible, but when you must get in their way there is nothing you can do but trust to luck. Quite probably that was not the authors' conscious intent, but it is the very prevalent public attitude. That's what the public thinks; isn't it likely that the public opinion has been developed by several generations of such presentations?

Two other conditions allowed so absurd a system to develop. The first is that cycling stopped attracting first-class brains by 1898, the end of the first cycling boom. It was then obvious that motoring would supersede cycling for those who could afford it, and shortly after that it was aviation, radio and the other modern developments that attracted people with brains and ambition. Cycling became an intellectual backwater and remained so until the 1970s.

The second condition is that there was no financial support for intellectual work in cycling. Government wasn't interested in developing cycling theory; the big challenge was developing the highway system for motoring. Cyclists had low status and generally had low incomes and educations. As the status and income of cyclists fell, so did the profitability of cycle manufacturing. In the United States, the manufacturers aimed only to sell to children as the adult market disappeared. While this change to a child market created a very important intellectual challenge, this challenge was so radical that its existence was not recognized. The challenge was this: How is it possible in a motoring and noncycling society, such as the United States, to teach children how to ride safely when children are the only cyclists? Not recognizing this challenge, the manufacturers supported only foolish and incompetent work, mostly propaganda rather than investigation, and much of it devoted to promoting bikeways, an idea that had no intellectual support whatever.

The absence of intellectual work on cycling theory, the low intellectual and educational level of those engaged in the field, and the progressive growth of confusion prevented the developers of American bike-safety programs from recognizing that they had undertaken an impossible task.

They assumed that children are unskilled

and incapable of judging vehicle speed and distance and the movements of vehicles in traffic, that children cannot look over their shoulders, that children are mentally incapable of understanding traffic concepts such as right-of-way, and are incapable of observing and predicting traffic movements. These assumptions certainly favor children by giving them the lightest intellectual load of any drivers; in this sense they are ideal for child safety. The program developers' task was to devise a system of traffic-safe cycling that would not require any of these abilities. However, not once, so far as I know, did any of them try to perform that task, or ask himself how to accomplish it, whether he had accomplished it, or whether it was possible. Neither, so far as I know, did any of them analyze how traffic maneuvers were actually performed, by cyclists or by motorists. Lastly, it never occurred to any of them that if there was a reasonable prospect of developing such an easy driving system, the motorists would have been developing it for themselves.

Having dismissed from consideration every skill by which child cyclists could save themselves and could operate in traffic, the safety-program developers were left with only a few possible instructions (to stay close to the curb, to signal when leaving the curb, to stop at stop signs, to look both ways at minor intersections, and to walk across major intersections), all to be done by rote without the possibility of exercising judgement or even modifying a movement in accordance with the traffic. The result contradicted traffic behavior and the law, and is, as I have said before, the largest identified cause of American car-bike collisions. By denying that cyclists have the ability to react to traffic, it denied them that ability because it denied all instruction to develop that ability, and it denied them the insight to consider whether they might be able to develop that ability. Therefore, it placed nearly all of the responsibility for traffic-safe cycling on the motorists, although it did not seek to change the traffic laws to accommodate this supposed change in responsibility.

Yet nobody questioned this system. I think that the whole bike-safety instructional system was such a crazy house of cards that its own craziness prevented rational thought about it. Since nothing made sense, and any attempt to make sense of it failed, people were dissuaded from applying any rational standard to it. It became taught as a system of quasi-religious belief in life-saving magic with a tradition of unquestioning intellectual obedience.

Even the modernized bike-safety programs continue in this failing. The older ones concentrated on teaching what not to do - basically "Don't get in the way of cars." The later ones, like Don LaFond's Illinois and Maryland programs, benefited from Ken Cross's studies of car-bike collision hazards by concentrating on "hazard recognition and avoidance." The apparent concept was that the cyclist could do anything he pleased so long as he recognized and avoided hazards. This approach has four serious defects:

1: Since the cyclist so trained does not know how the traffic system is supposed to work, he has little ability to recognize when someone is making a mistake.

2: This technique implies that the cyclist must distribute his attention over all of the traffic scene looking for hazards, instead of concentrating on those particular parts of the traffic scene that present the greatest difficulty in traversing and the greatest probability of accident.

3: Without knowing how the traffic system operates, who has right-of-way and who must yield, this prevents the cyclist from concentrating on those other drivers who have the right-of-way, those to whom he must yield.

4: Most of all, this approach neglects the very great safety advantages of understanding traffic principles and developing the safe operating habits that generally keep the cyclist out of trouble.

Proper cycling habits greatly reduce the number of potential accident situations the cyclist traverses and enable him to devote full attention to those that he must traverse. The latest crop of programs all claim to be "on road" programs, their authors attempting to join our bandwagon as people start to understand that cycling is not a skill that can be learned in the classroom. It is one thing to get out of the classroom but another thing to get into real road conditions, and still a far different thing to teach cycling as it should be taught.

These programs waste time on nonessentials, they still contain many errors and their teaching is still not based on an understanding of the vehicular-cycling principle (so they cannot teach that, either), and they do not allow the time necessary to learn the necessary skills in traffic of gradually increasing intensity. In fact, some of them merely take the students to look at traffic, rather than riding in it.

Another problem of conventional "bike-safety" programs is that they are unintentionally

designed to be taught by people who don't believe in safe cycling practices. They are designed to be presented by the typical schoolteacher, who suffers from the cyclist-inferiority superstition and therefore cannot present safe cycling practices in a logical, confident way. Of course, such a teacher might present accurate information verbatim, but the teacher's doubt would show through and the moment that students started discussion or asked questions the teacher would be answering in the language of the cyclist-inferiority superstition. Cycling must not be taught by people who disbelieve in vehicular-cycling practices. Today's situation requires special cycling instructors who believe in vehicular cycling.

Conventional bike-safety programs are not training programs at all; they do not train students in the sense that the word "training" is used in any other activity. There is no practice, criticism of the students' technique, or repeat practice after criticism, at all; it is all talk. People cannot learn activities like cycling unless they do them; they cannot learn them efficiently unless their performance is observed, evaluated, and criticized.

In summary, expecting conventional "bike-safety" programs to reduce cyclist casualties to a reasonable level is unrealistic; no sensible person should ever have had that expectation.

5.2 Governmental Policy Regarding Cyclist Competence

The bicycling program of the United States government is based on the claim that 95% of American cyclists will never learn how to ride properly, will never learn how to obey the rules of the road while riding a bicycle. This is explicitly stated in the Federal Highway Administration Manual Selecting Roadway Design Treatments to Accommodate Bicycles, 10 July 1992. The highway design treatment recommended for cyclists who don’t know how to obey the rules of the road is the installation of bike lanes. Although it is always claimed that bike-lane stripes reduce the need to know how to ride properly, how to obey the rules of the road, nobody has ever been able to explain how this works.

In other words, this bikeway system is the latest version of the traditional bike-safety program. The government proclaims: We have a system by which cyclists can operate without having to learn how to obey the rules of the road, but we have only a fuzzy idea of what that system is and we have no explanation of how it actually works. Nevertheless, we firmly believe in that system and insist that all else is wrong and dangerous.

The National Highway Safety Administration, the Injury Prevention part of the Center for Disease Control, and the Federal Highway Administration held a National Bicycle Safety Conference in the summer of 2000. The conference was divided into separate discussion groups named Motorists Will Share the Road, Bicyclists Will Ride Safely, Bicyclists Will Wear Helmets, The Legal System Will Support Safe Bicycling, Roads and Paths Will Safely Accommodate Bicyclists. I attended, at my own cost, and participated in the facilities group. John Allen participated in the cyclist behavior group. The report is National Strategies for Advancing Bicycle Safety, May 2001.

The strategies are so worded that there is no indication of any controversy (except about mandatory helmet laws). There is no reference to the concept that cyclists should obey the rules of the road for drivers of vehicles, and, therefore, none to the idea that bikeway designs conflict with that concept. The motorist behavior strategies concentrate on the idea that certain aspects of the traffic laws cause car-bike collisions, without identifying any of these supposed legal situations (which really don’t exist). There is a list of proposed traffic-law changes taken from previous work by cyclists for the National Committee for Uniform Traffic Laws and Ordinances, but the recommended changes are not of that type. The bicyclist behavior strategies presume simply more of the conventional bike-safety programs. The helmet group promoted mandatory helmet laws, which all the others absolutely refused to accept. That controversy took up all the remaining conference time. The legal system strategies suggest investigating to see whether or not motorists get off too easily in bicycle collision cases. (We know of cases; are these prevalent?) The facilities group produced two specific strategies to carry out the government’s bikeway program. Stripe 100,000 miles of bike lanes. Get a not-yet-seen bikeway textbook, written for the FHWA, into university highway design courses across the nation. What is particularly interesting about the facilities strategies is that the group leader, Andy Clarke, who was Executive Director of the Association of Pedestrian and Bicycle Professionals (the bike planners) and is now the chief executive of the League of American Bicyclists, admitted in writing in his initial paper that there was no evidence that the bikeway programs of the previous thirty years

had reduced the cyclist casualty rate.

In short, the recommended strategies are so written that everybody who reads it, or considers trying to implement any strategy, will be urged to continue along the present governmental policy that is based on cyclist-inferiority and bikeways. Vehicular cycling is carefully concealed from view so that nobody will become aware of the concept. This is the environment (social, legal, urban planning, educational), in which the Effective Cycling Instructor must operate, because it is the environment that exists and permeates American society. The Instructor who does not recognize this and work out how to operate within it will not succeed in developing students who both ride properly initially and continue to know why they should do so in the face of contrary social opinion.

The instructor who does not develop such students will have both failed his students and failed to do his part in the defense of cyclists' right to ride safely as drivers of vehicles.

5.3 Effective Cycling Imitations

There have been, and maybe still are, imitations of the Effective Cycling courses, or courses that used to go under the name of Effective Cycling. These often describe themselves as on-bike courses that teach cycling, or safe cycling, or some such name. I have seen several important deficiencies in these:

1: The courses don't teach a safe, useful bundle of traffic-cycling skills. The adult students who complete true Effective Cycling courses are possessed of traffic-cycling skills that enable them to cycle on all reasonable roads and in all reasonable traffic conditions. Not only is there no point in teaching an adult only enough traffic skills to ride on residential roads or rural bikepaths, but qualifying so limited a cyclist is harmful to both the student and to the rest of the cycling population.

2: The courses don't end with a full driving test that demonstrates whether or not the student has learned a full set of traffic-cycling skills. If the student is not tested, the previous training could well be useless.

3: Even if a full bicycle-driving examination is given, it is not scored in a quantitative manner. You can't tell whether or not a cyclist has learned the skills without observing more than one example of each maneuver, and without a quantitative score there is no way of evaluating the value of the course, of comparing one course against another, or even for correcting for one mistake by a student.

These deficiencies stem from several sources. One is the desire to have short courses because these are thought to be popular. The trouble with that concept is that it is impossible to teach beginners how to ride safely in a short course. They need time to learn (even though, as motorists, most adults already know how to drive a vehicle), they need time to change their emotional state from one of fear to one of confidence.

The public has two major mutually incompatible strong beliefs about traffic cycling. The first is that there's little to learn, that they learned it as children. The second is that it is extremely difficult, that only supermen can do it. As a result, the members of the general public are unwilling to invest the time to learn the skill. Why should they bother to learn something that they already know, and, in any case, if they did learn how to do it they couldn't do it anyway. It is true that courses sufficiently long to teach traffic cycling are not popular.

However, it is equally true that courses that are too short cannot teach people to ride safely for the normal range of trips that they might take.

The Effective Cycling Program always chooses the safer and most effective of the choices: teaching students a kit of traffic-cycling skills that enable them to ride safely anywhere in town, and testing them to ensure that those who pass indeed have those skills.This policy is qualified for children; for them the conditions of instruction and testing are limited to those suitable for their ages.

The defective driving tests stem from two different causes. The first is that too many of these courses don't teach the skills that are required to pass the test. The second is plain laziness, to put the best face on it, on the part of both instructors and administrators. They don't want to take the time to score the driving tests, just as they don't want to take the time to read and score proper written examinations. Possibly, also, is the desire to have no quantitative scores that could be used to make comparisons between instructors and between courses.

The Effective Cycling Program always chooses the proper testing and scoring procedures, both for the benefit of the students who know whether or not they have really demonstrated the required skills, and for the benefit of the Program, by allowing analysis of the scores achieved for both scientific and public relations purposes.

5.4 Effective Cycling Courses

There are several reasons for the success of Effective Cycling courses. The first is that they are based on the secure foundation of the vehicular-cycling principle. There is ample evidence that the rules of the road for drivers of vehicles provide workable procedures for traffic operation, both in terms of how vehicles operate and in terms of the human ability to control them. Nobody disputes this principle: if it were not correct, the motoring system could not exist. The dispute is over another matter. Conventional wisdom claims that riding a bicycle makes one incapable of operating according to the rules of the road, a view for which there is no scientific support whatever, and which is contradicted by the success of the Effective Cycling Program.

Because the vehicular-cycling principle is so important a foundation of the program, it is equally important for the instructor to recognize that he is teaching theory as much as practice, and to phrase his instructions in terms of the vehicular-cycling principle. Even when teaching children, who are not sufficiently mature for instruction in abstract theory, it is important to ensure that the teaching embodies the theory and enables the children to figure out the theory for themselves, even before they are ready to state it in words. This is how children learn about the world. Following the vehicular-cycling principle gives success in three forms. It reduces accidents, it gives legitimacy, and it produces practical mobility for cyclists.

The second reason for the success of the Effective Cycling Program is that each course is based on the generally-recognized method of teaching similar subjects to students of that age.

We consider Effective Cycling to be training in the practical operation of bicycles, and we teach in the ways that have been proved successful for teaching other practical skills. Young students require a great deal of practice and do not learn much from verbal instruction in what to them is abstract theory. Older students can learn more from verbal instruction and a base of that instruction enables them to benefit more quickly from practice. Therefore, they can learn more in the same time and we use that opportunity to teach more. Adult and young adult students who take the course for their own interest both can learn more and want to learn more. For them there is homework, both reading and practical, as well as longer and more detailed lectures before the riding portion of each class. However, even with the greater proportion of verbal instruction, they still get more hours of practical instruction on the road because the course has greater length. Practical instruction is the base of the Effective Cycling Program.

This brings us to the third reason for the success of Effective Cycling: it is a useful course. It aims to impart the knowledge and develop the skills that cyclists need to use their bicycles every day, for whatever purposes they desire, under all conditions of terrain, weather and traffic. The students recognize that they are learning valuable and useful skills, and they respond accordingly.

Even in the restricted format of the school-based courses, in which little more than traffic-safe cycling is covered, the students recognize that this training gives them the practical mobility that they desire.

The fourth reason for the success of Effective Cycling is the knowledge possessed by its instructors. They not only know cycling, but they understand the scientific questions concerning cycling, the social position of cycling in our society and the psychology of cyclists that these have produced. Effective instruction in a controversial subject is possible only when the instructor understands the controversy.

6 OBJECTIVES AND RESULTS

6.1 Full Course for Adults

6.1.1 Objectives of the Full Adult Course

The first objective of the Effective Cycling Course for Adults is to impart the knowledge and develop the skills that are necessary for using one's bicycle every day that one wants, for whatever purposes one desires, under all conditions of terrain, weather, road conditions and traffic. This may also be stated as developing the beginner into what most people now consider to be an expert cyclist or a good club cyclist, although without the connotation of great speed or endurance (which can hardly be developed from scratch in the duration of the course and which some cyclists don't desire).

The mechanical skills should start with choosing a bicycle for fit and quality desired. The students progress to performing all the routine adjustments and inspections on their own bicycles, and to the theory of all the operations necessary to inspect and replace all the moving parts.

The objective of the theory section is to give

the students the theoretical knowledge and the confidence that by following the instructions in Effective Cycling they will be able to perform each of the operations required whenever it becomes necessary and they have the tools to do it.

The manual skills are developed by several exercises: changing and patching a tire, disassembly and reassembly of sample hubs and by disconnecting and rerivetting a section of chain.

The students are encouraged to undertake further mechanical tasks at home by instruction in the principles of bicycle maintenance and simple demonstrations by the instructor. The objective is to make the student as independent of mechanical assistance as is reasonably possible, both in case of mechanical trouble on the road and to obtain reliable and consistent service from his or her bicycle with a minimum of special trips for repairs at bicycle shops.

The bicycle-handling skills to be developed cover all aspects of bicycle handling that are useful when riding on the road. These are: starting and stopping; pedalling smoothly and selecting the correct gear; riding straight even when looking behind; use of the brakes at maximum safe deceleration; rock dodging swerves; instant turns; crossing potholes and diagonal railroad tracks; handling gravel and slippery places; high speeds and high-speed turns on descents.

The physiological knowledge and exercise skills cover all that cyclists need to know about their bodies and minds in order to travel the fastest and furthest that is comfortable for them, with the least fatigue possible. This covers: smooth pedalling style; high-cadence, low-force pedalling; replenishing food, water and salt; physical training programs; saddle comfort; avoidance of exercise injuries, particularly those in the knee; pacing oneself for the ride; time-trialling technique. These are developed in part through lecture and in part with as much riding as we can get in.

The traffic-cycling objectives are to provide the confidence, knowledge and skills to ride under all conditions of traffic. Since many students in this course will be adults who have had bike-safety courses and motor-vehicle driving courses, a very basic objective is to counteract the fear of cycling in traffic that these have produced. This fear is overcome by repeated, successful use of traffic-cycling skills in traffic of gradually increasing intensity. This will not be successful unless the cycling experience is successful, so that the instructor must prepare for success by providing a basis of verbal instruction in theory and method, then demonstration of the method, and then practice in easy traffic. Only when the students perform a maneuver substantially perfectly in easy traffic is it proper to ask them to perform the same maneuver in more difficult traffic.

This foundation process is started with instruction in the principles of traffic law, to give the students both a basic understanding of how the law works and the recognition that the laws for drivers of vehicles (not those for cyclists alone) treat cyclists as fairly as they do other drivers and are the basis for our rights and safety when on the road.

The objectives of the traffic skills section are: knowledge of the basic principles of traffic law and its value to cyclists; knowledge of the accident statistics to learn that the most frequent accidents can be avoided and that the most feared accidents are the least frequent; the skill of selecting the correct position on the roadway under all conditions; the skill of knowing when and how to yield to cross traffic; the skill of changing lanes under all conditions; the skill of selecting the correct starting position at any intersection for any turn; the skill of taking the proper path through merges and diverges; the skill to recognize and evade the more common mistakes made by other drivers; the knowledge of the extra hazards commonly found in bikeways; the confidence to use all these skills in traffic of all intensities.

In addition to teaching competence in the traffic environment, the Effective Cycling adult course has the objectives of teaching the competence to handle other environmental conditions: darkness and rain, heat and cold. Even if none of these conditions occurs during the instructional period, the students should understand the information in Effective Cycling, why each item is important and how to obey it.

Cyclists also need to possess the skills for enjoying cycling. Effective Cycling covers cycling around town and to work, over the mountains, cycling with clubs, cycle touring, some knowledge of racing and the skill of time trialling, and cycling with mate and children. For each subject, the objective is to enable the student to start each activity correctly, avoiding the mistakes of most beginners and starting to acquire the proper skills, even though there is insufficient time in the course for the students to develop great skill. The class rides should have developed the skills of riding in town and in a group, and of riding a time trial, which are the basic skills for commuting, club riding and racing. The skills of mountain riding, tour-

ing, mass-start racing, and of cycling with love can only be introduced verbally within the course (unless the class of students is very unusual).

Lastly, it is highly desirable for students of cycling to acquire some understanding of the political and social situations in which they find themselves as cyclists. People who have studied the technique of cycling in traffic are in the best position to understand and support the vehicular-cycling principle and to learn of the ways in which that principle is opposed. The objective of this part of Effective Cycling is to make the students aware of the reasons why Effective Cycling differs from the traditional bike-safety course, the deficiencies in the federal bicycle regulation (particularly about nighttime protective equipment, brakes, and the regulation's inability to reduce injuries), the political opposition to proper cycling and the reasons for it, the psychology of the cyclist-inferiority complex, and the resulting social status of cyclists. There is insufficient time for students to acquire a detailed understanding of any of these subjects, but they should leave the course with knowledge that these problems exist and that Effective Cycling and the vehicular-cycling principle are the proper criteria for what's right for cyclists and what's wrong with much of present policy.

Results are of two types: skills and knowledge that should be measured to determine how well students have done in the course, and attitudes and opinions that, while important, should not be used to determine student performance. Performance measurement is the heart of the course. Practically all students learn to perform the basic mechanical operations and at least half of them progress to doing more complicated operations at home during the duration of the course. Practically all develop acceptable cycling posture and pedalling motion and increase their speed and endurance. The average increase in speed between the two time trials is about 20%.

They show that they know the physiological reasons for eating and drinking while riding, the importance of salt replacement in hot weather and how to stay warm in cold weather, even though they may have little practice in extreme conditions. Practically all learn to perform the bicycle-handling maneuvers with acceptable speed and smoothness. Class averages for the road test in heavy traffic are about 90% and practically no students who have proceeded that far with the course fail it. Students do not answer written questions about traffic behavior as well as they perform in traffic itself, which suggests that either their verbal skills are not as good as their operating skills, or that they have not yet fully incorporated the vehicular-cycling principle into their understanding of traffic.

6.1.2 Attitudinal Results of the Adult Course

Attitudes and opinions are harder to measure, both technically and because they should not be considered in evaluating student performance. However, most students show significant changes in behavior that are related to changes in attitude and opinion. They ride more and over a wider choice of roads, with less worry about traffic.

They talk about, and take pride in, being drivers of vehicles. They expand their cycling horizons to longer trips to more different places. In places where there are bad bikeways, they conclude that they won't ride on them. Rather than worrying about the dangers of bicycling, a rather typical attitude at the start, they have a confidence that their cycling skills will carry them through.

6.2 Partial Courses for Adults

There has been a long history of complaints that the Full Adult Course (FAC) is too long, that people don’t want to commit ten Saturday mornings to learning cycling. In one sense, that is a reasonable complaint; cycling skill (except for specific parts) is so denigrated that most people see no reason to want to learn it. In another sense, that is a most unreasonable complaint; it takes time to learn the skills that make cycling safe and enjoyable.

If the FAC is too long, then what parts should be deleted? One can consider that the FAC consists of four parts:

1: Bicycle Mechanics: Those skills that are desirable to keep your bicycle operating

2: Bicycle Handling: Those skills that enable you to direct your bicycle on the course and speed that you desire

3: Traffic Cycling: Those skills that enable you to travel safely and effectively in the traffic environment

4: Cycling Enjoyment: Those skills that enable you to enjoy various cycling activities The typical plan divides the time into several blocks of about two mornings each, supposedly more convenient for the participants, who are expected to continue through several blocks. Such plans also reduce the content.

The typical first block limits the Mechanics to safety check, bicycle size adjustment and fixing

flats, the Handling to starting, stopping, and shifting, the Traffic to two-lane easy roads, and eliminates Enjoyment. The result is useless (insufficient practical skill), dangerous (insufficient traffic skill), and unattractive (no enjoyment), and few participants continue.

The most serious purpose of Effective Cycling training is to develop the skill of cycling safely and effectively in the traffic environment. That means, passing the Cyclist Traffic Proficiency Driving Test. If the participants do not learn enough to pass the driving test, the training has been both useless and dangerous. However, when potential beginning participants consider taking the course, traffic cycling is the part that they think they will most dislike and most fear. After all, they have been raised to dislike and to fear cycling in traffic.

Beginners cannot be taught traffic-cycling skills in a hurry. It is not that so much must be learned; most adults already know how to drive in traffic. The difficulty is in adjusting the emotions so that that knowledge can be used when cycling. Hurrying through the instruction subjects the participants to the new stress of cycling in traffic without sufficient time to adjust to it. It also is poor instructional technique because it reduces the opportunities for the instructor to evaluate the progress of each participant, thus possibly pushing a participant into a maneuver for which he is not yet ready. Notice that it is not until the sixth meeting of the FAC that the class does a series of left turns in fast, heavy traffic. Only after that is the class ready to take the Cyclist Traffic Proficiency Driving Test. Therefore, assuming that the participants are mostly beginners, the course can’t be shortened by more than three meetings. And much of those three meetings are devoted to cycling enjoyment, which are activities to which the participants look forward with pleasant anticipation. It is necessary to have sufficient enjoyable and desired activity in the course to attract and to keep participants despite what they anticipate to be the drudgery and fear of traffic cycling.

However, not all classes will consist largely of beginners. When the participants all have considerable experience of cycling in traffic and want to sharpen up their traffic-cycling skills, a two-meeting course works fine. Two mornings with a week between is better, but I have done this on two mornings of one weekend.

This must be emphasized. The Effective Cycling Certificate can be awarded only to those who have passed the Cyclist Traffic Proficiency Driving Test and who have shown a reasonably comprehensive knowledge of other cycling aspects. It is up to the instructor to decide the depth of the course that will lead up to such tests, and, therefore, the level of skill and knowledge required for enrollment in the course.

6.3 Effective Cycling for Children

The objectives for the Effective Cycling courses for children are much less. In most situations there is insufficient time to do more than teach the traffic skills in terms of obeying the five traffic principles in real traffic of the appropriate level. If more time is available when teaching students of 12 or 13 years, then it is used to teach elementary bicycle inspection and maintenance.

The typical course is only 20 class sessions (say 15 hours), yet in this time children aged from 8 years to 13 years (in age-separated classes) learn to ride acceptably well in traffic of the type that they probably need to traverse in their daily travels. Eight-year-olds learn to ride on two-lane residential streets, ten-year-olds and older learn to ride on multi-lane streets, and thirteen-year-olds learn to ride on multi-lane streets with medium-speed, dense traffic. In each case, these students do better than average adult cyclists in the same circumstances. The class average scores on the traffic cycling test in real traffic are about 90%, just as for adults in their course. All of the students learn confidence in what they are doing. The youngest learn that by doing the right thing they can cooperate with motorists. The ten-year-olds learn enough to tell each other how to ride better and to criticize each other's mistakes. The older ones acquire sufficient confidence and understanding of the traffic system to start telling other drivers how to drive better. It is obvious that even without formal instruction in it, these students are acquiring the vehicular-cycling attitude at an early age, before the cyclist-inferiority superstition has hardened in their minds. I hope that they will retain this attitude despite subsequent exposure to the cyclist-inferiority superstition, an exposure that must be expected in today's milieu. The experience of adult cyclists, who rarely, if ever, retreat from the vehicular-cycling principle to the cyclist-inferiority superstition, supports this expectation.

6.4 Attitudinal Results

The traditionalists criticize the inclusion of the above attitudinal objectives, considering that these constitute undesirable social engineering,

the promotion of cycling and the expression of un-American values. This is not so. Individual adoption of the vehicular-cycling view does not come so much from propaganda as from the individual recognition that it is correct for the cyclist, providing the safety, speed and convenience that he requires. It explains the way that traffic operates and how to use its characteristics to achieve safety, speed and convenience. As Francis Bacon remarked: "Nature (the traffic system, in this case), to be commanded, must first be obeyed." That this truth conflicts with current popular opinion merely shows the popular error. While the growth of the vehicular-cycling opinion will eventually overcome current popular error, it is justified by its value to individual cyclists (in providing them with safety, speed and convenience in their chosen mode of travel) rather than by some appeal to mysterious social values.

However, most bicycle activists criticize this range of objectives for being too meager, for not including the social engineering measures and values that they desire. In their desire to convert the world to cycling they want to inform students that bicycles are non-polluting, fuel efficient, much used in China (seemingly forgetting about India, probably because of its politics), still used in Holland (forgetting the deplorable conditions of that use), and a valuable weapon in the wars against the automobile and against urban sprawl. These things are unjustified social engineering propaganda that is controversial, frequently falsely presented and, in any case, useless to the cyclist.

What matters it to the American cyclist how many Chinese cycle, unless he intends to take a cycling tour in that country? What does matter is how to best cycle in America, and that is the subject of the Effective Cycling course, without propaganda for anything else. What some consider to be propaganda is merely learning the truth about how to best use bicycle transportation in the modern cities of modern industrialized nations, and the attitudes needed to protect that use.

7 INSTRUCTOR QUALIFICATION PROGRAM

Effective Cycling Instructor qualification ought to be administered by a Bicycle Transportation Engineering organization. However, at this time (2004) no such organization has decided to do this work. The League of American Bicyclists failed miserably at this task. The reformers have not corrected its problems. Although other groups of persons have talked, no alternate organization has formed. As the author of this Manual, I can be found at:
John Forester
7585 Church St
Lemon Grove, CA 91945-2306
Or through the website:
johnforester.com

7.1 QUALIFICATION PROCESS

Qualification as an Effective Cycling Instructor is earned through a five-step process:
1: Admission
2: Preparation
3: Written Examination
4: Cycling Proficiency Examination (Road Test in Traffic)
5: Practice Teaching

The qualities sought in candidates are experience, knowledge and competence in cycling; understanding of cycling sport and compatibility with cyclists; teaching ability; the ability to organize a course (which means an understanding of the social and political problems of teaching proper cycling technique).

7.1.1 ADMISSION

Admission into the Instructor Training Program is through review of your cycling experience and personal qualifications as shown on your application form, and of recommendations from, preferably, responsible cyclists who know you and have cycled with you. The cycling experience required is regular cycling for both utility and pleasure under all conditions of traffic, terrain, and weather, sufficient to develop the automatic performance of cycling techniques and the attitudes that cycling under all conditions is a normal human activity that is best performed according to the vehicular-cycling principle.

Upon admission, you will be assigned to an Advisor, an experienced instructor who will answer your questions, help you along, keep your progress records, and arrange for you to take each examination when you are ready. The advisor will live as close to you as can be arranged.

You will also be placed on the mailing list for instructor information. You are then eligible to participate in instructor seminars, which often include cycling proficiency examinations (road tests).

7.1.2 PREPARATION (STUDY)

Many candidates have successfully prepared for the examinations without attending any semi-

nars. If you are already a highly competent cyclist, which you ought to be before applying, you know the subject that you will be teaching. However, you may know it without having carefully considered why you operate as you do, the scientific basis for it, and how to explain it to others. Careful study of Effective Cycling will sharpen up your cycling knowledge and enable you to recall it quickly.

You also need to know why Effective Cycling instruction is necessary and its scientific basis. The first chapters of the Effective Cycling Instructor's Manual summarize this subject. We have discovered that certain instructional techniques and sequences are more effective than others because they match the students' cycling psychology. Successful instructors not only use these and similar techniques, but they do so with empathy for each student's emotions. By careful study of the Instructor's Manual you will learn these instructional techniques and understand why they work.

Lastly, most instructors today have to establish the first classes in their areas, because few areas now have cycling instruction. There are many 'bike-safety' programs and events, which the public incorrectly believes provide adequate bicycle safety instruction to participants. The public does not understand that people cannot learn bicycle safety without learning and practicing safe bicycle operating technique; the public's concept of safe bicycle operating technique is limited to curb-hugging, stopping at stop signs, and signalling without looking; and the public believes that what we know to be safe bicycle operating technique is a dangerous activity for super-skilled enthusiasts. Instructors who have been successful in gaining sponsorship and students have successfully persuaded or circumvented officials who probably believed the common 'bike-safety' superstitions; they were able to do so because they understood, without believing, the common social attitudes about cycling. Probably you don't yet understand why you think differently about cycling than most people do. By careful study of the Instructor's Manual you can learn to understand the difference in attitude and how to persuade or circumvent those who believe the common cycling superstitions.

With careful study, and maybe some conversations with your advisor, you will be well prepared to take the examinations.

7.1.3 WRITTEN EXAMINATION

The examination covers three types of material: cycling knowledge, teaching knowledge, and social and psychological knowledge. Most questions require short essays in answer, because the essay form shows how you think about the subject and how you present it. The subjects include: bike mechanics and maintenance; bike handling principles; emergency maneuvers; cycling physiology; techniques for cycling in traffic; techniques for dealing with exceptional conditions of weather, lighting, grades and the presence of other cyclists; sporting touring and social aspects of cycling; teaching skills and the recommended curriculum; social and political issues that affect cycling and the teaching of cycling. You will need to study carefully both Effective Cycling and the Instructor's Manual.

There is no time limit for taking the examination, but most instructor candidates take 3-4 hours to complete it. It is a "closed book" examination.

Normally the Written Exam may be taken close to your home. You should make arrangements for someone to supervise your exam; that is, someone acceptable to your Advisor to whom the Examination Committee can mail the examination questions and who can provide you with a comfortable, quiet place for a few hours to take the examination. Postage and a return envelope are provided to the supervisor for returning the questions and your answers to the appropriate person for grading. The person whom you ask to super-vise the examination must be acceptable to your Advisor (and through him to the Examination Committee). That means that he/she must be a person with a reputation for probity in the cycling community. We suggest, in order of preference: a person suggested by the Advisor, a Certified Effective Cycling Instructor, the officer of a bicycle club, one of the persons who recommended you as an instructor candidate, some other responsible person outside your family. After asking an appropriate person to supervise your examination, you should notify your advisor, sending the person's name and address and a statement that you are ready to take the exam, or will be ready by a certain date.

Examinations are given two or three times a year, but candidates are allowed to take their examination at any time that suits their convenience within a week of the appointed time.

Bring to the examination room a pad of 8.5" x 11" paper for your answers to the essay part of the exam, and a supply of pens or pencils. You will write each answer on a separate page, in order to

assist in dividing up the grading work among several readers.

Grading normally takes from two weeks to two months, depending on the time of year (may be slow during good cycling weather), vacation schedules, job obligations, and other correspondence of the volunteer instructors who grade the exams. You will be notified by letter of the results as soon as available. You must score at least 70% on each part of the examination to pass. Good preparation will make failure unlikely, but should you fail once you may take another version of the examination at a later date.

7.1.4 CYCLING PROFICIENCY (ROAD) TEST

The instructor-level cycling proficiency (road) test is similar to that which all instructors give their students, but it is longer so it can include as many cycling situations as is possible, and substantially perfect performance is required.

The road test is administered by an approved instructor. In many cases, road tests are given as part of an instructor seminar, or at cycling conventions or rallies. Otherwise, your Advisor will try to arrange for you to take the road test with an approved instructor at a mutually agreeable place and time. For some candidates in very unusual locations, a different arrangement has been made. The test will be largely run over city streets at a time of medium to heavy traffic, because deter-mining your competence when cycling in traffic is the major objective.

When taking the cycling proficiency test, you need bring only normal cycling equipment.

7.1.5 PRACTICE TEACHING

There are two methods of fulfilling the practice teaching requirement. Method (A) is preferred if you live near an active Certified Effective Cycling Instructor. Method (B) will have to be used by those remote from a certified instructor. Both are described in more detail below.

7.1.5.1 Teaching Assistant

Assist a certified EC Instructor in teaching one or more courses. You should be involved as much as possible in all aspects of the course including planning, promotion, performing mechanical demonstrations, lecturing on theory, leading the on-road instruction, preparing and grading written examinations, and giving road tests. When the certified instructor feels that you have gained sufficient experience, he or she should give you a letter to this effect for you to submit in support of your practice-teaching report (described below) and send this to your Advisor with the letter from the supervising instructor.

7.1.5.2 Teaching On Your Own

If this method is allowed by your Advisor, you may arrange and teach an Effective Cycling course. The course should cover at least the material in the first seven sessions of the eleven-session course that is outlined herein, although you may rearrange the material as necessary or desired to suit your planned schedule. You should have at least five students taking the course. Most of the students should be inexperienced cyclists, but you should also have one or two who are experienced, because these help the class along.

You should arrange for some evaluation of your course by an experienced cyclist, for example by having a certified instructor or an officer of a bicycle club attend one or more of your later sessions and write a letter to your Advisor giving his or her evaluation. In any case, you must submit to your Advisor sufficient information to enable him or her to reach an objective evaluation of your teaching practices and skills. The most important information is how well your students learned: if the students learned well, the instructor taught well.

7.1.5.3 Practice Teaching Report

This report is to substantiate the claims that you taught and that your students learned. It should include at least the following information.

1: Your course schedule and the sponsoring organization (if any).

2: The number of students starting your course, their initial experience levels, attendance during the course, number remaining at the end, and the number of successful completions.

3: Any noteworthy successes, failures or problems, and your assessment of the reasons for them.

4: The final examination written questions, the students' answers and your grading of them. The score sheets for the final road test.

5: Comments by your students about whether or not they felt comfortable with your teaching style.

6: If you didn't use the outline given herein, whether or not you were satisfied with the course outline that you used, and why.

7: What you feel was the most important thing that you learned by teaching the course.

7.1.6 CANDIDATES WITH EXTENSIVE TEACH-

ING EXPERIENCE

Some instructor candidates, prior to applying to the EC Program, have acquired extensive experience by teaching cycling courses on their own.

Such candidates, if they feel that their experience is substantially equivalent to the normal practice-teaching requirement, may submit a practice teaching report as described above. The Advisor will judge the extent to which the candidate has fulfilled the practice teaching requirement.

7.2 PATCHES AND CERTIFICATES FOR STUDENTS

If you teach a course as an authorized instructor-in-training and thereby are granted your Effective Cycling Instructor's Certificate, your successful students will be eligible to receive Effective Cycling patches and certificates.

8 ORGANIZING AN EFFECTIVE CYCLING COURSE

8.1 MARKETING EFFECTIVE CYCLING

8.1.1 FINDING A MARKET

The most difficult task for an instructor is attracting students to a course. With other sports like skiing and swimming and with activities like driving a motor vehicle people sign up for classes because they want to learn. Some are motivated by the desire to acquire skill and knowledge, some to learn to avoid the dangers of the activity, and some, for some activities, to learn to pass the licensing test. With cycling it is not so. People are convinced that cycling in traffic is dangerous, but they are also convinced that what they were taught in bike-safety classes is all that can be done to lessen that danger. As badly as most people ride, they are satisfied with that degree of skill because they believe that there is no more to learn. Because cycling is a childhood activity, they believe that what they learned as children is all the knowledge about cycling that exists.

There are exceptions, but these are the exceptions that demonstrate the general truth of this rule. Many people recognize that they don't know how to maintain their bicycles, partly because modern bicycles differ from those they had as children and partly because they were never taught bicycle maintenance. Many people recognize that they don't know what equipment to take on a long tour, because they have never toured before. These reasons explain why the most popular bicycle classes are about maintenance and the next most popular are about touring with emphasis on the equipment.

Bicycle safety doesn't sell. People have been convinced by boring bike-safety classes that they know all that there is to know about that subject, and they don't want to hear any more about it. The skill of cycling through urban traffic attracts only the few who want or need to ride in urban traffic; most people want to ride in rural areas and plan to avoid riding in cities, or else they advocate bikeways so that they won't have to ride in traffic. Very few people start cycling with the intention of learning to ride centuries; they believe that twenty-five miles is a long distance. Cycling is a minor sport and a minority interest in America. The surveys that show that cycling is America's second most popular sport are false: they show only the popularity of what Americans think is cycling, which isn't cycling at all as we sporting or transportational cyclists know it.

In organizing an Effective Cycling Program, the instructor must work within the limited market that exists outside these generalizations. He must attract unusual people to the course. Some criticize this viewpoint as elitist, but it is not. Elitism is a pejorative word that is frequently misused, but its essence is the belief that only the few having the greatest aptitude are worth consideration. Success in Effective Cycling is not a matter of aptitude, for practically everyone can learn the Effective Cycling techniques if they want to. The question is interest rather than aptitude; finding those who are or may become interested. Those who criticize Effective Cycling for being elitist commit the opposite error when they teach cycling. In their effort to be populist, they teach only the popular and easy aspects, ignoring the heart of the course that we teach. The best way is to be neither elitist nor populist, but to do what works best. That is, to appeal to the interests of prospective students, and then to teach them far more than they originally thought they wanted to learn.

There is some connection between interest and aptitude. In a society whose dominant idea about cycling is the cyclist-inferiority superstition, people who think for themselves are more likely to be interested in cycling than are those who accept the popular beliefs. Although cycling is a cheap means of transportation, only a few of those who

are interested in cycling (except for university students) do so because they need cheap transportation. Although cycling is a good means of getting about in a congested city, relatively few people (except the transportation reformers) are interested in urban transportational cycling. In America, cycling is not a poor person's transportation or sport, but neither is it a rich person's sport.

The poor person and the person with a blue-collar job are more interested in cars than in bicycles, the rich person in yachts, horses and airplanes. Interest in cycling is greatest among people with middle-class incomes and technical or professional jobs or intellectual interests. Within those groups, interest is greatest among those who are interested in physical fitness, an active lifestyle or the outdoors. The Effective Cycling Instructor is most likely to attract students if he markets his course among such people, and the major attraction is the enjoyment that people will receive through cycling, or, more exactly, the greater enjoyment they will receive through Effective Cycling training than by learning the hard way. We must always remember that cycling interests only a small minority of the population. It isn't true that there are millions out there who are just hungering to go cycling except for their fear of cars. The small number of cyclists is why the mass media pays cycling little attention and then is generally inaccurate. For the same reason, mass advertising doesn't pay, because the cost depends on the very large number of copies of the advertisement that are distributed to everyone while the returns are based on the very small number of people who are interested in cycling and the even smaller number who are, at that time, interested in learning to cycle better. The Effective Cycling Instructor needs to find groups of people where the potential interest in learning Effective Cycling is far greater than average, and to inform them that the course exists and of its schedule. This takes time. You can't expect to develop sufficient interest in a class in the one month before it is scheduled to start.

Before discussing other prospective audiences we'll look at the two that were mentioned above as exceptions: the university students and the transportation-reforming, bicycle-activist associations. The great crowds of bicycles around some university campuses suggest that these are great markets for Effective Cycling, but it hasn't proved so. University cyclists are involuntary cyclists; they cycle because they have to, as little as possible, and they stop cycling as soon as they can. Of course, hidden in the crowds of involuntary cyclists are some voluntary ones, but they are not specially visible. Because cycling is a seductive sport, some of the involuntary cyclists may decide that they enjoy cycling, or are ready to make that decision if they are guided correctly, but, again, these are a small minority that must be sought out. The universities themselves are not inclined to help. They do not consider cycling to be a university sport, and they will not pay faculty to teach or coach it. Even those universities that pay the medical costs of many cycling accidents that occur on campus have not thought it worthwhile to make cycling courses available as a means of reducing their risks. The most that universities will do is to provide the institutional approval for a cycling club or team that operates largely on its own money. That makes the university market for Effective Cycling merely another club market, and one whose members have little money to pay for it.

The typical association of bicycle activists expresses great interest in cycling and in encouraging cycling, but most of these (there are a few notable exceptions) have not sponsored Effective Cycling courses. Their interests are different; many of their members encourage cycling principally as a means of opposing motoring. They loudly express their opposition to Effective Cycling as elitist, because they are not interested in better cycling but in more cycling, obtained in whatever way will attract the ill-informed majority of the population. Therefore, they take the popular route of catering to the cyclist-inferiority superstition by advocating bikeways and bicycle program offices, rather than the unpopular route of opposing these and supporting Effective Cycling and better cycling by and for those who choose to cycle, no matter how few they are. So long as these opinions are so prevalent in them, the bicycle associations are not a good market for Effective Cycling.

With these two potential specialized markets aside, the problem returns to that of locating, informing and attracting the potential students among the general population. Bicycle clubs are an obvious medium. Their members are interested in cycling, and some are new and inexperienced. Furthermore, their members are likely to have contact with people who are thinking of starting to cycle or who have done so but haven't joined the club. The club may also have contacts with local government, service organizations and media. Its ride for each week may even be published in a local newspaper's activities section.

Bicycle clubs have been one of the most successful bases for Effective Cycling courses.

Because Effective Cycling blends cycling with education, it would seem that it would fit well within the adult education and community college systems. It used to be so; community colleges used to be the most successful bases for Effective Cycling courses, but financial strains now limit most such institutions to courses that society considers useful. To put it more plainly, society is unwilling to subsidize instruction in Effective Cycling and many other self-development subjects. For Effective Cycling instruction to succeed, it must support itself by offering instruction that people are willing to pay for. As in most other aspects of cycling, we can't expect government to do it for us; cyclists must do it ourselves.

Bicycle shops are certainly places frequented by people who are interested in cycling, but, with rare exceptions, they are not good bases for an Effective Cycling course. The usual shop owner has a short-sighted view of cycling. He is interested in things that bring people into his shop more than in things that increase people's pleasure in cycling. This is short-sighted, because students in Effective Cycling courses tend to go on an equipment splurge once they find out what they want, and the more that they cycle the quicker they wear out their equipment and need to replace it. But the fact remains that the prospect of an Effective Cycling course that will start next April does not favorably affect sales in January.

Establishing an Effective Cycling course seems to the shop owner to be a longer-term investment than he usually considers, and he is used to dealing with tangible inventory like bicycles rather than intangible assets like programs. However, bike shops are good places for distributing publicity about Effective Cycling courses that are based elsewhere.

It is important to search for students in a cycling area, a place where voluntary cyclists are and, therefore, where a higher than average proportion of the population are likely to be potential students. By cycling area, I mean an area where cyclists live, not areas where cyclists like to tour. So far as I know, no courses are given in areas where cyclists like to tour but do not live. Since cyclists tend to be middle-class suburbanites with technical or professional jobs or intellectual interests, the course should be where such people live. Poor areas, blue-collar areas and the richest areas are not suitable. It is also possible to give courses where technical and professional people work, particularly if they are given at lunch time or immediately after work in the summer, generally through an arrangement with the employer.

8.2 SELECTING A BASE OR SPONSOR

The class needs a base, and a sponsor can provide some assistance.

However, these are not necessarily the same. A sponsor provides institutional support as well as, possibly, money. A decade ago, when a community college adopted the course it provided publicity (through its catalogs and flyers), enrollment procedures, a classroom, insurance, and a salary for the instructor. This is much less likely now than it was a decade ago. Today, community colleges charge the students enough to pay the instructor and to pay for their overhead expenses. In return, they supply only the classroom, insurance, and a listing in the catalog. It may not be worthwhile to seek a sponsor under these terms.

I have taught both through a community college and on my own with my house as base. When teaching at my house I held the lectures in my back garden and planned to move inside, carefully, only if it rained. Teaching at my home was no more difficult, even easier, than teaching through the college. Modern technology has provided machine substitutes for many of the other services that sponsors used to supply. For example, a personal computer at home, with access to a quick-print shop, provide an efficient means to produce publicity flyers. The same computer with printer provides cheap copies of papers that are needed in only small amounts, like route sheets and exams. A telephone answering machine receives calls whenever they are made, whether you are at home or not. An electronic calculator makes it easy to calculate test scores and to keep simple accounts about the course finances. All in all, it is possible to run a course from one's house and it has the minor advantage that all of one's tools and displays are right at hand.

However, one's house may not be in the right location for teaching the course, or one may live in an apartment. Then the instructor needs to locate a suitable class meeting place. A classroom-type room with easy access from the street is ideal, but the ideal is necessary only if the probable weather requires an enclosed room. If that is what you need, most likely it can be obtained only through a sponsoring organization. In that case, it may well be the sponsor's major contribution. However, an

enclosed room is not always necessary. If the weather is good, a public park is suitable, and many of these have some roofed-over space that can be used if it rains. Nothing that is done in class requires chairs and tables. The mechanical demonstrations can be done while sitting on the ground, as roadside repairs must be, and they can't be done in a chair with a writing arm because that slopes too much. The final exam papers can be held on temporary clipboards made of corrugated fiberboard (cut from cardboard cartons for lightness). The equipment for most sessions can be carried in a saddlebag, and the largest amount for any session can be carried in a pair of panniers.

8.3 ATTRACTING STUDENTS

Even if the instructor is attached to an educational institution, he must attract students through his own efforts. It is insufficient to put the course on the schedule and wait for students to sign up. (Of course, things might be different in a university setting, but we are not discussing that.) The instructor needs to use all the contacts he has and can develop to spread the word about the forthcoming class.

People respond best when an appeal touches their present interests. Saying that the Effective Cycling course will teach people how to ride centuries does not attract prospective students because until they have greater cycling experience they are appalled at the prospect of riding 100 miles. Most people who are interested in learning to cycle better have the quite modest expectation of getting more enjoyment from cycling. They want to avoid the problems that they recognize, learn how to ride easier, learn about equipment, and have companionship. Very few, at the start, are interested in becoming expert cyclists although the Effective Cycling course will develop them to what is commonly considered the expert level. The most effective appeals deliberately underplay the expert aspects of Effective Cycling and emphasize that the course is designed for beginners, that it teaches beginners everything that they need to know to enjoy cycling.

Emphasize the following: looking after your bicycle, learning how to avoid problems and accidents, learning how to ride more easily, developing physical condition, learning about touring and touring maps, going on lots of enjoyable rides with other beginning cyclists. You have to be honest, but it isn't honesty to frighten people with facts that, when they actually experience them, are not frightening or even difficult to handle. Of course, the pitch to cycling clubs and experienced cyclists can be both broader and much more specific, because they understand what you are talking about. Telling them that you end up with a 40 mile ride with a lunch stop doesn't scare them. To them you point out the expert aspects of Effective Cycling, and say that even most experienced cyclists get a lot out of the course. To them you emphasize the traffic cycling, the accident statistics and accident avoidance, the advanced bike handling, the touring and racing information, the advanced maintenance skills and the philosophy of the vehicular-cycling principle. This is all true, because the state of cycling knowledge is so low that even people who think that they are well-informed still don't know as much as is taught in an elementary course like Effective Cycling. Effective Cycling develops beginners into experts; it's good for both beginners and the moderately experienced club cyclist. However, be careful in how you distribute appeals to the expert aspect of Effective Cycling. It's fine to tell that to club members, but when you give them flyers to distribute to their friends and people who may contact the club, who are probably beginners, give them flyers that emphasize the beginning aspects. There are four basic ways to distribute information about a forthcoming course: personal speech, indirect distribution of flyers, notices in the cycling press, and notices in other lists of activities. There are quite a few local organizations who will listen to talks about cycling or bicycle safety, if you pitch the talk to their interests: PTA's, service clubs, school organizations, Y's, outdoor clubs, and of course bike clubs. Give them an interesting talk, inform them of the Effective Cycling course, and hand out flyers. Flyers can be distributed indirectly by giving them to bicycle shops, recreation departments, and Y's.

In areas where there is a cycling press (ranging from bike club newsletters to calendars of cycling events to tabloid monthly newspapers), the editors are likely to carry a story as well as the terse announcement of the course. Publications which are interested in local events may also carry a story that announces the course.

The flyer is of utmost importance, because in each type of distribution the object is to get a flyer that has the appeal, the enrollment information, and application form into the hands of a prospective student.

The flyer must contain the following items: an attention-getting appeal; a description of what the student will learn and how it will benefit him; reference to the stature of the Effective Cycling Program and the particular instructor; the name of the sponsoring institution (if there is one); a particular person, address and phone number to contact for further information; the times and place for the course; how to enroll; the cost; and an application form. There may be good reason to prepare several versions of the flyer with different appeals and descriptions that emphasize different aspects of the course for different markets. The appeals and descriptions ought to be written according to the considerations discussed above.

8.4 SAMPLES OF APPEALS AND DESCRIPTIONS FOR FLYERS

The first flyer shown in the next page. is intended for the general public, the second is intended for members of a bicycle club.

9 PREPARING TO TEACH

You need to get certain items of equipment ready before you start teaching. You need cycling equipment, tools, demonstration equipment, printed forms, supplies, clothing, as detailed on the following checklists. You may also need to arrange for textbooks for the students and for a video to show.

9.1 TEXTBOOKS AND FILMS

The usually-used textbook for an Effective Cycling course for adults is Forester: Effective Cycling. If the course situation requires the instructor to manage the supply of books, instructors can purchase copies of Effective Cycling at wholesale prices from the publishers: The M.I.T. Press, 55 Hayward St., Cambridge, MA 02318; MITPress-orders@mit.edu.

The usually-used textbook for a course for school children is Forester: Effective Cycling at the Intermediate Level. This is available from its publishers: John Forester Publications, 7585 Church St., Lemon Grove CA 91945-2306.

A book that you may wish to use to improve your knowledge of cycling affairs and cycling policies, particularly as concerning government, is Forester: Bicycle Transportation, also published by The M.I.T. Press at the address given above. You may wish to show a video, either during the course or when disseminating preliminary information about the course, as when organizing a program or as publicity for the course. The same situation prevails about videos as about books; most are worthless or harmful.

The only video that I recommend is what is commonly known as The Effective Cycling Video, produced by Seidler Productions, seidlerproductions.com.

9.2 CYCLING EQUIPMENT

1: Bicycle
2: Nighttime equipment capable of being mounted on your bike: Headlamp, either bright LED or generator type, bright rear reflector, LED rear lamp
3: Mudguards
4: Water bottle and cage
5: Saddlebag
6: Tire pump, frame mounted type, with head for both Schrader and Presta valves
7: Touring pannier rack
8: Touring pannier bags
9: Touring tools
10: First aid kit
11: Oil squeeze bottle with very narrow tip, or other oil application tool

9.3 DEMONSTRATION EQUIPMENT

The following items are required:
1: Rear derailleur, racing or touring, but opposite from your own type, used is OK
2: Spare brake and derailleur wires
3: Soft plastic foam, 3" cube, 2 pieces
4: Chain, short sections, used, 1 per student, prepared for chain joining practice
5: Rim section, 6" long, steel, common wired-on section
6: Rim section, 12" long with valve hole, light alloy, narrow, drop center (Welch type), prepared as rim tape exhibit
7: Rim section, 6" long, Mavic Elan or other pure hook bead type, prepared as rim taping exhibit
8: Tire section, 6" long with tube, high pressure wired-on of best type
9: Tire section, 6" long with tube, utility wired-on or heavyweight

The following items are required only for a course with the more detailed mechanical instruction.
1: 1: Tire section, 6" long with tube, racing tubular (if students are interested)

ENJOY YOUR CYCLING MORE!

TO GET MORE FUN FROM YOUR BIKE JOIN THE EFFECTIVE CYCLING PROGRAM

EFFECTIVE CYCLING teaches everything you need to know to enjoy cycling, from rides around the neighborhood to tours in delightful countrysides.

Each Effective Cycling session is a ride in which you are taught, practice and enjoy some aspect of cycling:

CYCLING SKILLS	
Bicycle Maintenance	Bike-Handling Skills
Developing Coordination for Easy Cycling	Developing Physical Condition for Faster Cycling
Learning How to Handle Traffic	Cycling With a Club
Going on Tours	Teaching Your Own Children

These rides are carefully adjusted to match the progress of the class; you always have companions of your own level of skill and condition. By the end of the course you will be confident wherever you ride your bicycle, and will be ready to ride with experienced cyclists.

The Effective Cycling Program was developed by John Forester, a famous cyclist and cycling transportation engineer, the author of the two leading books in the field, Effective Cycling and Bicycle Transportation. It is an enjoyable way to learn the easy methods and effective skills of cycling that he has learned in fifty years of cycling enjoyment and twenty five years of study, research, and teaching.

The Effective Cycling course will meet on eleven Saturday mornings, from (starting date) to (completion date), starting at 9:00 am, at (place). Preparation for each session will include additional cycling and a reading assignment. Sessions will start with a short talk and demonstration and then the class will go on a ride. Most rides will end at 12.00 noon, but for one later ride we will take our lunches and ride into the afternoon.

The course is sponsored by (institution's name) [and 3 credits will be awarded]. The fee for the course is $----, payable by check to _____ at _____(address). The course text is Forester: Effective Cycling, which is available at _____ for $____.

Participants may use any bicycle with hand brakes and a variable gear (3-speed, 5-speed, 10-speed, etc.). Do not purchase any equipment until after the first meeting, because the instructor can advise on what is best for your cycling style.

IMPROVE YOUR CYCLING SKILLS AND KNOWLEDGE

LEARN THE EFFECTIVE CYCLING SKILLS

EFFECTIVE CYCLING SKILLS	
Faster Bike Handling Accident	-Avoidance Techniques
Riding Harder With Less Fatigue	Better Maintenance Methods
How To Handle Traffic	Riding At Night
Principles of Gears and Gearing	Touring and Racing Techniques
Cyclists' Rights and Duties	Protecting and Advancing Cyclists' Rights

EFFECTIVE CYCLING is the fast, enjoyable way to become an expert cyclist. Stimulating lectures provide the knowledge, exciting rides develop the skills of EFFECTIVE CYCLING.

The Effective Cycling Program was developed by John Forester, a famous cyclist and cycling transportation engineer, the author of the two leading books in the field: Effective Cycling and Bicycle Transportation. His fifty years of cycling and twenty five years of study, research, and teaching combine the lessons of experience with the latest scientific knowledge. You will learn the skills that have worked for cyclists and why they work. You will develop confidence in your skill and knowledge. You will learn why EFFECTIVE CYCLING is the best guide to what's right for cyclists in governmental policies.

The Effective Cycling course will meet on eleven Saturday mornings, from (starting date) to (completion date), starting at 9:00 am, at (place). Preparation for each session will include additional cycling and a reading assignment. Each session will include:

1: Cycling knowledge discussion
2: Bicycle mechanical demonstration or practice
3: Cycling skills instructional ride

Most rides will end at 12 noon, but at least one ride will be an all-day ride with a picnic lunch.

This course is intended for persons who have some cycling experience and can ride 25 miles in 1.5 hours.

The course is sponsored by (institution's name) [and 3 credits will be awarded]. The fee for the course is $____, payable by check to _____ at (address). The course text is Forester: Effective Cycling, which is available at _____ for $____.

Do not purchase any additional equipment until after the first meeting, because the instructor can advise on what is best for your cycling style.

2: 2: Rim section, 6” long, for racing tubular (if students are interested)
3: Headset bearings, full set of cups, cones and balls, used, prepared according to the instructions given later in this chapter.
4: Bottom bracket axle, cups, balls, used, prepared according to the instructions given later in this chapter.
5: Hubs or pedals, used, 1 per student, prepared for bearing assembly instruction according to the instructions given later in this chapter.
6: Cups, small, paper or aluminum foil, 2 per student for holding bearing balls

9.4 REGULAR TOOLS

1: Spoke wrench
2: Chain tools for chain joining practice (students should have their own, but you should have some extras)
3: Socket wrenches, 1/4" drive, Tee handle, 3" extension and 8, 9, 10, 11 mm sockets
4: Adjustable wrench, 4" long
5: Adjustable wrench, 6" long
6: Screwdriver
7: Cotterless crank removing tool (the one that fits your cranks is fine)
8: Hexagonal keys, 5, 6, 7 mm

The following is required for the course that includes the more detailed mechanical instruction:

9: Cone wrenches, assorted sizes to fit the hubs that you use for bearing assembly practice

9.5 HOMEMADE TOOLS AND DEMONSTRATION EQUIP

1: Tire repair kit per Effective Cycling Chap 2
2: Third-hands, string type, 2 extra
3: Bike stand. The type depends on your classroom base. Instructions for making a simple portable type that you can carry to class and also use on the road are given later in this chapter. If you have secure storage for tools, then either a fixed base type or the semi-portable bipod type that fits the down tube and bottom bracket is suitable.
4: Rim-vertical-dent removing tool (rim jack) per Effective Cycling Fig. 19.4.
5: Empty tuna can, or similar, and 1" paint brush (cheap) for chain lubricant.
6: Cable housing, 1 foot, with nipple on one end and other end ground or filed square.
7: Inner tube and patching materials for patch demonstration.
8: Number placards, one per student (not necessary if you know the students by name).

9.6 PAPER FORMS

1: Maps, local, different scales of same area.
2: Maps, local touring areas
3: Maps, topographic, some local area
4: Map measurer (opisometer)
5: Enrollment forms. See Fig 6
6: Route sheet forms. See Fig 7.
7: Time trial result forms

8: Club newsletters from local clubs, racing and touring newsletters or newspapers, cycling magazines

9.7 SUPPLIES

1: Chassis grease, black molybdenum disulphide type, small can
2: Kerosene for cleaning solvent, 1 gallon
3: Oil, SAE 90, 1 quart
4: Chain lubricant, per Effective Cycling Chap 10 or your choice
5: Cleaning rags, 1 per student

9.8 CLOTHING

1: Spare shorts, chamois or synthetic lining
2: Polypropylene short liner
3: Cape and spats for rain gear
4: Helmet
5: Shoes with the type of foot-retaining system that you use.

9.9 MAKING EQUIPMENT

9.9.1 TIRE INFLATING EQUIPMENT

The instructor has to be able at the first class to pump any type of tire that students may have. In the old days we went to much trouble (and time) to make adapters and modify students’ Schrader valves. Nowadays, with high-pressure pumps that have two heads, one for Schrader and one for Presta, get yourself one. You will be ready for whatever failures your students present. Remember, a high-pressure pump can pump low-pressures tires, but a low-pressure pump cannot develop sufficient pressure for high-pressure tires.

9.9.2 BEARING ASSEMBLY AND ADJUSTMENT KITS

9.9.2.1 Get bearing assembly kit for each student. Kit consists of:

1: Hub (or pedal if insufficient hubs are available)
2: Two small cups (paper or aluminum) to hold bearing balls
3: 1 cleaning rag
4: Cone wrench to fit hub (See below) Students use own dumbbell wrench or adjustable for hub lock nuts.

9.9.2.2 Prepare Hubs Or Pedals
Prepare the hubs (or pedals) as follows:

Hubs must have loose balls (no cages), and preferably have toothed lockwashers to fit axles with slots, and dust covers that are part of the hub, not the cone. Hubs should not have either quick-release skewers or wheel retaining nuts. Disassemble and clean the hubs. Make sure that the cones and balls are smooth. Replace if necessary. Run the cones and locknuts on and off the axle enough times, or use a thread-cleaning die on the axle, so that the cones and locknuts can be easily turned with the fingers for the full length of the thread. If any have the Campy-style rear locknuts, replace these with hex locknuts to save on cone wrenches. Reassemble the hubs with light oil, not grease, and make sure that each can be adjusted properly and will then run smoothly.

9.9.2.3 Cone wrenches:

You need sufficient for the class. The Mafac multiple-size cone wrench is good for this, because it has one smooth jaw and one with 4 notches for different sizes of cone. Most Americans don't recognize its function. Also usable are cheap sheet-steel open wrenches, ground thinner if necessary, in the following sizes: 1/2" (file to 13mm); 9/16" (for 14mm); 5/8" (for 15mm and file to 16mm); 11/16" (17mm). It would be nice to have one wrench of the correct size for each hub, but a bit of sharing can be accommodated.

9.9.3 RIM TAPING SAMPLES

From a discarded light-alloy, drop-center, (Welch type), high-pressure narrow rim cut a piece about 1 foot long that includes the valve hole (or drill a new valve hole in the center of the cut piece). On each side of the valve hole fill the drop center with silicone rubber, building it up flush with the shoulders of the rim at the valve hole and tapering off to zero thickness before reaching the first spoke hole on each side of the valve hole. Leave the valve hole open. This work is described in Effective Cycling Chap 8, Fig. 8.10. With epoxy glue fasten nipples into the spoke holes as if they were held in by the spokes.

On one side of the valve hole, install permanent rim tape consisting of two sections of twine and one of adhesive tape, again following the instructions in Effective Cycling Chap 8, Fig. 8.8. When cutting the string, leave its ends long so that they protrude from the end of the rim section, so the students can see where they run under the adhesive tape.

From a discarded pure hook bead rim cut a section about 6" long (several spoke holes long). With epoxy glue, fasten nipples into the spoke holes as if the spokes were holding them in. Install rim tape to cover all but one of the spoke holes.

Cut a 6" long section of common steel rim to show its hollow construction.

9.9.4 HEADSET BEARING DEMONSTRATOR

This is an easy-to-carry item with windows cut into it so that the students can see the location of the parts inside.

Find a discarded frame with intact headset with steering column and fork crown. Disassemble the headset unit, including removal of the bearing cups and head tube bearing races. (No need to remove the fork crown race.) By cutting the top and down tubes about 2" from the head tube, separate this from the rest of the frame. Cut the fork blades from the fork crown. With a hacksaw, cut out approximately a quarter segment (90°) from the head tube, leaving a C-shaped unit. Clean up all the parts to make a nice display. Reinstall the head tube bearing races. Reassemble the headset parts in the normal way.

You may want to prepare a bottom bracket with cup-and-cone bearings in the same way. Whether you will use it depends on how many students show up with this type. Also, get a used or new bottom bracket cartridge to demonstrate the new type.

9.9.5 PORTABLE BIKE STAND

Here is a portable bike stand that supports the handlebars of an upside-down bike. It can be carried easily with a few tools in a saddlebag. Just follow the drawing below to make it. For ease in assembly, bend both brace wires to exactly the same size. Drill the holes in the base. After assembly, drill the holes in the uprights to suit the brace wires. Then the brace wires are interchangeable.

See Fig 2: Portable Bike Stand.

9.9.6 MODIFIED TAPE RECORDER FOR ROAD TESTS

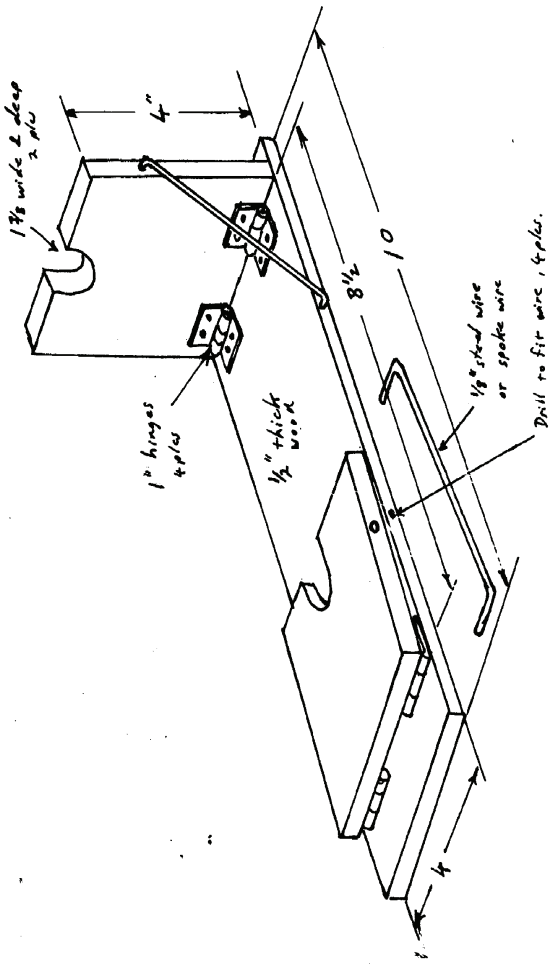

Fig 2:Portable Bike Stand

You must be able to control the recorder with both hands on the handlebar. This means that the recorder must have jacks for both a remote microphone and a remote on-off switch. A voice-operated (VOX) recorder is ineffective because most of what it records will be traffic noise. The maximum recording period need be no longer than one hour.

The recorder is a standard cassette-type portable battery-powered recorder with provision for remote on and off switching and for a remote microphone. The recorder is carried in a small backpack (preferably made to fit) or, if small enough, in a jersey pocket. The microphone may be either clipped to the jersey (called a lapel-mounted or a tie-clip type), or a microphone mounted on a headset and positioned adjacent to the mouth. The remote switch consists of a single pole, single throw, momentary contact, normally off, keyboard control button designed for mounting on a printed circuit board (I used Electrocraft 35-418, probably not now available; Partsexpress.com miniature pushbutton switch 069-110 is similar), which is connected to a 24ga 2-conductor wire. Sew a thumbstall (like the thumb of a glove) and arrange a wrist strap secured with velcro. Glue the wired switch to the ball of the thumbstall with plenty of silicone rubber that is well filleted around the switch. Make two arm-sized elastic and velcro garters to hold the switch wire to your arm. Put on the backpack with the recorder inside (a slab of polyurethane foam between recorder and spine is comforting). Mount the thumbswitch on your thumb and clip the microphone to your clothing just below your collar. Then cut the switch and microphone wires to the correct length, and fit with plugs to match the recorder jacks. Fasten or sew the wires to the backpack shoulder straps to prevent them from getting caught.

1: Push Switch
2: Microphone
3: Wire, 24ga, 2 cond.
4: Plug to fit remote jack, 2 each
5: Plug to fit microphone jack
6: Foot Switch

To use the recorder, put the recorder in the backpack and connect the wires. Put the recorder in Record mode; it will not operate because the switch is off until you press it. Put on the backpack, mount the thumbswitch and with the armbands secure the switch wire to your arm just above and below the elbow. Clip the microphone in place. To operate while riding your bicycle, press the thumbswitch either with your forefinger or against the handlebar or brake lever mount, and speak naturally. When dismounting, release the recorder from the Record mode because many recorders are damaged by being stored with the heads and capstan advanced, as in either Record or Play modes.

With odometer and watch, this recorder is also useful for making evaluations of trips and routes.

When playing back the tape to record observations on paper it is a great help to have a foot-operated switch to turn the recorder on and off. These switches are commonly available for use in transcribing dictation, and have a cord that plugs in to the same socket that you have used for the thumbswitch.

9.9.7 NUMBER PLACARD

The number placard is a simple way to make

easily-donned numbers to identify students for both classes and tests. You need as many placards as students plus a few spares.
For each placard you need:
1: Fabric, lightweight, light in color, 10" x 12" tear size
2: Battens, 2, 1/16" x 1/4" x 9-1/4", made of wood, plastic or stainless steel
3: Bias tape, 1/2", 12" long, 2 pieces
4: Shoelace, 36" for smaller students, 44" for larger students.

You also need a waterproof marker with a wide (1/2"+) tip for marking the placards. Sew a quarter-inch hem into both the 12" sides of the fabric to form the top and bottom edges. Hem each remaining side to form a tube that will accept a batten. Slip a batten into each tube and sew the tube's ends closed to retain the batten. Into the fabric that is adjacent to the two ends of one batten sew the two ends of one 12" piece of bias tape. Sew them so the tape forms a loop extending horizontally from each end of the batten.

Repeat for the other batten. Into the middle of one of these tapes tie a shoelace so that one end is about 12" longer than the other. The end of the placard that has the shoelace will be the right-hand side. With the marker, write the numbers that you desire on the placards. Use only two-digit numbers so that there can be no ambiguity caused by omitting a digit, and use no numbers that can be misread if they are donned upside-down.
See Fig 3: Number Placard.

See Fig 4: Enrollment Form
See Fig 5: Route Sheet Form
See Fig 6: Time Trial Results Form
See Fig 7: Cycling Proficiency Score Sheet 1
See Fig 8: Cycling Proficiency Score Sheet 2

10 TEACHING THE ADULT COURSE

COURSE OUTLINE
This is based on the course that is described and outlined in Appendices A and B of Effective Cycling. These have proved to be very practical and their use is recommended whenever the circumstances allow.

10.1 SESSION 1

10.1.1 SESSION 1 PREPARATION

No route sheets. Select general area for first ride on quiet, flat residential streets that are easily reached from class. Plan for many turns for practice, but plan to simply select the route as you go.
1: If you operate your own course, get enrollment forms and liability releases.
2: Make sure that you have your dual-valve pump for pumping students' tires.
3: Get spare shorts to show chamois lining.
4: Carry full touring tool kit on all class trips, and several rags.
5: Carry copies of Effective Cycling for sale to students if this is the normal method of supply, and carry change.
6: Get keys for classroom if required.
7: Review the objectives of the course and bicycle inspection.

10.1.2 SESSION 1 LECTURE

Classroom approx 2 hours, ride approx 1 hour.

10.1.2.1 Describe The Course

The objective of the first session is to get the class started. Inform the students of what the class will be like, the amounts of work it involves, and how you will conduct it. In most classes students have the chance to withdraw, and other prospective students may be present who will join if you can interest them. It is important to be fair and accurate, and this involves some prediction. Many students are apprehensive about the distances to be ridden. To them, 15 miles sounds like an all-day trip. Do not emphasize that trips will be of X miles, because they have no way of knowing how easy X miles is, unless they are already experienced cyclists. Point out instead that the trips will fit the class ability and will take the time allowed for the class, except for the one longer trip for which they will carry lunch. Try to size up the class and adjust your ride plans to the kinds of rides you think they will be doing. Point out also that everybody will be able to travel at his own pace because on longer trips you supply route sheets, and explain how you and your assistant share the load so that those behind are also looked after. Emphasize that this is not a course in any particu-

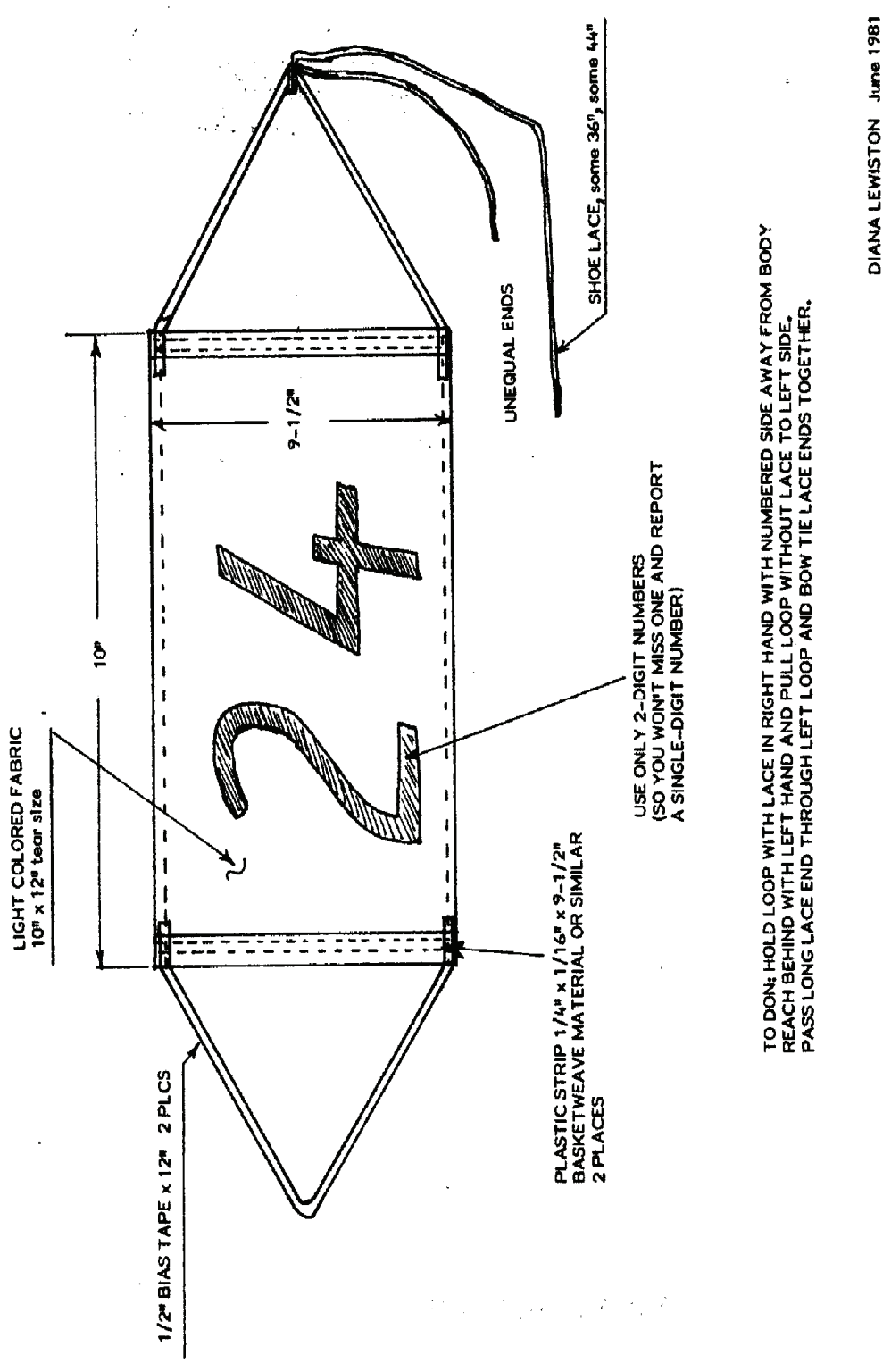

Fig 3:Number Placard

EFFECTIVE CYCLING Enrollment Form and Liability Release

I wish to enroll myself or my minor child in the Effective Cycling Course of the level indicated below,

to be taught by _____

under the sponsorship of _____ organization,

from (date)_____ to (date)_____ on_____ days at _____ hours,

at (location)_____. Course fee is $_____.

Beginning level_____ Intermediate level_____ Adult level_____

The instructor will teach Effective Cycling at the level indicated in accordance with the curriculum of the Bicycle Transportation Engineering Group, the most effective and generally safest techniques of cycling that are known. At the Adult level the instruction will include practice in traffic cycling, fast descents, fast maneuvering and quickest stops in order to develop the competence that is necessary for safe cycling. It will also include how to look after yourself and your bike, how to develop your physical speed and endurance, and the enjoyment of cycling with a sociable group over pleasant roads. The Intermediate level short course concentrates on the traffic cycling technique that is necessary for safe cycling around town by upper-elementary and middle-school students. The Beginning level short course is suitable for lower-elementary students (3rd grade) and concentrates solely on elementary traffic cycling technique that is necessary for cycling in easy or moderate traffic as students of that age can understand it.

Students with medical problems that may be aggravated by exertion, or with hip, knee, or ankle problems, are advised to consult their physician before intensifying their cycling.

The undersigned participant or guardian recognizes that cycling is not an absolutely safe sport or transportation mode, and that accidents may occur despite all reasonable care on the part of both instructor and student. Both student and instructor, on behalf of themselves, their heirs, and assigns, hereby release each other, the Bicycle Transportation Engineering Group, and any other sponsoring organization from any and all claims resulting from damage to property, or injury, or death during the class.

Student name _____Telephone _____

Address _____Age, if under 18 _____

_____Date _____

_____

Signatures: Student _____Parent or Guardian _____

Instructor name _____Telephone _____

Instructor address _____

_____

Instructor signature _____

Fig 4:Enrollment Form and Liability Release

COURSE					
ON	Leg Miles	TO	TURN		Total Miles
			R L S U	N S E W	

Fig 5:Route Sheet Form

COURSE						Miles	
CONDITIONS						Date	
Start Order	Name	Start Time	Finish Time	Riding Time	Place	Prev. Time	Pers Best Time

Fig 6:Time Trial Results Form

FORESTER CYCLING PROFICIENCY SCORE SHEET

 Page 1 of 2

Group #		Cyclist #	
Name		Date	
Address		Test Place	
		Examiner	Scorer
Total Poss.	Total Lost	Score (100(P - L)/P	

TRAFFIC SIGNAL	+5		BEING OVERTAKEN	+10	
Wrong Action	-5		Too Far Left	-8	
STOP SIGN	+5		Too Far Right	-4	
Too Fast	-2		OVERTAKING	+10	
Not Looking	-4		Swerving	-4	
Not Yielding	-4		No Look B4 Swerve	-8	
EXIT DRIVEWAY	+5		Cut Off Slow Driver	-5	
Too Fast	-4		RIGHT TURN	+5	
Not Looking	-4		Wrong Lane	-2	
Not Yielding	-4		Not Yielding	-5	
RIGHT TURN ONLY	+10		Not Looking Left	-4	
Straight from RTOL	-8		LEFT TURN	+15	
Swerving Out	-8		Wrong Start Position	-12	
INTERSECTN APPRCH	+10		Not Looking	-10	
R-Side R-Turn-Car	-8		Not Yielding	-15	
R-Side Moving Car	-4		No Stop in Ped Turn	-15	
Too Far Right	-4		End in Wrong Lane	-5	
Too Far Left	-4		MULTI L-TURN LANES	+10	
PARKED CAR	+10		Wrong Lane Choice	-7	
Swerving	-8		Wrong Side of Lane	-4	
Too Far Out	-2		CHANGING LANES	+15	
Too Close	-6		Not Looking	-8	
No Return When Req	-2		Not Yielding	-12	
Return When Not Req	-4		Too Many Lanes	-5	

Fig 7:

FORESTER CYCLING PROFICIENCY SCORE SHEET		Page 2 of 2	
GROUP#		CYCLIST #	
MERGE +15		PEDALLING +5	
Incorrect Path -8		Slow Cadence -2	
Not Yielding -12		Stiff Ankling -2	
DIVERGE +15		SHIFTING +5	
Incorrect Path -8		Too Slow on HIlls -2	
Not Looking -8		Too Slow in Traffic -2	
Not Yielding -12		PANIC STOP +20	
GROUP RIDING +15		Rear Wheel Skid -5	
Overlap -5		Lift Rear Wheel -15	
Too Far Behind -2		Skid & Fall -15	
Not Indicating Rock -2		INSTANT TURN +20	
Not Indicating Slow -5		Too Wide -5	
Swerving -8		Too Slow -10	
WIDE TO NARROW +5		ROAD DEFECT +20	
Swerving -6		Incorrect Action -10	
No Look or Yield -4		WIND BLAST +20	
OFF-ON ROADWAY +15		Too Much Wobble -10	
Bad Choice of Place -2		AV'D MOT @STP SIGN +20	
Too Fast Return -8		Incorrect -10	
Not Looking -8		AV'D MOT MERGE +20	
Not Yielding -8		Incorrect -10	
Not Perpendicular -10		AV'D MOT RIGHT TURN +20	
DIAG. RR TRACKS +15		Incorrect -10	
Not Looking -12		AV'D MOT LEFT TURN +20	
Not Yielding -12		Incorrect -10	
Not Perpendicular -10			
POSTURE +5			
Wrong Saddle Height -2			
Wrong Foot Position -2			

Fig 8:Cycling Proficiency Score Sheet page 2

lar type of cycling, but will cover all the basics with emphasis on the type of cycling the students want to do. (That is, unless you have already announced this as, for example, a racing training course or a round-the-town utility course.)
Explain that students need a few tools to do repairs while on the road, and to maintain their bicycles at home. This will require a few dollars, but it is much cheaper and much more satisfactory than getting a shop to do it. Explain that homework is expected. There are three kinds of homework.
1: The first is conventional reading assignments. Students are expected to have read the material before class so that they are prepared to learn more of what you present, and to ask questions which will clear up their difficulties.
2: The second is mechanical work on their own bicycles. Students are required to keep their bicycles in safe operating condition, and are advised to keep them in efficient operating condition. This does not usually require much effort; perhaps half an hour per week average.

Many students find that they wish to improve their bicycles and to add or change equipment as they find out what they really want, so each student should not be surprised if this happens to him or her.

3: The third type of homework is additional cycling. Skills cannot be developed unless they are practiced, and physical condition does not improve on one morning of exercise per week. Students should ride at least three times per week, never having more than two non-cycling days in succession. Cycling is meant to be a fun course because cycling is an elective and seductive sport. Therefore, those who get seduced into cycling more and cycling harder get the most fun from the course and are best prepared to really enjoy cycling later. So the course will be slanted somewhat toward those who are having most fun, and the student who does no extra cycling will find the trips harder than the others find them.

10.1.2.2 Enroll The Class

Having described the course, enroll those who wish to participate. If you are teaching for a school or college, this will be mostly done for you. Just follow the established procedures. If you are teaching on your own, have each student fill out the enrollment form and liability release, collect fees and sell textbooks.

10.1.2.3 Equipment Demonstration

Show the required tools. (Listed in Effective Cycling Chap 2.) Make sure that students understand that these are necessary to keep their bikes going, and what each tool is for. You cannot show the method of use for each in the time you have in this session, but you can generally apply the tool to the bike part to show what it fits.

Show the optional tools. Point out that many of these need not be obtained until the student needs to do the job that each is used for.

Show cycling shorts (turn them inside-out to show the chamois or other liner), gloves, trouser bands and cycling shoes with and without foot retaining devices. Point out that these are the standard types of cycling clothing that have been developed over the years as best for the purpose. If the student wishes to buy clothing for cycling he is best advised to buy this type of clothing first, and to experiment later. Point out that gloves are also protective equipment, because they protect the nerves in the hands from handlebar pressure (to some extent) and protect the palms if the cyclist falls onto the road.

Demonstrate the hard-shell helmet that is lined with crushable foam and meets the ANSI Z90 standard. Point out that 75% of cyclists who die in cycling accidents die of brain injuries that are mostly caused by the head hitting the road at the end of the accident events. The hardshell helmet enables the cyclist to survive most of these, so it is the best insurance the cyclist can buy.

10.1.2.4 Bicycle Inspection

Have each student inspect his own bicycle as you demonstrate the inspection steps with your own bike. Inspect for: wheel truth and alignment; wheel bearing adjustment; axle nut or quick-release tightness; crank to axle rigidity; bottom bracket bearing adjustment; pedal bearing adjustment; headset bearing adjustment; handlebar, stem and saddle clamps tightness; basic brake test. Ask if there are any gear troubles. Check tire pressures with thumb.

If any trouble makes a bicycle unsafe to ride in class, either repair it, warn the student how to avoid the danger, or prohibit its use in class until repaired.

Reject coaster-braked bicycles from participation after this week. The coaster brake makes it impossible to start and stop properly and is unhandy in traffic. Reject most single-speed bicycles because they will be ridden by people who are too weak to keep up with the class when limited by this equipment, but accept the already-

strong rider who rides fixed gear from choice.

Instruct the students with rejected bicycles to plan to get better bicycles this week, preferably loaners so they can acquire more cycling experience before buying bicycles that suit them.

10.1.2.5 Establish The Pump Policy

Students who cannot pump their tires to the proper pressure at any time, especially when this is required during a ride, unjustifiably interrupt class procedures (as well as causing themselves extra trouble). Therefore, every student shall have a pump. Furthermore, all users of Schrader valves shall use push-on, lever-lock pumps like the Zefal HP. Make this quite clear, to prevent later trouble.

10.1.2.6 Cyclist Posture

Demonstrate proper cyclist posture and bicycle adjustment: frame size selection, saddle height, saddle forward movement, handlebar height and angle, the availability of stems with different forward reaches and heights. Discuss the advantages of the sporting-type bicycle with 10 or more speeds and dropped handlebars. Warn against the disadvantages of mountain bicycles and recumbent bicycles for normal use (mountain bikes don't have dropped bars or foot retaining devices, recumbents are hard to start and to get up hills). Find a place where the students can sit on their bicycles while leaning up against a wall. Check their posture while they lean against the wall.

10.1.2.7 The Five Basic Traffic-Cycling Principles

Discuss the five basic traffic-cycling principles. Talk about cyclists using the road, using your own experiences and local situations as examples. This has two purposes: to give the students some idea of how you want them to operate and to give them some confidence that cyclists should use the road.

10.1.3 SESSION 1 RIDE

1 hour, approx.

This ride is to size up the new students and evaluate their present proficiency. You are evaluating both their traffic proficiency and their speed. In addition, note the types of foot-retaining devices used (if any), and whether any students are having difficulty with theirs.

Assume that some students (unless it obviously isn't so) do not know the correct way to start and stop a bicycle. Demonstrate from a straddle position. To start: pedal up; stand on it and coast; crotch back over saddle; sit down; other foot on pedal; turn the pedals. To stop: slow down with the brakes; one foot free and forward; crotch off saddle, forward, and down over the top tube; slow to a halt; just before stopping, turn front wheel away from free foot; bicycle stops, leans toward the free foot, which you put on the ground.

It sounds silly to go into this detail, but it is useful. Many Americans do not realize that the reason that the saddle is higher than the top tube is to enable you to sit high enough to pedal properly and still be able to lower your crotch in front of the saddle for stopping and starting. So they resist proper posture because they think that they must start and stop while sitting. Five minutes of demonstration before the group starts off is worth more than one hour of cajolery while riding.

This is an example of how to teach everything in the course. Give it step by step, explaining both how and why. But don't act like a professor teaching something difficult. Cycling is mostly common sense, and most students think that they know it, even if they don't. So you show how easy it is once shown how. Demonstrate always, even if you say: "I know you all do this, but have you thought why you do it (or why bicycles are built this way)?" Then you are not talking down to them, but showing what the group will do together and explaining why it is the best way to do it.

This ride is to size up the new students and evaluate their present proficiency. You are evaluating both traffic proficiency and speed. Start slowly. On this ride never let the group get separated by more than one block. Move out slowly on residential streets, watching carefully. Lead off for a while to get the group moving. Turn onto a street they can follow, tell the leaders where to stop, and drop back to the tail. Go forward and back along the line to observe all students. Observe for any dangerous deficiencies, and, if seen, correct immediately. Keep regrouping, keep talking, to give confidence to those who need it. Watch each student in turn for proper posture and bicycle adjustment. Advise those who need to readjust some item to do it during the coming week.

If the students show sufficient ability, as they probably will, move onto streets with a little more traffic and increase the speed to see how well the slower riders move. Remember what you observe to use in planning next week's ride.

10.2 SESSION 2

10.2.1 SESSION 2 PREPARATION

10.2.1.1 Tire Repair

Prepare tire repair demonstration package consisting of: 1 tube, deliberately punctured with a hole sufficiently large to find easily; abrasive cloth; patch cement (rubber cement); patches; tire irons; wrench, if you don't have quick release hubs; tire boot; boot cement (neoprene contact cement).

10.2.1.2 Demonstration Equipment

Take demonstration section of rim with permanent rim tape and valve hole fillets.

10.2.1.3 Review

Review Whys and Wisdom of Traffic Law, (Effective Cycling Chapter 27) and, if you have it, Systematic Traffic Law (Bicycle Transportation, Chapter 1).

10.2.1.4 The Stop-Sign Problem

In both lecture and ride you will be facing the stop-sign problem. Effective Cycling instruction about stop signs arouses lots of controversy that you must be ready to face. Review the discussion of stop signs in Chapter 12.

10.2.1.5 Rear-View Mirrors

Consider also the problem of rear view mirrors and prepare your discussion. Refer to the discussion of mirrors in Chapter 13.

10.2.1.6 Route Selection

Review your memories of the students in the class to adjust ride distance, speed and route. You want to teach basic traffic maneuvers as done on two-lane residential streets. That is, starting and stopping, straight riding, leaving driveways and approaching stop signs, overtaking other cyclists, right turns and left turns.

For this ride do not preselect a route unless you must travel to the riding area. Just select a residential area which has many two-lane, lightly travelled streets with some stop signs available. You will zigzag around this area while practicing each maneuver as much as appears necessary, so you will be making whichever turns appear suitable at the time.

Zigzagging about and going round and round in circles doesn't offer much sense of accomplishment to cyclists, so select a fun route with little traffic (meaning all kinds of traffic: motor traffic, pedestrian traffic and playing children) to finish the ride with. Plan to use as much of this route as you have time for after achieving a reasonable level of competence in the traffic maneuvers; not an expert level, just the basic minimum for operating on residential streets.

10.2.2 SESSION 2 LECTURE

Lecture 1.5 hours.

10.2.2.1 Tire Repair

Demonstrate removing a wheel, dismounting casing, removing tube, looking for puncturing object. Show permanent rim tape and silicone rubber around valve hole. Then remount (supposedly new) tube and casing, inflating tire, inspecting for proper mounting, and reinstalling wheel. Discuss advantages of pure hook-bead rims, molded valve stems. Then demonstrate patching of pre-punctured tube. Describe booting, showing pre-pared boot and bottle of contact cement.

Emphasize these points. Squeeze tire beads into well all the way around. The first section to be dismounted is the 4 inches at the valve. Resqueeze beads into the well after the first tire iron is inserted. Search by feel and eye for puncturing object, and use position of hole in tube (if found) to assist in locating the object. Don't let dirt or gravel get inside casing or on tube; keep tube off ground. Return rim strip to proper location and tightness, if not using permanent rim tape.

Emphasize advantages of permanent rim tape and silicone rubber around valve hole. Last portion of tire bead to be mounted is the 4 inches at the valve; first off, last on. To get last 4 inches over rim, squeeze beads all around into well, just like after inserting first tire iron when dismounting, and for the same reason. Don't use tire irons unless you have very weak fingers. Replace wheel correctly with adequate clamping force on lever or wrench.

10.2.2.2 Tire Pump

Demonstrate use of tire pump. Demonstrate weak person's use of knee to push pump to high pressure. Left hand holds pump on valve, left thigh supports left wrist; right hand holds pump handle, right knee pushes against right wrist. Disassemble pump to show how to inspect and replace pump leather washer, and to check for washer nut tightness. Proper lubricant is castor oil, not mineral oil; proper softening agent is a little neatsfoot oil rubbed well in. Demonstrate pump test. Close pump outlet with finger. Pump should hold pressure when pushed in. Then gently push pump handle in and release. The trapped air inside should return pump handle almost to the starting position, demonstrating that the washer

seals with little air pressure. Gently pull the handle out. When released, the handle should not move in, demonstrating that the washer is sufficiently flexible to admit air under little vacuum. Tell how to refix end fittings on hose, wrapping with thread to clamp hose on fittings.

10.2.2.3 Bike Stands

Discuss bike stands: handlebar stands, hanging the bicycle from ceiling or from stand, bipod stands under bottom bracket. Emphasize that hanging up the bicycle provides safer storage and that all cyclists need a stand for adjusting derailleurs or trueing wheels.

10.2.2.4 Posture

If necessary, repeat the information on proper posture and pedalling action.

10.2.2.5 The Five Principles, and Whys And Wisdom Of Traffic Law

Discuss each paragraph in these sections of Effective Cycling. Emphasize the concept that these are not arbitrary rules but are the result of years of experience with safe and efficient methods of traffic flow. It doesn't matter what kind of vehicle is considered, or whether it runs on granola or gasoline. All drivers must obey the same rules or there will be conflict.

There are only two classes of person in the rules of the road: drivers and pedestrians.

Cyclists are the only drivers who have the choice, but they cannot safely combine both roles. They must absolutely be either drivers or pedestrians at any one time, for to act like a pedestrian on the roadway, or to act like a driver on the sidewalk or in crosswalks, is extremely dangerous. Answer any suggestions that cyclists' slow speed, fragility or immaturity demand different rules as follows: Low speed requires that the cyclist obey the slow vehicle rules, or get on the sidewalk and obey the pedestrian rules at walking speed. Fragility demands that the cyclist stay out of accidents, and since the driving rules are the safest rules that we know he should obey them very exactly. Immaturity due to youth demands that the cyclist still obey either the pedestrian or the vehicular rules, depending on the traffic conditions, and that the young cyclist should be more likely to decide to be a pedestrian under given conditions. Immaturity due to false training, like the present students have all had before this, demands that they learn how to ride properly as drivers of vehicles to be safe, because they are too old to choose to ride as pedestrians on sidewalks at walking speed.

10.2.3 SESSION 2 RIDE

1.5 hours approx.

Starting and stopping should be a review, done only if necessary. Normal residential street straight riding should require little instruction except not to dodge in and out between parked cars. Absolutely prohibit wrong-way riding.

10.2.3.1 Stop Signs

Remember the discussion of the stop-sign problem in the review section. Therefore, emphasize the skill to determine those intersections and situations at which the cyclist should yield, and the skill of yielding. And emphasize that the traffic that has priority consists of all traffic, both motorist and pedestrian, so that the action of yielding must start at the place where pedestrians, if present, will cross. If students choose to come to a full stop behind the stop or crosswalk line, even when there is no traffic, do not criticize them for doing it, but point out that it is not a safety-related requirement.

10.2.3.2 Ride In A Straight Line

Each cyclist should ride in a straight line. A deviation that is so slow and gentle that other drivers can easily see and avoid it is all that is permitted without first looking over one's shoulder and yielding to overtaking traffic.

10.2.3.3 Overtaking

Overtake slower drivers normally on their left. At this stage, most of these will be cyclists. Since they are required to maintain a straight line unless they first look and yield, it is unnecessary for the faster driver to tell the slower driver that he is overtaking "on your left" or "on your right." Too frequently, these words cause the cyclist ahead to move to the side mentioned, with disastrous results.

10.2.3.4 Right Turns

Right turns are easy; I've never met problems except with other cyclists. Emphasize the right arm, right turn signal to alert the other cyclists when riding in a group.

10.2.3.5 Left Turns

For left turns, look behind, merge left to center if no faster traffic is coming (either cyclist or motorist). Start to merge over half a block before the turn. This normally requires instruction and

review later. Tell, demonstrate, lead one or two turns, then drop to the rear and observe the students making a series of left turns. They are not correct unless they turn their heads far enough to see you, and for you to see their faces. With beginners, and even with supposedly experienced cyclists, this will require review in a later week because they will be slow in learning to ride straight while looking behind.

10.2.3.6 Rear-View Mirrors

Prohibit rear view mirrors during class. Since this is controversial, base your response on the position discussed in Chapter 12.

10.2.3.7 Ride Instructions

Keep the group together. Stop frequently whenever desirable for either instruction, evaluation (that is, friendly criticism), or regrouping.

Observe and advise students and answer questions on posture, pedal cadence, shoes, clothes, gear operation, etc. This will be slow, easy riding, so emphasize use of middle gears to keep up cadence, which loosens up legs, keeps a good reserve of acceleration, and trains for faster riding.

Ride yourself at 90 to 100 rpm cadence to encourage them to imitate you. If students ask questions about matters to be taught later in the course, never be reluctant to say that you will talk about that later. You don't have sufficient time to duplicate your presentations, and in any case they will be better understood when presented with the proper
preparation.

10.3 SESSION 3

10.3.1 SESSION 3 PREPARATION

10.3.1.1 Tools

1: Get tools for brake adjustment and maintenance:
2: Third hand (string type OK)
3: Socket wrenches; 8, 9, 10, 11mm with handle
4: Brake positioning wrenches: 10, 11mm thin wrenches (similar to cone wrenches)
5: Hex keys: 5mm, 6mm
6: Adjustable wrench, 4"
7: Pliers, small
8: Grease, small can or jar
9: Cable cutters are optional.

10.3.1.2 Supplies

1: Map measurer for ride planning, from outdoor supply store or map shop
2: Route sheet master forms (copied from Fig. 8.8), sufficient for the rest of the course

10.3.1.3 Review

Review the following: Effective Cycling:
1: Chapter 4, Brakes.
2: Chapter 28, Cycling Accidents,
3: Chapter 29, Where To Ride On The Road Effective Cycling Instructor's Manual:
4: Chapter 3, Accident Statistics Bicycle Transportation
5: Chapter 5, Accidents (optional)

10.3.1.4 Ride Planning

This is the first club-type ride of the course. It has three purposes:
1: To instruct where to ride on roads of different widths
2: To develop strength and endurance
3: To develop cycling enjoyment in students

Select a route for a 1.5 hour ride. It should have roads of different widths, not much climbing, and not involve left turns in heavy traffic. Straight riding and right turns in heavy traffic are acceptable if there is a wide outside lane. Include in the route several right-turn-only lanes at which the route goes straight, and at least one at which it goes right. Places where the outside lane narrows are useful.

Stay off narrow roads with heavy and fast traffic. Try to provide two sections of route which continue on one road for some distance so that even students unsure of the route may ride unaccompanied as fast as they like without fear of getting lost.

By now you should have a better idea of the speed and endurance of the class, so lay out a route on which they must keep moving steadily to finish in time. Appropriate distances may be 12 miles for weak beginners, 15 for non-club cyclists, 20-25 for club cyclists.

Copy the route onto a route sheet form and make one copy for each student and staff member.

10.3.2 SESSION 3 LECTURE

1.5 hours

10.3.2.1 Brake Adjustment And Maintenance

Discuss caliper rim brakes only. If anyone shows up with stirrup rim brakes or drum or disc

brakes and doesn't know how to maintain them, work with him after class.

Ask if any students want their brakes adjusted. Select both a sidepull and a centerpull brake. Each must have sufficient free end of the inner wire to be able to grip the end, and preferably has the cable end soldered, or at least not frayed, so it can be disassembled and then rethreaded through the fittings. If the inner wire has a frayed end, do not disassemble it from the anchor bolt; if it has too short a free end to grip, do not loosen the anchor bolt. Demonstrate the adjustment of the sidepull first, then the centerpull.

If the inner cable end is not frayed, loosen the anchor bolt and pull the inner wire out of its housing. Explain how to inspect for wear at the lever, the brake adjusting barrel, and all cable stops. Instruct to replace the inner wire if any strands are broken. Grease the inner wire and reassemble (except no lubrication for plastic-lined housing). Adjust in accordance with Effective Cycling Chapter 4, Brake Adjustment. Perform basic brake test to demonstrate that the work is satisfactory.

Explain how to solder the inner wire and cut to length at the soldered point to prevent fraying.

Discuss brake types in accordance with the discussion in Effective Cycling. The reason that centerpulls will not follow a bent rim when applied is that there is too much friction between the hook and the bridge wire to allow the motion. Emphasize that for brakes as well as for other cycling equipment, much of what has been written is superstition. The only real operating difference between sidepulls and centerpulls is that centerpulls require a little less hand strength but have a softer feel, while sidepulls have a more solid feel. Since, for most people on solo bikes, the ability to slightly release brakes when they are too firmly applied is more important that the ability to apply them too firmly with little effort, the sidepull brake provides better control.

For replacement cables recommend plastic-lined housing (slippery cable), because by reducing friction it both increases the force available and improves the delicacy of control. Point out that if you strip off the plastic jacket for 1/8" from each end, the slippery cable housing is the same diameter as the normal housing, so that special end fittings are not necessary.

10.3.2.2 Discuss Cycling Accidents

This discussion is not intended to frighten the students into good cycling behavior; they have been subjected to far too much of this already and that is one reason why their cycling is so dangerous. Rather, this discussion has two main purposes: to give the students a true understanding of the accident facts (instead of the superstitious nonsense that they have been told) and thereby to give them confidence and an incentive to properly develop their skills. To achieve these purposes, you must make several points:

1: Most accidents to cyclists are not car-bike collisions. Discuss the types and proportions of accidents to cyclists. Discuss some of the truths that contradict the cyclist inferiority superstition: bike paths are the most dangerous facilities, cycling to work is the safest cycling known, riding among dogs and pedestrians is far more dangerous than riding in motor traffic.

2: Extremely few car-bike collisions fit the superstitious description of a well-behaved cyclist being hit from behind merely because he is using the road. Most car-bike collisions occur from ahead of the cyclist, match those that occur between motor vehicles, and can be explained as recognized forms of driver error in failing to obey the rules of the road.

3: Discuss the types and proportions of car-bike collisions, For additional information, refer to Table 3.1.

4: Most accidents to cyclists can be avoided by the cyclist. Cyclists without special training learn to avoid the major causes of car-bike collision, as shown by Fig. 3.1.

5: Club cyclists avoid 80% of the accidents that affect most adult cyclists (Effective Cycling, Chapter 28).

6: Cyclist skill is by far the most important factor in having a low accident rate.

7: The safe-cycling portion of the Effective Cycling Program is a proper, well-planned safety program because it assigns emphasis in accordance with the relative frequency of accident types and it provides effective accident prevention methods in accordance with recognized driving and traffic principles and the skills of expert cyclists.

10.3.2.3 Where To Ride On The Road

This is basic riding technique which you should know by heart and habit. Discuss in the sequence that is presented in Effective Cycling, Chapter 29.

10.3.3 SESSION 3 RIDE

1.5 hours

This ride is the first that is anything like a club ride. Most likely, the locations for instruction (today, changes in roadway width) will be scattered along the whole length of the ride. With the pre-planned route you know where these are. At the start, outline the route. Where the route takes many turns or where you plan to demonstrate techniques, let the students travel as fast as they like to a recognized point. If you stay in front, you may stop to regroup at will, but if you may not stay in front (and a simple problem with any student can cause you to fall behind the leaders), pre-assign a regrouping location. This should be before any hard-to-follow turns or difficult traffic locations.

Your assistant should plan to be last unless some student deliberately drops behind or turns for home. (You don't have to be first and your assistant last all the time. By agreement you can exchange places, particularly when you want to either observe or instruct those who normally ride toward the tail.)

As you ride, observe as many of the students as you can see, and observe the traffic situations that occur. Whenever there is some cycling technique or problem that is worth discussing, plan to speak on it. If it affects only one student, tell him as you ride. If it affects several, or can be used as an example to instruct others, discuss it at a regrouping point. If it is immediately important, of if it refers to a particular traffic situation that just happened, stop the group for discussion at this time.

Your instruction should be about double what you had planned to teach. The other half will come from seizing examples that occur during the ride. For example, you are cycling on a wide boulevard and, just ahead of the students, a motorist sticks his nose far out beyond the stop sign to the edge of the motor traffic. Probably, there will be no collision, but the students may stop, or swing wide without looking behind, or attempt to go behind him. Use this experience to demonstrate the need for watching for the expected hazards, the method of riding close to the cars that minimizes this hazard, and the immediate look over the left shoulder to determine how much clearance exists in which to move left to avoid it.

When you reach a route section with 1 or 2 miles of easy-to-follow route with little likelihood of instructional opportunities, establish the next regrouping point 1 or 2 miles away, tell those students in the lead to stop there, and encourage everybody to ride to that point as fast as they can.

You also; you, too, need the exercise and the enjoyment. When you reach the regrouping point, pass the time until the rear catches up by giving instructions suitable for the faster students (who are probably also the most advanced). There's always plenty to talk about; the problem is limiting the amount of talk.

10.3.3.1 Instructional Ride Philosophy

This combination of demonstration, instruction, group riding and speed training is the basic routing for class rides.

The unplanned instruction is fully as important as the pre-planned instruction. Seize every opportunity to instruct. This is one reason why instructors must be experienced cyclists. The instructor cannot expect to do a good job if he depends on weekly preparation to provide his knowledge. This preparation gets only the equipment ready and lists the items that must be covered; it cannot provide the basic cycling knowledge which unforeseen events make necessary each week. The instructor must have not merely the ability to operate properly himself, but he must have the ability to observe student deficiencies and explain to students how to correct them. The instructor should look on himself not merely as a teacher but also as a coach and as a leader in a group activity.

10.4 SESSION 4

10.4.1 SESSION 4 PREPARATION

Tools

1: Touring oil can (squeeze bottle with pointed tip that can be closed), filled with SAE 90 oil.

2: Chain lubricant: SAE 90 oil and paraffin wax, equal proportions, in sufficient white gas to dissolve wax, in small jar, or your choice of chain lubricant.

Kerosene, small jar

3: Paint brush, old, 1" wide, for applying kerosene and chain lubricant

4: Grease, small can

5: Cleaning rags and a newspaper

6: Tools for derailleur adjustment: 8mm socket, 5 & 6mm hex keys, screwdriver with 1/8" blade for derailleur stop screws, stubby screwdriver with 1/4" blade for lever friction adjustment.

7: Bicycle stand to keep rear wheel clear of ground during derailleur adjustment. If one isn't available at the classroom, carry the folding one that is described under equipment.

8: String, about 3 feet, for showing where steering axis hits ground.
9: Soft plastic foam, 2 chunks about 3" cube, for rock dodging

10.4.1.1 Equipment
Since you are going to demonstrate oiling a bicycle, it is better if your own bicycle has oil
holes, as described in Effective Cycling Chapter 10.

10.4.1.1 Review
Review the following: Effective Cycling:
1: Chapter 10, Cleaning and Lubrication
2: Chapter 14, Derailleur Adjustment
3: Chapter 3, Steering
4: Chapter 23, Emergency Maneuvers
5: Practice your instant turns, rock dodges and panic stop s.
6: Practice the front-brake-only demonstration.

For this ride slowly, 3mph or so. Jam on the front brake to almost stop. Speed up to 3 mph again and try harder. Keep increasing the brake force until you lift the rear wheel. The moment it lifts, release the brake. Do not try this while moving fast, because you will go over too quickly to release in time.

10.4.1.2 Ride Planning
Locate a playground or parking lot on which you can practice rock dodging, instant turns and panic stops. You need at least the space of 3 basketball courts, and you need almost sole use of it. Lay out a route from class to parking lot and then 5 miles along an arterial street with right-turn-only lanes and, if possible, a freeway overcrossing with on and off ramps.

10.4.2 SESSION 4 LECTURE
About 1:15 to 1:30

10.4.2.1 Cleaning And Lubrication
Give a practical demonstration of the weekly and monthly operations for cleaning and lubricating a bike. Don't do all the work, but demonstrate each technique and indicate all the parts to which it applies.

Explain the difference between what you do at home, with a bike stand, plenty of solvent, newspapers or metal pans, lots of rags and special lubricants, and what you do on tour with only an oil can and a rag. Emphasize the difference between oiling a little to replenish the oil and oiling a lot to wash out water and grit. Explain how to oil the freewheel while it is on the bike by laying the bike on its side and applying oil to the gap around the adjustable cone. Also describe how to remove, clean, oil and replace the freewheel or cassette at home.

Most students will have grease-lubricated hubs and bottom brackets, and all will have grease-lubricated headsets. However, there is likely to be a mix of cup-and-cone bearings that need lubrication, while others will be cartridge bearings that don't require lubrication. Based on the mix, decide on how much instruction you will give next session about servicing cup-and-cone bearings. If you decide to cover cup-and-cone bearings, explain that grease-lubricated bearings must be disassembled, the parts cleaned, greased, and reassembled to remove grit and to renew the lubricant. Say that this process will be covered in the next session.

10.4.2.2 Derailleur Adjustment
Ask if any student has derailleur adjustment problems, and if so demonstrate on that bike (unless) it looks too battered to be merely an adjustment problem).

Set the bike on the stand. Demonstrate setting the lever friction. Demonstrate setting the rear derailleur travel limits. Explain that each bike requires a different setting and that old chains require more travel than new chains. The chain must quickly reach each end sprocket, but it must not be permitted to go off either end of the cluster. Therefore, the travel limit screws are placed where they are easy to reach and adjust. Demonstrate setting the front derailleur travel limit screws (don't get involved with the old Simplex push/pull front derailleurs). Get fast shifting to maximum cross-over (big-to-big and small-to-small) but no over-shift off the chainwheels. Demonstrate moving the front derailleur lever a little toward the center after shifting to a maximum crossover gear, until the chain stops rubbing. Explain that this is normal.

Demonstrate the big-to-big and small-to-small positions, showing that the rear derailleur cage should have at least a little free movement available at both positions, at big-to-big to allow for the extra chain that is required as it climbs up on the teeth during shifting, at small-to-small to keep the chain taut. Explain that this adjustment is usually made by changing the length of the chain, an operation that will be covered in session 8. Explain why it is undesirable to do much riding in

either big-to-big or small-to-small gears.

10.4.2.3 Steering And Handling

Discuss the relationship between head angle and fork rake that produces the trail distance.

Stretch the string parallel to the head tube to show where the steering axis hits the ground, and show that this is forward of the place where the tire touches the ground. Discuss how the trail keeps the bike stable by correcting for inadvertent leans.

Demonstrate, by wheeling a bike with your hand on only the saddle, how leaning steers it. Discuss the characteristics of bikes with longer trail and those of bikes with shorter trail.

10.4.2.4 Rock Dodging And Instant Turns

Move next to a post or other object that can support you, and mount your bike facing the class.

Demonstrate straight-ahead position with bike vertical. Say that in this position the bike is stable; that is, it corrects its own errors if you relax to let it do so. If it starts to fall over to one side, it steers to that side until the wheels are directly under you again. Demonstrate the position during a turn with the wheel turned and the bike leaned over. Say that in this position also the bike is stable; more lean and it steers a sharper curve, less lean and it steers a wider curve. This is keeping its wheels directly under the apparent vertical, which is tilted from the true vertical because of the sideways acceleration of going around the curve.

Ask the students: "If it is stable in both positions, how can I get from vertical and straight to leaned over and turning without something like this post to push against? Pushing on the air (here let go of the post and grab wildly at the air for an instant) doesn't work. So how can I get leaned over so I can turn?" The answer is that you wait until the bike starts to fall over to the side to which you want to turn. Then you cancel the self-correcting action with a minute movement of your hand so it leans over further and further until it is as far over as you want. Then you let the wheel turn to the correct angle. Some student may guess this, but probably not, so tell them. Now say that waiting for the bike to fall over naturally is fine on a curving road and gives really smooth turns, but it takes too long in an emergency, like when that car on your left turns right.

Then you have to force your bike to lean over fast. Again ask: "How can I do that?" The answer is to steer the wrong way so the wheels track out from under you. To make a right turn you don't lean by moving your weight sideways to the right, because there is no physically-possible means of doing so. Instead, you generate the rightward lean by making the wheels move to the left. Demonstrate the front wheel steering motions and simultaneously demonstrate the correct lean angles. Take care to remind them that actually the lean is produced by wheel movement, not by body pushing, but you cannot demonstrate that while not moving forward.

Tell them that it is not hard to learn instant turns if they first learn to dodge rocks, something that most of them have some experience of. Dodging rocks requires three motions. The first is to swing the front wheel to one side of the rock; for example, to the left, which causes the bike to lean rightwards. Then the natural consequence is to swing the wheel to the right to return to the upright position, which is followed by returning the wheel to straight ahead. The instant turn is just half of this: the first swerve to the left, followed by a lesser turn to the right that is insufficient to cancel out the rightward lean. Then the cyclist automatically turns right very quickly.

10.4.2.5 Panic Stops

With a piece of string (the third hand string is suitable) or a parking brake wedge, lash the front brake lever to the handlebar tightly enough to lock the front wheel against normal hand pushing. Hold your bike crosswise to the class. Show the center of gravity of bike and rider about 2" in front of the saddle nose. Demonstrate with hand motions that the brakes persuade the road to push backwards at the place where the tire touches the road, against the momentum of bike and rider pushing forwards at the center of gravity. Push forwards on the back of the saddle with the front brake locked to show how the bike starts to somersault over the front wheel. Teach that whenever the brakes work weight is transferred from the back to the front wheel, and the harder the brakes work the greater is the transfer. Present the discussion in Effective Cycling about brake action.

10.4.2.6 Training And Competence

Emphasize that nobody can perform emergency maneuvers (or any other maneuvers) without first learning and then practicing them periodically. We'll learn on the parking lot, but both panic stops and instant turns can be practiced on the road at the appropriate times and places. The cyclist must periodically do his normal stops and turns in the emergency way to maintain his ability

to perform them without thinking about it, because when they are necessary there is no time to think.

10.4.2.7 Review: Where To Ride On The Road

Review intersection straight-through riding and avoiding right-turn-only lanes and merges in from the right.

10.4.3 SESSION 4 RIDE

About 1:45

10.4.3.1 Parking Lot Practice

Ride to parking lot.

The first activity is what I call dancing with the bike. The cyclist rides at medium speed, maybe 10 mph, along a zig-sag path on each side of a straight general course. The cyclist makes wide zig-zag short-radius swoops across the line and back again, really swinging back and forth and, naturally, leaning to a steep angle when making each turn. This is an exercise in relaxation and confidence, getting rid of the fear that forcing the front wheel to turn will dump you. Of course it will if you don't recover, but the recovery is natural and effective, and learning that gives confidence. Get all the students to swoop gracefully. Then they are ready for rock dodging.

Put one plastic foam block on the ground near the middle of the area. Demonstrate rock dodging by riding straight at it, then dodging the wheels around it at the last possible moment, as if you had barely seen it in time. Direct the students to make runs at it dodging first left and later right (to keep their performance improvement symmetrical). Stand near the foam block and criticize and praise them individually as they perform. Do this for all maneuvers.

Once they demonstrate a sharp and vigorous swing and recovery, demonstrate the instant turn by cancelling the recovery. Have students make instant turn runs at the block, dodging left and turning right. Then change to left turns. Some will get it immediately, others will be stiff and rigid. A fluid, smooth sequence is important. Then set up two foam blocks about 10 feet apart to form a stop line. Demonstrate rear-wheel-only braking, front-wheel-only braking with rear wheel lift, and safe maximum braking. Set students up to ride in pairs toward the stop line (foam blocks), attempting to stop at the stop line (not quite stop; they must keep going to clear the area for the following students). Get them to practice sprinting for the line and applying the brakes later and harder, like racers fighting for position at a turn. Once across the line, they turn away from each other and ride back to the rears of the waiting lines, so keeping two circuits of riders riding constantly in competitive pairs. Praise and criticize freely, and keep encouraging them to use their front brakes harder until their rear wheels skid. Then instruct them to ease off the front brake to reduce skidding, or they will wear through the rear tires in one lesson. If a student skids the rear wheel but is not slowing down sharply, he is using his rear brake too hard. Instruct him to be gentle with his rear brake but firm with his front.

My students have reported doing 8 miles in this practice, and it is tiring.

10.4.3.2 Arterial Street Ride

Ride on an arterial street route going straight through intersections, practicing staying out of right-turn-only lanes and avoiding cars that are merging in from the right.

10.5 SESSION 5

10.5.1 SESSION 5 PREPARATION

10.5.1.1 Tools And Demonstration Equipment

1: Get bearing assembly kit for each student.

Each kit consists of:

Hub that has been previously prepared per the instructions in equipment making

Cone wrench to match the hub, that has been previously prepared per the instructions in equipment making

Two small cups (paper or aluminum) to hold bearing balls

A cleaning rag

2: Students use own dumbbell wrench or adjustable for hub lock nuts.

3: Used hub cones, one smoothly worn but not defective, one with pits and ready to be replaced.

4: Headset bearings in head tube with steering tube and fork crown, sectioned in accordance with the instructions in equipment making

5: You may choose to demonstrate a bottom bracket with cup-and-cone bearings in shell, sectioned in accordance with the instructions in equipment making. Or you may choose to show a bottom bracket replacement cartridge. Or both.

10.5.1.2 Supplies

Time-trial equipment, consisting of: results form (see sample forms); fine-point fiber-tipped

pen (ballpoints won't write on sweaty paper); writing surface (clipboard, corrugated fiberboard from an old carton); stopwatch (the modern digital wrist stopwatch is fine).

10.5.1.3 Select The Time Trial Course

The time trial course should be from 6 miles over rolling terrain to 10 miles on the flats. A rolling course is better than a flat course, because the object is to teach proper pace over different conditions, not to make a 10-mile record. A course with traffic and signal delays should be avoided because of unequal effects on riders, but low-traffic stop signs are acceptable because they should affect all riders equally. Course may be loop, out-and-back, or point-to-point. The same course must be used for both of the scheduled time trials.

10.5.1.4 Review

Review the following: Effective Cycling:

1: Chapter 11, Bearing Assembly

2: Chapter 30, Avoiding Straight Road Hazards

3: Chapter 32, Riding the Intersections, the section on Avoiding Motorists' Intersection Errors

10.5.2 SESSION 5 LECTURE

1.5 hours

10.5.2.1 Bearing Assembly and Adjustment

Hand out bearing kits, cups for balls, cone wrenches and rags. Instruct students in disassembling the unit completely, cleaning parts, inspecting for wear. Pass around as examples parts that are worn but usable and parts that are worn out.

Teach students to assemble loose balls without grease to hold them in. For better-grade hubs in which the balls will not pass between the axle and the dust cover, insert the bare axle into the hub, pull it back behind the dust cover at one end and insert the correct number of balls. Trap the balls inside by returning the axle to center. Then pull the other end of the axle behind its dust cover and insert its balls in the same way. Then assemble the cones and locknuts to the axle and adjust the cones. For hubs in which the balls will pass between the axle and the dust cover, insert the axle, loosely assemble the cones, insert the balls, and adjust. Inspect each unit for proper adjustment; a minute amount of play and no binding. Return for readjustment if it is not correct.

Now that the students have experience with bearings, use the headset and bottom bracket units to demonstrate the similarity between all bicycle bearings. They all have cups matching cones at each end, with at least one adjustable cup or cone that is locked with a locknut, and all but the bottom bracket have a non-rotating lockwasher. Some, like bottom brackets, have cups outside, while others, like hubs, have cones outside. So long as the cyclist understands these principles he can repair any one of them.

Show the bottom bracket replacement cartridge, and describe how cartridges are removed and replaced, and the special tools that are required.

Show, or describe, a hub with cartridge bearings. Point out that the words “sealed bearings” do not refer to cartridge bearings, but only to cup-and-cone bearings with protective seals that are only reasonably good at excluding water and dirt. These bearings are supposedly permanently lubricated and are used until they wear out. Axles, hubs, and bearings are all machined to precision fits that require force applied through special tools for removal and installation of bearings.

Describe the special wrenches that are required for some bottom brackets and headsets, and the need for special tools, or the very careful and gradual use of hammers and drifts, for removing the headset races, and of the use of protective blocks when gradually hammering or pressing (with a long bolt through the head tube and nut) the headset races into place.

Emphasize that headsets require the closest adjustment: no play but no preload. And that no headset should have caged balls, even if that is what the manufacturer supplies. Instruct that headset failure as the bottom bearing balls indent the bottom races in the "straight-ahead" position may be "temporarily" relieved by rotating one lower race a bit and by replacing caged balls with loose balls.

The roller bearing headset may last much longer than the conventional ball bearing headset, and in the Stronglight/Galli version both the races and the rollers can be replaced without any special tools because they are loose pieces. This design may prove the best in the future.

10.5.2.2 Avoiding Straight Road Hazards And Motorist Errors At Intersections

Teach about each of the situations discussed in Effective Cycling Chapter 30 and in the Chapter 32 section Avoiding Motorists' Intersection Errors. Notice that for each of these the cyclist must first observe the problem and then handle it. Good cycling demands constant watchfulness, but mere fearful looking around is not watchfulness but

carelessness. You must watch for those things that are important in order to see them as soon as they appear. So the cyclist must know what to watch for. Emphasize these problem situations so that when the conditions suggest that one may be present the cyclist starts to watch for it.

After observing the problem, the cyclist must handle it. Notice that many of these situations require either the emergency maneuvers that were taught last week, or bike handling actions similar to them. For instance, a front wheel that is diverted by a diagonal railroad track is like the initial swing of rock dodging, and the escape action is the recovery motion of rock dodging. When skidding on slippery surfaces the reactions that are trained by rock dodging and instant turns help the cyclist stay up.

Emphasize the similarities in watchfulness and bike handling skill between all of these situations.

Emphasize that the motorist who comes from the opposite direction and turns left, the motorist who overtakes and turns right, and the motorist who comes out of a stop sign without yielding cause the most motorist-caused car-bike collisions, and that the primary avoidance maneuver for all of these is the instant turn, and the secondary avoidance maneuver is the panic stop. Generally, the turn is more important than the stop, because the cyclist can get further away from the threat in a given time by turning than by stopping. Stopping all to often leaves the cyclist in the motorist's path and dependent upon the motorist's ability to stop, while turning gets the cyclist out of the motorist's way.

10.5.2.3 Time Trial Instructions

The typical student is afraid of time trialling because he thinks that it will painfully collapse him for the rest of the day. He does not realize that he will not hurt himself in a 10-mile ride (assuming that he doesn't have medical problems), and that its effects will wear off 10 minutes after the finish. Only the experience will convince him, so your task is to persuade him to try the experience. You emphasize that each rider travels at his own pace, and that this is not a race against each other but an individual comparison between today's time and that of the next time trial near the end of the course. All you ask is improvement, which averages 20% faster time in my classes. I go so far as to casually say that improvement over the time trial is a requirement for passing the course; but I have never had to worry about flunking anybody for this reason. Your persuasion and the fact that everybody else does it gets the laggards in also. Discuss time trialling technique in the classic elementary way. Equal power throughout the course. Maintain the balance between muscle strength and oxygen transport by shifting to a higher gear if your are out of breath but have strength, or shifting to a lower gear if your legs feel weak but you are not breathing hard. Add a little power on climbs, reduce a bit on descents, because of the non-linear effect of air resistance. Keep the cadence high, so shift the moment a hill slows you down, and keep shifting down to keep your cadence at optimum, but keep the power on as you go over the top and shift up on the downhill until you either reach terminal speed at normal power in a high gear, or until you must pedal so fast that it is too tiring and not powerful enough (spinning out). Maintain deep regular breathing, don't gasp. Keep down on the bars in a streamlined posture because your main resistance is the wind of your racing speed.

Discuss time trial rules and organization. No drafting; every rider must ride alone. Explain the effect of drafting because the students don't know about that yet. This is just another of these things that cyclists take for granted, but which the new cyclist just doesn't believe until he experiences it. (The course is full of these; that is why it is necessary.) An overtaking rider must move out when feet behind to overtake the slower rider, and must not cut back until 50 feet beyond him. Riders start at 1 minute intervals, slower riders first, faster riders last. This reduces the time required and gives riders a challenge in chasing and overtaking a nominally slower rider. Riders are assigned numbers in the order of starting, beginning with #1, the nominally slowest rider. Remember your number, and call it out as you pass the timekeeper at the finish, or he won't be able to record your time. At stop signs, slow to a crawl, just like in town, and stop if traffic is approaching. Obey all other traffic laws also as you would in normal riding.

10.5.3 10.5.3 SESSION 5 RIDE

10.5.3.1 10.5.3.1 Time Trial

Ride to start of time trial course.

At start get out the map and with it describe the course. Show where the climbs and descents are. Advise where to work harder than average to make a climb, and where, if anywhere, to ease off for a descent. Point out stop signs and places where caution is advisable.

If everybody, including the staff, wants to ride also find a faster rider with a digital wrist stopwatch to serve as starter and to ride last.

Assign numbers to riders and set up the time sheet. (If everybody rides, instructor goes first with official watch and time sheet, to be back at the finish in plenty of time to record others as they finish.) Read through the time sheet asking "Who is number two?" etc., to make sure that every rider remembers his number.

The start will be unassisted. The rider straddles his bike with one foot on the pedal and one on the ground.

If everybody rides, get both stopwatches ready to start. Get to the starting position with riders 2 and 3 behind you and the starter (last rider) beside the line. Explain again that each rider starts on his number's minute; rider #1 at 1 minute, rider #2 at 2 minutes, etc. Start the stopwatches.

If the instructor rides he goes first, to return to the finish line in plenty of time. This is a gamble; but I have never yet had a puncture while on a class time trial. I use wired-on tires for all instructional rides, so there is less chance of trouble. As he crosses the finish line, the instructor observes his time and turns around to get back to the line. He gets out sheet and pen, and writes down his own time. He is then ready to record the next rider's time, which may well be 10 minutes later. This is why you use a fiber-tipped pen instead of a ballpoint; the instructor drips sweat over the time sheet.

As each rider comes in, observe his time and listen to him call out his number. Record the time against the number. Subtracting the rider's number in minutes from clock time gives riding time. After the last rider comes in, ride to a good spot for conversation. Sort out the times in sequence and write in place numbers. Announce the names, places and times, starting with the fastest time.

Now that riders know what it feels like, you can teach them more. Ask who had energy to spare at the finish; tell them to work harder from the start. Ask who was going much slower at the end; tell them to start easier. Many probably didn't sprint for the finish; tell everybody that no matter how tired you are you have one sprint in you for the finish. If two times are only a few seconds apart, point out that a good finishing sprint might have made a difference in the placing. Ask about cadence and gear shifting, and explain that you will give instructions on gears and correct shifting in session 7. Then ask each one to consider how he felt at each part of the course, and to decide whether he could do better or go faster at each part.

By this time all riders are probably exhilarated as energy returns, so ask them how racing feels. You should get a cheer in return.

If you have time, go for a fun ride.

10.6 SESSION 6

10.6.1 SESSION 6 PREPARATION

10.6.1.1 Tools And Supplies

1: Rim samples: get the samples of the steel wired-on rim, the light alloy wired-on drop center rim, the light alloy hook bead rim, and the rim for tubular tires (if you think your students are interested in tubulars) that have been prepared in accordance with the instructions in equipment making.
2: Tire samples: Get 6" long samples of various tires and tubes: roadster tire, high-pressure tire, tubular tire.
3: Spoke key
4: Bike stand
5: Tool for removing vertical dents in a rim
6: Shoes and pedals with some type of foot retention device. If any student uses a different type than yours, use theirs as an additional example.

10.6.1.2 Route Planning

Select a route for a city traffic ride which will enable many left turns in heavy traffic. One way is to ride on a main arterial, left turn off it, U-turn in the cross street, left turn onto the arterial again, and left turn off it again. You make every left turn (unless delayed by too much traffic) for several miles, turn around and return while making left turns in the other direction. You need two such streets. The first is multi-lane but with little traffic, for initial practice. The second is multi-lane with fast, heavy traffic. I use a 6-lane arterial highway carrying 40,000 cars a day with posted limits of 35 and 45 mph.

10.6.1.3 Review

Review the following: Effective Cycling:

1: Chapter 19, Rims and Spokes
2: Chapter 2, Section on Cleats
3: Chapter 31, Changing Lanes in Traffic
4: Chapter 32, Riding the Intersections

10.6.2 SESSION 6 LECTURE

1 to 1.5 hours

10.6.2.1 Rims and Spokes

Demonstrate the differences between steel and alloy wired-on rims, between drop center (Welch) rims and hook bead rims, and between rims for wired-on tires and rims for tubular tires.

Demonstrate the differences in weight and stiffness between different kinds of tires, and tell the intended use of each.

Say that for most purposes, front and rear wheels with 36 spokes are the best choice. Wheels with fewer spokes may be fine for racers, but are insufficiently durable for normal use. Wheels with 48 spokes are appropriate for tandems.

10.6.2.2 Wheel Trueing

Ask if anybody needs a wheel trued. If so, set the bike on the stand. If not, put yours on the stand and go through the motions of trueing the wheel.

1: Discuss how to flatten bulges in the side of the rim with wrench, vise, mallet, etc.
2: Discuss removing vertical bends in the rim by use of the rim jack after removing a few spokes.
3: Discuss removing small vertical wobbles by loosening or tightening spokes at the wobble.
4: Discuss removing lateral wobbles by loosening and tightening opposite spokes.

In both 3 and 4, emphasize doing the work in the bike frame, using your thumb on brake or stay to detect the wobbles. Point out that trueing stands are fine for shops but expensive for cyclists and unavailable on the road. Tell how to true-up fork ends to get wheels truly centered. Emphasize working on radial wobbles first, then lateral wobbles, always working on the worst remaining wobble. Teach how to remove the twist put into the spoke by rotating the nipple. Emphasize that wheel trueing is not hard to do or to understand, and that practice makes perfect. The cyclist who starts out by correcting only the worst wobbles in a crude way to get home again ends up trueing wheels to within 1/16" after doing a few. Like most cycling operations, the students need encouragement as much as teaching.

10.6.2.3 Foot Retention Systems

Observe your students to see what kinds of foot retention systems they are using, if any. Repeat the instruction on proper foot position on the pedal, and say that for road cycling a foot retention system keeps your foot in the proper place. Probably no students will be using cleats; any one who wishes to adopt a foot retention system will choose one of the automatic pedal systems. Describe the two most common systems (Look and Shimano), and give any advice that you think appropriate for other systems.

Describe, in general, how to adjust the position of the shoe on the pedal, so that the pedal spindle is under the big toe joint and the toe-in or toe-out angle is most comfortable for the cyclist and the shoe and ankle clear the crank. Instruct first-time users to practice clipping into and unclipping from the pedals while stationary and leaning against a wall, so they will know how when actually riding.

10.6.2.4 Changing Lanes In Traffic

This is one of the most important lectures in the course because moving into and using the inner lanes by riding actually in the traffic is the biggest fear for most cyclists. You have to overcome this fear. Students are very apprehensive about the ride with left turns in heavy traffic, imagining all sorts of crises, and some may not show on this day because of this fear. In earlier sessions you should have maintained an air of competent caring, confidence without recklessness, when mentioning this ride. Saying that it will be easy suggests recklessness; saying that it will be hard increases fear; saying that there is insignificant danger, while accurate, suggests to them that you don't know what you are talking about.

Emphasize that you will show them all how to do it safely, and that everybody will do it together. Say also that riding this heavy-traffic ride is one of the requirements of the course, both because it shows that the student can take care of himself in traffic and because through it the student develops the confidence that he can ride in any traffic that his route requires.

So take sufficient time; don't hurry through.

Use lots of pantomime to show how you turn your head to look behind, take little sidesteps to represent moving over a lane line, point at the imaginary car you are discussing. Emphasize 'driver' and 'motorist', play down 'car'. Never talk as if a car drives itself. Emphasize the negotiation; the cyclist asks for permission to move over, and does not move over until he receives assurance that that permission has been granted.

Draw the cyclist's track while changing lanes, or refer to Fig. 31.2 in Effective Cycling. Face the class in cycling posture, and with all the gestures and technique described above, mime the slow-

speed, medium-speed and high-speed lane changing techniques that are described in Effective Cycling.

Discuss what to do if you can't get to the left turn lane in time; keep straight, turn a block later, or get to the curb and make a pedestrian-style left turn. Emphasize allowing plenty of time and distance, never hurrying across lanes unless they are all empty. Also emphasize that there is nothing wrong in riding in the inner lanes, although the wise cyclist stays close to the lane line to let motorists overtake. Untrained cyclists are frightened that they are not supposed to be there, and that 'cars' will not see them because they are not expected to be there. It's the whole business about 'cars' owning the road and driving along without human intervention or guidance; absurd, but that is what they believe until they actually experience otherwise. Emphasize that whenever there is merging traffic, or other drivers are changing lanes, or any other source of confusion, the safe thing is to keep cycling straight ahead in whatever lane you are in until the traffic sorts itself out. Then the cyclist can change lanes later when other drivers are not distracted and can pay attention to him.

At the close of the lecture some students still will not believe that they will be able to make left turns in heavy traffic. Just accept this; that is why you ride directly to do it. You have given them the intellectual knowledge, and actually doing it will produce the emotional confidence.

10.6.3 SESSION 6 RIDE

Ride to a multi-lane road with little traffic.

Demonstrate the proper method of changing lanes as if traffic were there: look behind, cross the line; look behind, cross the lane; look behind, cross the next line. Lead the students through it, then follow them as they do it, taking turns as a leader. Make sure that all look behind and are not simply following the leader, who may be making a mistake.

When all students:

1: Look behind
2: Make 2 moves per lane change, one for the line, one for the lane
3: Ride smoothly without wobbling while they are looking over their shoulders

Then ride to the multi-lane arterial street with heavy traffic.

Lead a left turn after selecting a gap in traffic. Do it again in heavier traffic. Then follow while the students take turns leading. Make sure that there is no mere following the leader, but do not discourage leading because that gives followers confidence. The natural leaders or the more confident students end up leading two or three followers, which is acceptable at the beginning. Note those who have already led, and designate new leaders for each set of turns to ensure that everybody leads at least one set of turns.

Travel along the heavy-traffic street, making a left turn off, U-turning in the side street, changing leaders, left turning onto the heavy-traffic street, and make the next left turn off it again.

Make about 30 left turns in heavy traffic. Afterwards ride to a quiet spot for a discussion. Evaluate the students' performances, and ask what they think about the session. Probably they will express excitement and new confidence.

While a few students have made foolish moves in this session I have never had significant trouble, and I have never had a student fail this part of the course. Those who fail do so because they cannot propel their bicycles or cannot coordinate sufficiently to handle their bikes while thinking about something else (such as traffic), and these types have already dropped out.

10.7 SESSION 7

10.7.1 SESSION 7 PREPARATION

10.7.1.1 Equipment

1: Rain protection equipment: Mount your mudguards, have cape and spats. Use your helmet, not a rain hat, but you may use a helmet cover.
2: Nighttime protective equipment: Mount 3" diameter amber rear reflector and a headlamp (taillamp optional) that is powered either with a rechargeable battery pack or a generator.
3: Sponge blocks (2) for emergency maneuver practice.
4: Rear derailleur that is different from your own, so that you have both a touring-type, wide-range derailleur and a racing-type, close-range derailleur to show.

10.7.1.2 Route Planning

Prepare a route sheet for a city ride from the location for practicing emergency maneuvers over a route that includes merges and diverges, like freeway overcrossings with ramps, or expressways if you are allowed to ride these.

10.7.1.3 Review
Review the following: Effective Cycling:
1: Chapter 33, Riding at Night
2: Chapter 34, Riding in the Rain
3: Chapter 35, Riding in Cold Weather
4: Chapter 5, Gear Calculations and Selection
5: Chapter 32, Riding the Intersections, the section on Merges and Diverges
6: Chapter 36, Bicycle Commuting and Utility Cycling
7: Chapter 12, Problems, the section on Nighttime Protective Equipment

10.7.2 SESSION 7 LECTURE
1 hour

10.7.2.1 Riding In The Rain

Demonstrate mudguards, cape, spats. Point out that mudguards are essential to keep dirty water off you; since rain is clean, mudguards have a higher priority than cape. Only after mudguards are installed should cape and spats be added. Emphasize the necessity of adequate ventilation to remove heat and sweat vapor; point out the disadvantages of closed garments like rain suits.

You are likely to be asked about Gore-Tex (tm) by people who believe that its permeability to water vapor (ability to pass water vapor through its pores) makes rain suits that are made of it the best choice for cycling. Gore-Tex may be good for tents and the like, where the problem is keeping warm rather than overheating, and where the resting inhabitants are evaporating only the water vapor in their breathing air, but cycling conditions are far more extreme. Gore-Tex passes water vapor only when both sides of it are dry (which is when you would not have your cape on), and even then an active cyclist generates far more sweat and heat than the material can pass.

Discuss the problems of cycling in wet weather. Caliper brakes never properly grip wet chrome-plated rims, and even with aluminum alloy rims the brakes are slow to take hold. Rain interferes with vision, both the cyclist's and motorist's. So ride with much more clearance ahead of you and steer well clear of possible trouble. Puddles conceal holes and rocks, and provide water splashes from both your wheels and passing cars, so stay clear of puddles. Roads are slippery, especially painted lines or metal objects like manhole covers, drain grates and train tracks, so avoid fast turns and braking on turns, and never do either when crossing especially slippery places. Point out that the bike handling skills that the students learned in emergency maneuvers also help the cyclist stay up on slippery surfaces, another reason for learning them well. Ride steadily in middle gears to reach your destination, avoiding hard riding that creates sweat and skids, avoiding frequent gear changes because it is harder to change gears with a cape, partly because you cannot see the derailleurs.

Point out the advantages of a 5-speed hub when riding in the rain, because its shifts are just as easy even when wearing a cape.

When the rain stops, take off the cape and spats and roll them up. Attach them to the outside of your saddlebag with their straps, to avoid getting the wet and mud on whatever is inside your bag.

10.7.2.2 Riding At Night

Demonstrate the amber rear reflector and the white front lamp. Explain that the amber reflector is 2.5 times brighter than the same design if colored red, and that although the law specifies a red reflector, it also allows (in some instances, requires) amber reflectors and amber lights on both bicycles and motor vehicles. So far, nobody has been bothered for using the amber reflector in place of a red one.

Discuss why the front lamp and the rear reflector are necessary and also why they are sufficient. Students always believe that being covered with reflectors is better than anything else, not realizing how collisions occur. Here are the reasons why the front lamp is better than front and side reflectors: the lamp shows the road surface, it alerts pedestrians and cyclists, and it alerts motorists long before their headlamp beams would strike reflectors.

The dangers of nighttime cycling and nighttime protective equipment are emotional subjects that will lead to as long a discussion as you allow. Use the position in Effective Cycling Instructor's Manual Chapter 12 as your basis for discussion. Discus the differences between generators and rechargeable batteries., and between incandescent (halogen) lights and LED lights. Generators provide adequate light from incandescent lights and are always ready for use. Rechargeable batteries powering LED lights are bright for their weight, particularly useful for those cyclists with night vision problems or with rough roads or bike paths that require slow speeds. Rechargeable batteries powering LED lights make bright rear lamps really practical; recommend such. A generator system powering LED lights might be won-

derful, but we haven’t seen one yet.

Discuss never stopping half-way across an intersection at night. Discuss combined rain and darkness, particularly how motorists' headlamps hitting rain drops on the cyclist's eyeglasses create dazzling displays, so the cyclist must ride with good knowledge of the road ahead and plenty of maneuvering room.

10.7.2.3 Riding In Cold Weather

First discuss the principles of staying warm. Insulation doesn't make you warm, it merely slows down the loss of internally-generated heat. Therefore, every body part requires a flow of hot blood to supply the heat that is necessary for it to keep warm in cold weather. Insulating the trunk and the legs, where the heat is produced in cycling, compels the body to send hot blood to the fingers, toes, genitals and face, which otherwise don't have sufficient blood flow to stay warm in cold weather.

Insulation works by trapping many small cells of stationary air between the body and the environment. Therefore, these cells must be kept full of air. Since water both collapses the cells and transmits heat faster than air, water destroys the insulating power and must be kept out of the insulation. The one full exception is closed-cell foam (used for divers' wet suits), which is useful for gloves, the garments that otherwise get miserably wet in cold, misty weather. The partial exceptions are wool, which is sufficiently springy that it retains its cellular structure even when wet, and polypropylene, which repels moisture and so doesn't get wet from the water vapor released by the body.

Polypropylene is now the best material for cyclists' undergarments and middle garments in cold weather, provided that it is protected by a wind-proof outer shell.

Since staying warm in cold weather is a delicate balance between being cold and getting over-heated (and consequently sweaty and dangerously wet) under great variation in the amount of heat produced, cycling clothing must easily allow great changes in the rate of heat loss. This requires clothing in many layers with adjustable openings.

In cold weather, roads are often very slippery, and in snowy weather they may be very narrow and rutted, thus exacerbating the normal traffic problems. Cyclists need to use good bike-handling and traffic skills to handle these difficulties.

In winter weather, bicycles suffer from more grit and water, to which salt is also added. Keeping them in a warm, dry place whenever possible and careful cleaning and lubrication to remove grit, water and salt and to refill the oil reservoirs is essential to satisfactory service.

10.7.2.4 Cycle Commuting

Discuss cycle commuting. The points to emphasize are the ease of commuting by cycle once one learns how, and informing students of all the techniques that make it easy. Emphasize also that cycle commuting is the safest cycling that we know. The reason, of course, is that cycle commuting is done on the safest roads in the best organized traffic, by some of the cyclists with better skills and who certainly know their routes. Traffic density is, of course, high for most cycle commuting, but this low accident rate shows that traffic density has less power to increase cycling accidents than good traffic control and skilled cyclists have to reduce them. Now that students have completed the heavy-traffic left turn session they can start to appreciate that traffic is not as excessively dangerous as they used to think. The real problems of cycle commuting are those associated with riding every day under whatever conditions occur; this is the real test of the cyclist who has it all together. The other problems associated with cycle commuting are the social ones; what does your employer think, what do your colleagues and customers think?

10.7.2.5 Gears And Derailleurs

The object of this discussion is to get students to use their gears as best as their gearing systems will allow. Improvements to gearing systems may be covered later, if the students request.

Describe how to calculate gears and what the gear number (inches or meters) means. Describe a gear-shift data table having a column for each chainwheel size and a row for each cluster cog, with the gear number in each cell. If you have such a table taped to your stem, show it. Assign to each student the task of preparing a gear shift data table for his bicycle for the next session.

Describe the chain takeup limitation of derailleurs, and warn the students that many rear derailleurs lack sufficient takeup capacity to accommodate both a wide-ratio cluster and wide-ratio chain-wheels. Exhibit samples of racing and touring derailleurs to show the difference. Defer answers to questions about gearing improvement

until next session.

10.7.2.6 Merges And Diverges

Discuss the proper track at merges and diverges per the diagrams in Effective Cycling Chapter 32, the section on merges and diverges. Emphasize two things. For diverges and separations, change to the appropriate lane early. For merges and particularly unions, don't worry if traffic keeps you in a middle lane for some time afterwards; just ride the lane line until traffic settles down. Point out that even if minor branches are not marked with yield signs, in commuting traffic motorists understand which is which from habit, and the cyclist will too if he pays attention as he rides through on successive days.

10.7.2.7 Maps

Remind students to bring their maps for next session's country ride.

10.7.3 SESSION 7 RIDE

2 Hours

Review and practice rock dodging, instant turns and panic stops. This will probably take only 0.5 hour, exclusive of travel time.

Ride on multilane streets, expressways if permitted, and through many ramp connections, emphasizing proper lane selection and proper position in the lane selected.

10.8 SESSION 8

10.8.1 SESSION 8 PREPARATION

10.8.1.1 Equipment

1: 1: Gearing Visual Aid. Prepare a gear data table for your bicycle and tape it to the handlebar stem.

2: 2: Chain Repair Tools. Get chain tools, bits of old chain that have been well-cleaned, and wiping rags. Get pocket tape for measuring chain for wear.

3: 3: Day Touring Equipment. Fit water bottle cage and bottle, day saddle-bag, packet of pocket food.

4: 4: Club Newsletters. Get a collection of copies of newsletters of local cycling clubs - even of distant clubs if there are few local clubs. Try to have examples of newsletters from touring, racing, social, political, and national cycling clubs.

10.8.1.2 Route Planning

Select a course for a country ride, and print sufficient route sheets for every student to have one. The format that is shown in Fig. 5 is the best that I know. Take your map with you, as you have reminded the students.

10.8.2 SESSION 8 LECTURE

Lecture 1.0 hour

10.8.2.1 Gears

Inspect students' gear-shift data tables.

Because of the limited choices offered by manufacturers, most will have rather standard choices of chainwheel and cog sizes. Therefore, describe the now-standard process of gear selection while cycling. That is, the large chainwheel is for good conditions, the small chainwheel is for difficult conditions, and the intermediate chainwheel, if present, is for somewhat difficult conditions. Look at the road ahead and the wind strength and direction, and estimate which chainwheel you will most use for that distance. Shift into that chain-wheel and then shift the rear derailleur to suit the smaller changes in gradient and wind. Note that shifting from one chainwheel to the next will produce about the same change as two or three shifts at the rear cluster.

If the students desire discussion of gearing theory (rather unlikely), then give a quick description of half-step gearing, with or without granny.

10.8.2.2 Chain Repair

Hand out lengths of chain to all students and chain tools to those who don't have one, and rags. Demonstrate breaking and joining chain. Emphasize care in extracting the pin so that it remains in the side plate, thus making it easy to reassemble. Show the students the worn pins so that they realize where the wear occurs, and explain how it occurs (flexing and straightening under load as the chain comes off the sprocket and goes onto the chainwheel.) For reassembly, emphasize how to loosen a stiff link - students often don't understand that the stiffness in a reassembled link is caused by the outer plates pressing against the inner plates.

With your pocket tape, demonstrate how to measure a chain for wear. (24 links; less than 12-1/8” OK, any greater needs a new chain.)

Discuss new chain on old sprockets - how it clunks and jumps under load. Using Figs. 18.2 and 18.3 in Effective Cycling, explain how the hooks that are worn into the sprocket teeth will

clear the old stretched chain but will catch on new chain. Explain that old sprockets can be ground smooth again with the correct tools, but that otherwise they must be replaced. Most of this trouble can be prevented by early replacement of chains before they exceed 12-1/8” for 24 links.

10.8.2.3 Keeping Your Body Going

Discuss the development of cycling condition as a step-by-step process. Practically no American understands physical fitness beyond aerobic conditioning, because there are few activities that demand more. They believe that an all-day ride is merely more of a one-hour ride. They do not understand that the food conversion chemical reactions must also be trained to provide energy for long rides, that the fat decomposition reactions must be trained after those (particularly if you want to lose weight), and that heat tolerance and heat control are also trainable. Not knowing these, when they first get the bonk they feel that they have reached their endurance limit, which is not true at all. So discuss each system in turn, in the sequence that is given in EC.

Pull your pocket food out of your pocket and point to your bottle. Require these items for next week's ride.

10.8.2.4 Introduction To Club Cycling

The first half of the club talk is selling students on joining a club. You are probably a club rider, so you know the enjoyment of club rides.

Those students who are not club members have started to enjoy club-like cycling in the class, and if you persuade them that this enjoyment will continue in a club they start to understand the attractions of club cycling. In a way, this is like encouraging young adults to leave home properly - you as instructor have raised them be cyclists, and you want them to continue cycling for a lifetime of enjoyment. Some students like the class and wish to repeat; a second time is fine for them, and gives you a base of experience in the next students, but by the end of the second series they should be completely ready for club cycling.

Effective Cycling gives a general discussion of the reasons for joining a club and the types of club. You add to this your knowledge of the local clubs. After describing them, distribute copies of newsletters for handing around the class so that everybody sees one.

Describe in general terms the events and activities listed, and special events than you know about. Some students will ask for recommendations about clubs, in which case you should recommend what you think best for each student. If you belong to a hard-riding, semi-racing club, don't recommend it to a student who rides a 10-mile level-road time trial in 50 minutes. On the other hand, if you have a student who is always up front and rode 60 miles alone last Sunday, recommend such a club to him.

Exercise some political caution. If there is a club around that wants to coerce people into cycling through restrictions on motoring and building bikeways, steer students away from it. These make the newcomer feel important, but they don't provide so much cycling fun, and hence cyclists don't develop as well. If you have taught the class well, your students should be well beyond the stage of bikeway activism, but they don't yet know it. Remember that the prime motivation for adult cycling in America is enjoyment, and that most of those who choose to ride for transportation do so because they enjoy cycling. So steer your students into clubs that they will enjoy for a lifetime.

If students ask about the political side of cycling and how to influence government, defer discussion until session #10. The later in the course that you talk politics, the more likely you are to be believed.

The second half of this section covers club cycling technique, from how to prepare for a club ride to how to ride in a group and what to do if you get separated. Carefully cover group cycling technique in preparation for today's ride. In discussing close riding and taking pace, consider the abilities of your students. For some, this discussion is an immediate prelude to pace lining, while for others it is only a theoretical possibility. So far, unless your students have had other cycling experience, they have not cycled fast enough to appreciate the effect of wind resistance, and the reduction in effort produced by taking pace. So emphasize that this is a technique that all club cyclists learn sooner or later, and you are providing the basic information so they at least know the principles before they start, which will be whenever they are ready for it.

10.8.2.5 Assignment

Remind students to bring maps, touring tools, water, salt if they use it, pocket food and picnic lunch for next week's ride.

10.8.3 SESSION 8 RIDE

2 Hours

Act like a ride leader for a club. Hand out

route sheets, explain the route using your map, and lead off.

When you reach a section that is suitable for pacing, form those students that you think qualified into groups of three or four and start them riding at moderate pace at about 3-foot spacing. Have each leader count pedal turns and move over at the first suitable time after 50 turns. Carefully instruct them not to accelerate when taking the lead, but to keep a steady pace. Emphasize the necessity for slowing signals if slowing becomes necessary. Watch the former leaders drift back and get on, instructing them how to give a spurt just as the last rider passes. As proficiency increases, instruct them to close up to about 2-foot spacing, and instruct former leaders to drop back smartly, not working against the wind for extra time by riding alongside the others. This requires a better spurt to get on, but saves energy. Having started the first group, drop back to coach the next group.

The pacing riders will go faster than the others, so set a stopping point for regrouping.

I find that about 1/3 of my students are already ready for proper pace lining after the first hour of practice. Collect the whole class, establish a regrouping point a few miles ahead, select those who have shown the best condition and technique today, and ride with this group at a fast pace. If you like, take a longer way, because you will be going faster. This group will be exhilarated by riding faster than they have ever done before. Then finish the ride with the slower group - send your assistant in the lead (he or she shouldn't always have to trail) and coach the others in cycling at easy pace and 3-foot spacing, which will be as good as they will be capable of at this time.

10.9 SESSION 9

10.9.1 SESSION 9 PREPARATION

10.9.1.1 Cable Maintenance

Get spare brake and derailleur wires and about one foot of cable housing and a tight-fitting housing nipple. Grind or file one end of the housing flat and square; fit the nipple to the other end.

10.9.1.2 Cotterless Crank Tool

Your students probably won't have any bicycles with cottered cranks. If there are one or two, be prepared to describe a crank support for removing and replacing cotters. A useful type is made from a 6" piece of 2 x 4 lumber by drilling a hole 0.75" diameter by 2" deep into one end.

10.9.1.3 Touring Equipment

Fit touring equipment to your bike - mudguards, carrier and pannier bags, or large saddlebag, lights, wired-on wheels, wide-ratio gears, touring tools.

10.9.1.4 Touring Maps

Get representative touring maps, preferably of an area that is familiar to the students, in different scales, and at least one topographic map of a local area. If you have a computer mapping program, use it to prepare a printed map and route sheet, with elevation gains or route profile (if it has that facility) for a local ride.

10.9.1.5 Review

Review the following: Effective Cycling:
1: Chap 4, Brakes
2: Chap 16, Cranks and Chainwheels
3: Chap 39, Introduction to Touring
4: Chap 37, Mountain Riding

10.9.1.6 Route Planning

Select a route for a longer ride (I usually use about 45 miles) with a picnic lunch stop. I often run the ride beyond the lunch stop and have lunch on the return trip, so that the slower and shorter riders can ride a shorter distance. The last leg is a 1200 foot climb - riders climb as far as they wish and coast back to lunch. Or you can schedule a longer and a shorter ride to the same lunch stop.

10.9.2 SESSION 9 LECTURE

1 Hour

10.9.2.1 Crank Maintenance

If there are a few cottered cranks among the students' bicycles, play act the procedure for removing and replacing cottered cranks. Remove the front wheel of a bicycle that has cottered cranks so that the 6" long support tool can support the crank at the cotter. Play act using wrench and hammer to loosen the nut and drive out the cotter.

Show the spare cotter, examine it for nicks and bashed threads, describe filing it smooth and parallel to the other cotter. Instruct your students to have a spare pair available before removing any cotter. Play act driving the cotter in and tightening its nut.

Remove the dust cover from a cotterless crank set and play act removing the bolt and using the crank extractor tool. Say that some axles are

tapered squares, while others have tapered splines, and that those of different makers are not interchangeable. Explain how to examine inside the removed crank for burrs, and how to cut them out with a sharp knife, being very careful not to scrape the faces of the socket. Explain that a skilled mechanic can reshape the inside of the socket to match the axle, but most people have not developed that skill. Therefore, it is vital to have the parts perfectly clean and to work very carefully. Say that engineers are divided on the question of grease, some believing that a light coating of clean grease makes for closer contact with less stress on the parts, while others don't think that grease is desirable. I personally prefer using grease. Say also that a drop of blue Locktite on the threads of the bolt helps keep it tight, but that even so the bolt must be checked for tightness after the first 50 and 100 miles.

Describe using a large wrench to straighten cranks while they are still on the axle. Describe using a smaller adjustable wrench to straighten wobbly chainwheels, just like straightening a rim. Say that bike shops have better tools to handle badly-bent cranks and chainwheels.

10.9.2.2 Cable Maintenance

Show the brake and cable wires that you have prepared. Show the end of the housing that has merely been cut, and slip the nipple over it. Then show the end that has been ground or filed square, and explain that each end must be treated in one of these ways. Inspect a bike for wear of the inner wires, particularly showing the typical wear points inside the brake levers and at the derailleur levers. Inspect the housing for kinks. Play act removing the wire and the housing and replacing them with new parts.

10.9.2.3 Touring

As in the club cycling discussion, combine the general principles of touring as given in Effective Cycling with your knowledge of local conditions. Discuss the four methods of touring, show how to carry your equipment. Describe maps of differing scales and sources of maps. Show how maps disclose the general nature of the terrain, and try to get students familiar with the different scales of maps. Use the topo map of the local area to show how much detail is available, but also point out how short a ride it is to go beyond the edge.

If you have a computer map program, present the map, route sheet, and route profile (it the program will do that), and describe the use of this aid.

Discuss the four functions of maps: routing, following, changing, and locating.

Every student contemplating touring worries about equipment and clothing. Basically the cycling equipment is simply that which you use for riding every day when at home. Touring is simply riding every day without going home at night. The only exception is to avoid tubular tires, which most students will not be using in any case. Don't tour on them because replacement supplies are hard to get and repair takes more time when time is valuable. The repair equipment is the light-weight version of what is used at home - generally the cheaper variety. Clothing is the minimum that is necessary for cycling and for socializing - anything else is silly. If cycle-camping, lightweight backpacking gear is best. Go quickly over the list in Effective Cycling to illustrate principles but do not be definite. The students can always refer to the list at home.

Describe your own carrying equipment as mounted on your bike, and other typical kinds.

New cyclists always ask: How Far To Tour? Reassure them with the answer: As Long As You Like - It's Up To You.

Assign for homework the planning of an over-night tour to any location that the student wishes, starting either directly from home or by using a car start. Have him get maps, select his style of touring, plan his route and stopping points, and make an equipment list for what he would need. This brings the practicality of touring close to mind - I need to fix this and get that and I can go!

10.9.2.4 Mountain Riding

Mountain riding presents three problems: steep grades, total elevation gain and high-speed turns. Except in extremely flat areas like Florida, there are sufficient hills to make mountain riding a normal part of cycling, except for the large energy expenditure that is necessary when climbing large elevation gains. Even in areas with low altitudes it is possible to have elevation gains of 5,000 feet in a one-day ride, which by most standards is a hilly day. Since roads in areas with short hills are not usually engineered to minimize the worst grade, even these areas require low gears for climbing.

For example, southern England is a low land that is not considered mountainous, while California is mountainous, yet England requires lower gears for climbing than does California while giv-

ing practically no opportunities to use higher gears on descents because the hills are so short. Therefore, teach the gear-shifting and pedal action techniques for climbing and also the techniques for fast cornering, but leave the development of endurance to the individual, unless there is need to regularly climb 1,000 feet or more in your area. Emphasize the classic techniques of shifting down to maintain pedal cadence and of selecting the speed at which you can complete the climb at a steady pace. Teach how to look ahead to estimate the total climb before you reach the foot, so that the correct pace can be selected.

For fast downhill cornering, emphasize braking before the curve and leaning into the curve sufficiently to make the curve at the speed at which you are traveling. If the rider enters a curve too fast he has only one sensible choice: lean to make the curve, even if he slides off the road, because he then goes off the road feet first. If he doesn't lean sufficiently because of fear, he rides off the road upright and head first, which is much more dangerous. To develop sufficient lean, the rider steers toward the outside of the curve for a moment, just as he does when initiating an instant turn. Therefore, teach the similarity between the two movements. Teach cyclists to use the whole width of the lane to make the curve more gradual, emphasizing that at these speeds the cyclist is traveling as fast as any motor vehicle can travel, so there is no need to squeeze to the curb.

10.9.3 SESSION 9 RIDE

3.5 Hours

Distribute route sheets and explain the route. Emphasize the location and expected time at the lunch stop, and whatever arrangements you have made to allow faster and slower riders to lunch together.

This is a fun ride, so lead off just like a club ride. Don't force the pace unless the students want to, and then allow time for riders to regroup within the faster and slower groups. Talk about cycling as you ride and at lunch - there's never any shortage of subjects by this part of the course. Move back and forward within the group and talk with everybody; naturally, there should be a leader with each group. Practice more pace lining, particularly if the road is level and there are headwinds. From this point on, you have taught every-thing in the course. The remainder is practice, review and evaluation, with emphasis upon enjoyment.

10.10 SESSION 10

10.10.1 SESSION 10 PREPARATION

10.10.1.1 Parts Interchangeability

Back when England was the factory for the world, most bikes used English inch dimensions, with only some bikes using metric millimeter dimensions. But now there is general agreement about a common system that mixes inch and millimeter measurements. However, progress has introduced new interchangeability problems even between parts measured in millimeters, so that a purchaser of parts needs to know what will work with what.

There are several designs of cranks and bottom-bracket spindles that are not interchangeable. Some front derailleurs are designed to mount on a permanent bracket, while others clamp around the seat tube. There are several chainwheel-to-crank mounting systems, differing principally in the stated “bolt-circle diameter”. This is the diameter of the circle of the mounting bolts, but since nearly all have five bolts equally spaced you can’t measure the bolt-circle diameter. For five-arm cranks, the bolt circle diameter is 1.7 times the distance between adjacent bolt holes. All front hubs are now 100mm wide, but rear hubs may be 120, 125, 130, 135, depending on the number of sprockets they are designed for.

10.10.1.2 Ride Planning

Select a country ride and prepare and copy the route sheets. If desirable for this class, have both longer and shorter routes. End at a place that is suitable for a discussion.

10.10.1.3 Review

Review the following: Effective Cycling:
1: Chapter 21, Leather Maintenance
2: Chapter 7, Dimensional Standards
3: Chapter 40, Introduction to Racing
4: Chapter 41, Cycling With Love
5: Chapter 44, Introduction to Politics

10.10.2 SESSION 10 LECTURE

1.0 Hour

10.10.2.1 Touring

Review some student's touring plan, and ask what problems other students had not solved in their planning. Use the answers to cover any problem areas; make sure that each student has developed a feel for the equipment and knowl-

edge that he needs to go touring.

10.10.2.2 2 Leather Articles

Discuss the maintenance of saddles and toestraps.

10.10.2.3 Dimensional Standards And Interchangeability

Discuss tire and rim sizes and point out that the engineering designation of casing width and diameter of rim (at the bead) is least likely to result in mistake when buying tires. (That is, 25-622 for high-pressure 700C size, and similar.) Discuss the difference between wired-on tires with wire beads and wired-on tires with foldable beads.

Say that nowadays almost all bicycle parts are made to a common set of dimensional standards, which are a blend of English and metric dimensions. There are several designs of cranks and bottom-bracket spindles that are not interchangeable. Some front derailleurs are designed to mount on a permanent bracket, while others clamp around the seat tube. There are several chainwheel-to-crank mounting systems, differing principally in the stated “bolt-circle diameter”. This is the diameter of the circle of the mounting bolts, but since nearly all have five bolts equally spaced you can’t measure the bolt-circle diameter. For five-arm cranks, the bolt circle diameter is 1.7 times the distance between adjacent bolt holes. All front hubs are now 100mm wide, but rear hubs may be 120, 125, 130, 135, depending on the number of sprockets they are designed for. If you are in doubt about a part, see a good bicycle mechanic who can identify what you have.

10.10.2.4 Racing

Outline the types of racing as described in Effective Cycling. Tell some racing stories, particularly about local races on roads that the students know and which they may go to watch.

Remind students that they have already started to race in the easiest way by riding time trials, and that part of next week's examination is the second time trial. Weather permitting, they should do better now than the first time. Now that they know what to expect of themselves and the course, and have a little experience by which to judge, discuss the time-trial recommendations in Effective Cycling and ask them to prepare themselves accordingly.

10.10.2.5 Cycling With Love

The most important concept in this subject is that cycling can be a lifelong family activity whose enjoyment can be passed on to one's children.

Don't spend much time on equipment; rather describe the stages of a cycling life, from the young person seeking companionship to the couple whose children are leaving home accompanied by the knowledge, enjoyment and friendships that have been developed through cycling. Emphasize that happy cycling with friends, lovers and children is a social activity that we can learn to do well, with quite realistic patterns for each age. Just as with other cycling activities, there's no mystery to it once it has been explained.

10.10.2.6 Politics

Outline the current political situation for cyclists, whatever it is at the time. By this time, students will be ready to realize that they have been riding as drivers of vehicles and that any policy or program that restricts that kind of cycling is bad for them. Point out what government has done to discourage cycling as drivers of vehicles, and what, if anything, it has done to encourage that. Emphasize that there is no safer cycling method than cycling as the driver of a vehicle on a well-designed roadway, and that we do not know of any better special road design that can be produced at reasonable cost. Emphasize that this course has been developed and taught because competent cycling technique is the key to both safe and efficient cycling. There is no highway design that makes incompetent cycling safe.

10.10.2.7 Final Examination Reminder

Remind students that the final examination has three portions: written, a traffic ride and a time trial, and that they will be evaluated on all three.

The written part and the traffic ride will be evaluated on an absolute basis, because all cyclists have equal potential and all have equal need for the knowledge. The time trial will be evaluated on a relative basis, primarily whether the student does better than the first time, considering his age, type and experience and the weather on the two events.

10.10.3 SESSION 10 RIDE

2 Hours

This is another fun ride. Lead it so students get maximum enjoyment. At the end, hold a review at which you answer questions, review material, or just talk about cycling, as the students wish.

10.11 SESSION 11

10.11.1 SESSION 11 FINAL EXAMINATION

10.11.1.1

There are two general ways to schedule the written and road tests. One way is to give the written test to all students, and then give the road test to all students. The other way is to split the class into two (or more) groups, having one group(s) taking the written examination while the other group is taking the road test. This requires an assistant to proctor the written test while you give the road test. Which you do depends on the size of the class and the local circumstances of traffic and the like.

10.11.1.2 Written Examination preparation

Inventing the written examination questions appears to be the major preparation, but perhaps it is not. Review in your own mind what you have covered and what you should have covered better.

See if the course had a good balance between mechanics, traffic skills, and cycling skills and enjoyment. Reflect on whether the students both learned the basic standard in maintenance and traffic, enjoyed themselves in the course, and are equipped to develop their skills and enjoyment for a lifetime.

The examination in Appendix C of Effective Cycling is one that I have used and is representative of what I consider to be appropriate. There are questions on mechanics, physiology and traffic. The questions are not randomly selected from things that I have said, but have been chosen to illustrate points that I have considered important. Nearly always I will have at least one question on each of brakes, darkness, emergency handling, intersection maneuvers, physical conditioning, politics. The questions are written to elicit the best answer if the student has really learned the subject. American cyclists today tend to be intelligent and well-educated, so they can answer well. Do not, however, grade lower than passing those answers that show that the student knows the material even though he expresses it badly. Since one purpose of this course is to develop cyclists who can spread the word to others, it is appropriate to reserve the highest grades for those who can both ride and explain. Therefore, we have a spread between passing, for those who ride adequately, and A grades, for those who can both ride and explain. I have not had students who can explain but not ride, and I expect that this is an impossible combination.

I allow one hour for the written examination. If the class is held at an open area without desks, supply 8.5” x 11” corrugated fiberboard writing boards, cut from cutup cardboard cartons. These work well enough and are light enough for you to carry.

10.11.1.3 Cycling Proficiency Test Preparation

Work out the test route that you will use. Try to include as many of the important items as you can find in your area. Don’t ride straight for any considerable distance, but make many turns to include the largest number of different maneuvers in as short a distance as possible, providing there is sufficient motor traffic to test the students. If the test area is near a bicycling-popular university, or other source of incompetent cyclists, try to stay away from those because they will upset the traffic pattern. Bear in mind that you might want to obtain more observations of some maneuver or other, and allow for changing your route if that becomes desirable. Also bear in mind that you want to reach the time-trial course after the test ride. Print up a route sheet for each student.

Make sure that your voice recording system is working properly, including the foot switch if you plan to score the test on site, and take it all with you.

Print out sufficient test score sheets for the number of students that you have, plus some spares. The students will probably score each other’s tests. If so, and your site does not provide desks, provide a 8.5” x 11” piece of fiberboard (cut from cardboard cartons) for each to use to write upon.

Take at least a simple 4-function calculator that you are used to using. Several will speed up the calculations of scores.

10.11.1.4 Time Trial Preparation

Use the same time-trial route as before. Print and take a time-trial results sheet, or more if required for the number of students. Take your stop watch and a fiber-tipped pen for recording times (not a ball point; won’t write on sweaty paper).

10.11.2 Examinations

10.11.2.1 Written Examination

There’s not much to say about giving this examination. It is closed-book.

10.11.2.2 Cycling Proficiency Test

Instruct the probable leaders not to get too far ahead of the slower riders, so you can observe all at once. Then yourself follow the class to observe how they ride. You know how to ride, and you know what you have been teaching, so evaluating how they ride should be little problem. If you have a large class, select a small group to ride ahead of you while the others ride behind. Record the behavior of that group, making sure that no student simply follows the others all the time. Once that group has been observed, select another group for observation. Continue until you have observed all students for sufficient number of maneuvers to be able to make a valid score.

10.11.2.3 Time Trial

Run the time trial. Assuming that the weather is not bad, times should be better. My students have averaged about 20% reduction over the two trials. I have never had to consider whether a student would pass or not - all beginning students have improved so much that passing has been certain. Repeat students usually show less improvement, but their times are already better than average.

10.11.3 Final Remarks

After the time trial move to a good discussion spot. Set up to record the scores for the road test. Assign each student to score the results for another student, while you work the recorder to speak the observations of each maneuver in turn.

If you have time, then calculate the scores, using the calculators. Go over the correct examination answers, answer questions, inquire how the students feel about the course, and thank them for attending.

Naturally, if you have some formalities to be completed for your sponsoring organization, if any, then be sure to complete these.

11 TEACHING IN SCHOOLS

SPECIAL PREPARATION

Organizing an Effective Cycling course in the public schools presents far more difficulty than organizing one for adults. The normal difficulties of making any addition to the curriculum are bad enough; cycling adds the elements of fear and controversy.

11.1 REQUIREMENTS

Starting an Effective Cycling program for schoolchildren requires six factors:

1: A hardworking and well-informed but patient and tactful organizer
2: A trained and certified instructor
3: Public support, particularly from the parents of that school
4: A willing school administration
5: Voluntary students with voluntary parents
6: Sufficient money to carry the program

It is vital that those who wish to organize Effective Cycling classes in the schools understand the difficulties that they face. Only a determined, long-term campaign can succeed, and then only when competently conducted. Effective Cycling succeeds because it teaches students how to ride properly in traffic, but that prospect raises deep fears in parents, police, public administrators and school administrators. If not alleviated, these fears will kill all prospects of a program. Only when these fears are dispelled can the normal bureaucratic problems be tackled.

Unlike previous 'bike-safety' programs, Effective Cycling is based on the principle that cyclists fare best when they act and are treated as drivers of vehicles. Naturally, the training consists of learning the skills of riding properly in traffic. This training can only occur in the streets in real traffic, just as motorists learn to drive cars. That is what causes opposition. People believe that cycling in traffic is deadly dangerous even for skilled cyclists, and they won't allow their unskilled children to be taken out onto the streets where they will be killed.

These unfounded fears will kill any program that arouses them. Even when not fully aroused by strong emotions, these fears arouse the superstition that cycling training cannot work. The superstition holds that even normally-skilled cyclists can protect their lives only by staying out of motorists' way, a skill that is easy to teach. Since the little there is to learn is already taught in bike safety programs, there is no need to set up a course that has no content and cannot have any. It's a dangerous waste of money when other things are much more important.

The organizer must have the persuasive skills and the knowledge to overcome this unfounded but superstitiously strong opposition.

He or she must have the diplomatic skills to defuse the fears among those who may be interested or affected, and to convince those who will not give up their fears that they will never be adversely affected by a program that they may

continue to disapprove of. That is why so much of the training of instructors is directed at social and psychological understanding of cycling affairs.

11.2 ORGANIZING A PROGRAM

Starting the first Effective Cycling program in a public school system took four years of dedicated work. Yours may be quicker because intermediate and elementary Effective Cycling have now been developed and tested, but the chances are that Effective Cycling and the vehicular-cycling principle are still new ideas in your city. Convincing people of the need for a bicycle-safety pro-gram is not enough, and by itself it may be harmful. You have to convince them that all the previous bike-safety programs were wrong and that Effective Cycling, a program that is certainly expensive and that sounds dangerous to most people, is the correct solution. That's a long task.

Start by contacting two groups of people: those who are interested in cycling (whom you probably know already) and those who are interested in child safety and school safety programs. The cyclists are more likely to be informed of EC's virtues, and even if they are not they are more likely to understand its logic and benefits. Seek out those who have children in school and are active in parents' organizations and educational affairs. Persuade them to help you in your effort by developing their contacts in those areas and spreading the word that Effective Cycling works and has their approval. Get introduced to the committees that are active in school safety. You will probably be asked to do some work; well, successful performance demonstrates your sincerity and reliability. However, try to do things that pertain to cycling, saying that that is your field and where you can best help. If not that, then work in traffic safety.

You have three purposes: to know what is going on in your area in this subject; to develop a reputation for being well-informed, capable and reliable; to be invited (with some push from yourself, of course) to give presentations to any group that may be able to assist in starting an Effective Cycling program.

These presentations have two purposes: to arouse interest and to allay fears. The people in your audiences will usually not be interested in cycling either as a sport or as a transportation reform. They are interested only in making children's cycling safe. They are not averse to having children enjoy cycling, and they may view enjoyment as a useful way to teach safer cycling, but only a few of them regard the teaching of sporting cycling as a benefit that is worth supporting. On the other hand, nearly all of them will disapprove of cycling as a transportation reform. Stay well away from giving the impression that you are working to popularize cycling or to convert people from motoring to cycling. In fact, you will be given that label whether you encourage it or not, so it becomes necessary to specifically disavow it, repeatedly. Stick to the main point that you are primarily working to reduce the accident rate for the cycling that children will do in any case, and secondarily to give them more enjoyment in cycling properly, and nothing more.

Since the main subject of your discussions is safety, you must talk about the dangers of cycling. However, you must be very careful to distinguish between the real dangers and what the audience thinks the dangers to be. They think that the danger is motor traffic and that the way to be safe is to stay as far out of its way as possible. You must point out that the major dangers, the causes of most accidents and most car-bike collisions in this age group, are cyclist errors that are preventable through Effective Cycling training. Otherwise they will continue to believe that EC training is dangerous because it takes place on the streets in real traffic.

Likewise, you have to criticize the bike-safety training that they are used to and believe in, but you must always do this only in the course of presenting the better methods of EC. For example, when you describe the five traffic principles that underlie EC training, you can easily add that none of these are covered in the traditional bike-safety programs. Similarly, you may point out that traditional bike-safety education does not teach children who are entering the roadway to look both ways and to delay until they see that no traffic is coming. "We practice that many times until I know that the children do it right every time. Isn't that what you want your children to learn?" The instructor may say that certainly he will take the-children out in traffic, but only after they have demonstrated that they ride properly where there is no traffic. Then the first practice in traffic will involve only one car at a time until the students have demonstrated that they can judge one car at a time.

This careful process is why the EC program works and why it is effective.

You have to discuss frightening thoughts, and every time that you do you risk aggravating

the fears that lie behind them and thereby ruining your chances, unless you immediately allay the fears with a demonstration of a safer and better technique while displaying a wise and competent personality. It's a tall order.

Once you have generated support and demand from the local community you may approach the school administration. The same gradual approach is desirable, and it is desirable to seek out those persons in the education community who may give support, openly or quietly.

Even when the administration has become supportive, there are the usual bureaucratic problems: people, time and money. Time must be found in the school year, and even in those systems where safety education is required that time will be insufficient. The program requires one period a day for three, or better four, weeks. That will be either physical education time or after-school time because cycling is a sport. If the school's risk manager must approve, you must describe the program to him. He will probably approve after a detailed discussion. The police may oppose, requiring more explanations. The money will have to be found. You may be prepared to start by donating your time, but the class requires supplies and no program will continue unless the instructors are paid.

11.3 OBJECTIVES OF COURSES

The Effective Cycling Program in schools has one objective: to provide traffic-cycling skills that are usable by and suitable for the students. Since the program may be given as early as the third grade or as late as the seventh grade, the level of achievement will depend on the age of the students, but in each case the students will learn the skills that are necessary for the cycling that is typical of their age.

Students in grade three will learn to use the first three principles of cycling in traffic:

1: Riding on the right-hand side of the roadway, never on the left and rarely on the sidewalk.
2: How to yield to traffic whenever they reach a superior cross street.
3: How to yield to traffic whenever changing lanes or moving laterally on the roadway.

They will use these principles for making all the maneuvers (including vehicular-style left turns) that are necessary for two-lane residential streets with traffic flowing at 25 or 30 mph.

Students in grades five or seven will learn to use all five principles of cycling in traffic:

1: Riding on the right-hand side of the roadway, never on the left and rarely on the sidewalk.
2: How to yield to traffic whenever they reach a superior cross street.
3: How to yield to traffic whenever changing lanes or moving laterally on the roadway.
4: When approaching an intersection, one's position is determined by where one wishes to go. Those who want to turn right are on the right near the curb, those who want to turn left are near the center of the road, while those who want to go straight are between these.
5: When travelling between intersections, one's position is determined by one's speed relative to other traffic. Parked vehicles are at the curb, slow vehicles are next to them, while fast vehicles are near the center of the road.

They will use these principles for making all the maneuvers that are necessary for multi-lane streets with traffic flowing up to 35 mph (grade five) or 45 mph (grade seven). It may appear that the eight-year-olds need to learn the latter two principles and do so. To some extent, the eight-year-olds learn about intersection positioning as they learn how to turn left, but since they learn only on two-lane roads they do not have to learn how to select a lane but only how to position themselves near the center of the road. They practically never ride fast enough to need to know about speed positioning, except when one is overtaking another. In both these cases, they are taught the correct method of performing the maneuver without explicit mention of the principles of intersection positioning and speed positioning. Turning left and overtaking a companion are taught as exceptions to the general rule of riding near the right-hand edge of the roadway, rather than as examples of the principles of intersection and speed positioning.

These objectives are sufficient for the students to operate as drivers of vehicles on the streets that serve most of the destinations that they are allowed to go to. These objectives can be attained in courses that last fifteen class sessions.

The older students may in addition be taught to do the normal mechanical safety check and minor adjustments. This is likely to require an additional five sessions.

In addition to learning how to cycle properly and understanding the purpose of each action, students of grade seven will acquire an understanding of the traffic system as a system for the

efficient and safe movement of traffic on highways. They will observe that they are performing the same maneuvers in the same ways as other drivers, and will conclude that this is the way that it ought to be. They may take to criticizing the performance of any motorists who make mistakes in front of them, particularly those drivers who cause delays by nicely yielding to the cyclist when the cyclist has the duty to yield to the motorist. The instructor does not have to lecture the students on these matters; they reach these conclusions themselves, and it is probably better so.

The objective of developing to a useful and safe extent the essential skills of cycling in traffic ignores many items that other bicycling programs include. It ignores these because developing the traffic skills requires more time than most school systems have previously allocated to bicycle safety programs. There is no time to be wasted on work that does not advance the skills of cycling in traffic. Many educators assume that knowledge of road signs and traffic laws prevents cyclists from getting into accidents or makes them behave more as society desires, but in fact this knowledge has only a peripheral effect. The cyclist who has learned effective cycling technique has the knowledge and incentive to operate in accordance with the laws and principles because he has learned that that technique really works. On the other hand, the person who knows only the laws does not know how to cycle properly because he knows only words without knowing the skills and appreciating their advantages. More than that, children don't learn activities from laws; they learn the meaning of the law from being shown how to perform activities that are in accordance with the law.

The Effective Cycling Program does not teach children to make the pedestrian-style left turn, for several reasons. In the course, children learn to make vehicular-style left turns with skill, so that there is little need for them to make pedestrian-style left turns. As a general rule, students should not cycle at all on roads where they cannot safely make a vehicular-style left turn. There is no evidence that pedestrian-style left turns are safer than vehicular-style ones. At those locations where traffic is so heavy that a pedestrian-style left turn might be justified, it takes a large part of one class session to get all students through one pedestrian-style left turn. A class can practice pedestrian-style left turns only at signalized intersections, walking their bicycles as a group when the signal permits. Since the students already know how to do this, there is no point to taking valuable class time to review. Since signalized intersections are safer than those without traffic controls, and since traffic signals break up the traffic into platoons, there is less need to use the pedestrian-style left turn at signalized intersections than there is at unsignalized intersections. Since the skills needed at unsignalized intersections are so different from those needed at signalized ones, it isn't worth valuable class time to learn to make pedestrian-style left turns at signalized intersections.

The Effective Cycling Program for children does not include methods of recognizing and avoiding the mistakes of other drivers. Accident statistics show that this is a desirable objective and the adult course shows that it can be attained, but experience has shown that children can't learn this in this course. For the fifth and seventh grade students, the problem is probably not one of insufficient maturity but of insufficient experience of traffic. The Effective Cycling course is their first exposure to traffic concepts and operation in traffic. Their time is fully occupied in learning how to operate properly. Until they have had sufficient experience to make proper operation habitual, they do not have the understanding of traffic to be able to detect the incipient mistakes of other drivers, and hence cannot avoid the improperly-driven vehicles. The most difficult part of the Effective Cycling course for seventh grade students is to teach them not to creep up on the right-hand side of right-turning cars. They have not yet learned how to distinguish a car that will go straight from one that will turn right, while experienced adult cyclists can do this with fair accuracy. Presumably, if the students continue to ride properly after the course they will develop this skill as adults do, but it takes more time than is available.

11.4 TEACHING METHODS

11.4.1 TEACHING BY REPEATED PRACTICE

The Effective Cycling courses for children are taught by the classic methods for any motor activity. There are four steps to teaching any one concept and skill:

1: Tell: The instructor tells the students what the activity does and how it is performed, using hand motions or visual aids as appropriate and available.

2: Show: The instructor demonstrates in front of the students the proper method of performing the activity, explaining what he is doing as he does it.

3: Repeated Practice: The students repeatedly practice the activity until they perform it correctly. Once the skill is learned under easy conditions, they are required to perform it under progressively more difficult conditions until they can perform it under the most difficult conditions that are suitable for their age.

4: Repeated Evaluation: As the students practice, the instructor evaluates each performance and tells each student when and how he is doing it incorrectly and how to correct his error, and praises each student as he improves and when he does it correctly.

This method of teaching is nearly all action with little talk. It is teaching by doing. If the instructor keeps the activity going the students can learn the five basic traffic skills extremely well in the fifteen sessions. If he wastes time talking or doing administrative things during class time, the students will have insufficient practice and will not complete the course. One might think that there is ample time in fifteen sessions to do much more, as some other programs attempt to do in less time, but in fact there is not. The students need all the practice that can be squeezed into those fifteen sessions. Remember, we are not teaching verbal concepts for verbal repetition on a written examination. We are teaching students the proper methods of cycling in traffic, which must be done properly because they are done under conditions when errors can be dangerous and which will be useful all the students' lives.

American adults can be taught more quickly than children with a greater use of verbal instruction and less practical instruction. This is because they already have experience in traffic, so that as the instructor explains a matter they can picture in their minds the situation that he is discussing. Children cannot do this, for two reasons. First, they have a lower level of verbal skill, so that they do not fully understand the complicated sentences and abstract words that the instructor must use to discuss traffic situations. Second, they have no experience of operating properly in traffic, so that they cannot use the words that they barely understand to create an accurate picture in their minds.

Many third grade students cannot understand what is meant by the phrase 'the center of the road', for on their first attempts to approach a left turn they may position themselves anywhere across the width of the road. Those older students who have cycled in traffic for some years may have a better understanding, but because they have been cycling so badly their understanding is still very poor and cannot be relied upon.

When children learn by imitation, they learn very few things at one time. An adult may copy a series of motions, getting most of them generally correct on the first attempt. Children have less ability to learn several motions, so on their first attempts they make many mistakes. Each child will require at least one repetition of the series to correct each of his mistakes. As each child runs through the motions that produce each traffic maneuver, the instructor must remember the child's most significant errors and describe one or two of them to him immediately after he completes the maneuver and returns to the group. As the child performs the maneuver, the instructor may use the child's performance as an example to the other students who are watching, explaining to them the good points and the errors made by the student. However, do not rely on this description to reach the mind of the child who is performing, because he will be concentrating on doing the task correctly rather than listening to the instructor. Remind him of your evaluation after he completes the maneuver and has time to think about his performance.

The first part of learning any maneuver is to learn the sequence of motions that make it up. If you are teaching the students to make a left turn on a two-lane street, you first teach them to look behind, move to the center, look for traffic that is already in the intersection, look ahead for oncoming traffic, make the turn, look behind again, move to the side of the new road. That maneuver takes seven different steps. Not all are obvious. You, the instructor, can see whether the student looks behind because you can see him turn his head but you cannot see whether he looks ahead, because that does not require any obvious motion.

Once the student has learned the correct sequence of motions, he is ready to understand why each action is performed. Ask the student: "What do you do first?" The correct answer is: "Look over my shoulder." Q: "Why do you do that?" A: "So I won't turn in front of a car." Q: "What are you looking for?" A: "I'm looking for no traffic." That phrase no traffic is very important, because most children first answer "I'm looking for traffic." Certainly they are, but if they see traffic they should wait and look again until they see no traffic. Emphasizing the phrase no traffic tells them what they must see before they make their move.

Once the student can perform the correct

sequence of motions in the absence of traffic and knows why he must do them, he is ready to learn how to adjust that performance to whatever traffic may be present. You watch for the simplest traffic situation to develop, and then start the student through the maneuver. If the student is learning to turn left, the simplest traffic situation is when a car is a long way behind him. The student looks, sees the car behind, and may either wait before moving to the center of the road or may move directly. Because the car is a long way behind, it doesn't really matter which the student does, or even if he doesn't see the car. You observe what happens to determine that the student is actually observing the car, not merely turning his head without seeing anything. If that student does well, then on his next repetition allow a car to get closer before starting the student through the maneuver. When you are sure that the student shows judgement in determining whether there is sufficient time to move to the center before an overtaking car reaches him, then you start the student when a car is immediately adjacent to his position so that he has to wait.

Once the student has demonstrated good judgement about overtaking cars, you start him through the left-turn maneuver when a car is approaching from a long way ahead. As the student develops his skill in judging cars from ahead, you start him so that he will reach the intersection just as a car arrives from ahead. You, the instructor, have to remember the progress that each student has made, so that you start each student through the maneuver under conditions that suit his state of skill. Once all the students have mastered the skills of judging cars from both behind and ahead, you move the class to a busier intersection where there is a good chance that the students will meet cars coming from both directions simultaneously.

11.4.2 SELECTING AND USING APPROPRIATE SITES AND ROUTES

It is more difficult when teaching children to find appropriate locations for teaching each maneuver, than it is for adult classes. The short class session and the children's slower speed limit the radius from the class site within which teaching can be done. The children need to start in easier conditions than adults, and they cannot ride through difficult conditions to reach the practice site. These conditions reduce the proportion of places that are suitable for teaching each maneuver. In addition, parents may object, on grounds of safety, to certain sites or to the use of certain routes to reach teaching sites. These objections may have no relation to the actual chances of an accident, but those parents who make them will have strong beliefs in the validity of their fears.

Because their objections are based on fear rather than knowledge, these parents must be handled with tact and their concerns must be addressed. Otherwise they will kill the program.

You must identify a site or route for each step of the instruction, generally at least three sites for each maneuver, each site offering a different degree of difficulty. With elementary-school students you will need one site for each group in the class. You must select a route to each site that does not require a maneuver that hasn't been previously learned. Of course, you can avoid making a left turn by making three right turns around the block, and you can collect the students into one group and shepherd them across a busy street. If the area has many suitable sites and most of the streets are suitable, it is likely that from these you will be able to prepare an acceptable plan. However, if the area has few suitable sites and many streets that will be objected to, you have a more difficult problem.

One tactic in dealing with the objections of parents is to find out where their children are riding today, both to and from school and for recreation and transportation. Spend some time observing the child cyclists in the neighborhood and counting the number that pass various places.

Find out from the school staff and faculty how much they know about which routes the children use. It may be possible to arrange a meeting at which many children mark on one map the routes that they cycle, both to and from school and for other purposes. (If you do this, cover the map with a clear plastic sheet and have the children draw with pens that write on the plastic. Then one map can serve for many collections, and for other purposes.) Then select your instructional sites and routes considering the streets that are actually used. If there are objections to your selections, you answer that you are teaching the students to be safe on the routes that they are already using.

11.4.3 IDENTIFYING STUDENTS BY NUMBERS

It is practically impossible for the instructor to identify all the students by name when the class is on the road with most students facing away from the instructor. The students must carry number

placards and be identified by number. One design for the number placards is shown in Fig. 3. At the first session, assign each student a number that will be used throughout the course and issue the matching placard. At the close of the session, all students return the placard, to be reissued at roll call of the next session. By the second session even grade three students know how to tie the placard in place, and most will have learned their number. They may well take to calling each other by number.

11.4.4 USE OF THE VOICE RECORDER

Use the voice recorder on every session, not just for examinations. You, the instructor, should use the voice recorder and the numbering system to emphasize to the students that you know what each student is doing and are recording your observations. Give praise and criticism by number, and voice-record the maneuvers made during each ride and the errors that are made by each student, designated by number. Don't record comments made during the repeated practices of the maneuver being taught, because the students are still learning and there are too many comments with too little background information. Recording your evaluations by number both keeps the students on their best behavior and gives them confidence that you are doing your job of evaluating their performance. Many students start the course expecting that the examination will be easy or stupid. Recording your evaluations as each maneuver is performed on a ride and playing them back to the students at the close of each session shows the students that you know what they do and are judging fairly, just as you will be doing on the final examination.

When you play back your evaluations at the end of each session, some students may object to some aspect of the evaluations. One may complain that somebody else made the same mistake that you described for him, but you didn't record that. Make the point that you record only the maneuvers that were made on the ride and the errors in each of those that you personally observed. You might not see all the errors, or not be sure that some action was an error, but you took care that you did not say that something was wrong unless you were sure.

11.4.5 TYPICAL CLASS SESSIONS

There is no time to waste in any session. The cycling classroom must have easy access to the bicycle parking area and to the street, and be able to hold both the students at chairs with writing arms and when standing with their bicycles for equipment demonstrations. Have the students collect their bicycles and don their helmets and proper shoes during the passing time and be ready to ride when they appear at the classroom with their bicycles.

During the passing time, the instructor and assistants change the tape cassettes in the voice recorders, sort the number placards into numerical sequence, and get ready whatever papers are needed for the next class.

Check the roll while issuing the number placards. Give a short talk (5 minutes is useful, 10 minutes is too long) on the maneuver to be learned in that session, and get the class on the road.

The format of the road sessions varies with the age of the students. Younger students need more individual practice and learn less from class rides than do older students. For grade three students, much of the road time is assigned to small group practice of each maneuver, so that the class ride from the school is quickly dispersed into small groups, each under an assistant instructor, for practice at separate sites. Because these students vary widely in their energy and have little self-control, it is useful to group them by their energy levels. Those who want to ride fast are then sent to the farthest sites to burn off a bit of energy before starting to learn. Once at the site, the instructor has the students wait at the place from which they will start the maneuver, in a line along the curb, while he describes and demonstrates the maneuver and what he wants them to do after it is complete. (Such as: "Then wait there by the curb until I tell you to come back.") Then he instructs each student in turn to start when he is told. Each student in turn then practices the maneuver, returning to the start as instructed and lining up for his next practice run. When the time allowed has elapsed or the students show sufficient progress, the assistant instructor in charge of the group leads a group ride back to the rendezvous point, which may be either the classroom or some intermediate point. If it is an intermediate point, then the whole class makes a class ride before returning to the classroom.

Grade seven students are introduced to each new maneuver with individual practice at one site, but quickly progress to practicing during the class ride. Only occasionally with a large class is it necessary to split a grade seven class into smaller groups for practice. Since most of their learning

occurs during class rides, the instructor must plan more routes and fewer sites for grade seven students than for grade three students. Grade five students are somewhere in between these two extremes.

During class rides the instructors station themselves along the line of students so that they can observe what is going on and issue instructions and directions. With young students an instructor must be at or very near the head of the line to tell them which way to go and to give an example of what to do. With older students who know the way, there is less need to be at the head of the line. Those instructors who have voice recorders use them to record the maneuvers made and any errors that students make, or other comments on the actions of students. One instructor must be assigned to be the last person on the ride, and has the task of returning any students who have trouble or fall behind.

Once the class has returned to the classroom, the instructor may give a short talk about what the students have learned and what he has observed, and may play back a portion of the tape recorded comments if he thinks that these illustrate his points. Then the students doff their placards and, just before the passing bell, leave to return their bicycles to the parking racks and to take off their helmets and, if worn, cycling shoes.

11.4.6 LOOKING BEHIND PRACTICE AND TEST

This is the only playground exercise in the course. Its objective is to determine that all students can look behind on either side while holding a straight course. Indicate to the students a loop course around the playground area that has at least one straight stretch. First have all the students ride around the loop in the clockwise direction while you station yourself on the outside of the straight stretch. Have all the students turn to look back at you over their left shoulders after they pass you. Indicate by voice or gesture that those who look at you and hold a straight course are to leave the circuit. Continue until all have shown that they can look behind at you while holding a straight course. Then have them ride the circuit in the anti-clockwise direction so that they look at you over their right shoulders, and repeat the procedure.

11.4.7 CLOTHING REQUIREMENTS

Students do not need special clothes for the Effective Cycling course, although not all the clothes that they might wear to school are suitable. However, since the students who would take the class are those who cycle to school, at least while they are enrolled in the course, they will have arrived with clothes that they can cycle in.

The most frequent problem is shoes, for they may cycle to school in shoes that are not suitable for cycling. Students are required to appear for the cycling class in completely closed, well-fitting, low heeled shoes with laces or straps. Shoes that have open toes or that may be kicked off without unlacing or unbuckling are not allowed for safety reasons. Boots are discouraged because they interfere with good pedalling.

Helmets meeting the Z-90 standard should be required, and if not required should be encouraged, as is true for all cycling.

11.4.8 USE OF RADIO COMMUNICATIONS

Some classes have used two-way pocket radios for communication between students and the instructor during class rides. The etiquette is the same as for speaking in a classroom. The instructor may transmit at any time, but a student is allowed to transmit only after he has raised his hand and has been recognized by the instructor's transmission: "Yes, Number Ten." Radio communication enables one instructor to stay near the rear of the line so he can observe the actions but still talk to the whole class at one time. With older students this saves time because the class doesn't have to close up and wait whenever the instructor needs to tell them something. With younger students and their smaller groups, radio communication does not save so much, but communication between the instructors would probably be beneficial. Whether the pocket-sized radios that are available are able to communicate for the distances by which groups might be separated can be determined only by experiment.

11.5 PERSONNEL REQUIRED

Each class requires a qualified EC instructor and one or more assistants. For grade three students there should be an instructor or an assistant instructor for every seven students, while for grade seven students there should be an instructor or assistant for every ten to fifteen students. There-fore, these programs require about one and one half instructor hours per student for grade seven or about two instructor hours per student for grade three.

11.6 SUGGESTED CLASS SCHEDULES FOR GRADES 3, 5, AND 7

These schedules are based on 20 periods of 45-50 minutes each.

The student text (to be issued to parents of the grade 3 students) is Effective Cycling at the Intermediate Level.

11.7 EFFECTIVE CYCLING FOR GRADE 3

11.7.1 Before The Course Starts

Two weeks before course starts, send parents of each enrolled child the text Effective Cycling at the Intermediate Level, with instructions to:

1: Read the text and be prepared to discuss any questions the child may bring home during the course.

2: Inspect the bicycle to be used according to the instructions in ECIM and bring it up to acceptable standard.

3: Sign the inspection and permission forms and return them to the school.

11.7.2 Session 1

11.7.2.1 Lecture

Assign number placards & show how to don.

Collect bicycle inspection forms.

With students on bicycles leaning against wall, inspect for major mechanical defects and for correct posture adjustments. Give a short lecture on the traffic system and cooperative cycling.

11.7.3 Session 2

11.7.3.1 Lecture

Show Bicycling Safely on the Road, with introductory talk first, discussion afterwards.

11.7.4 Session 3

11.7.4.1 Lecture

Yielding to crossing traffic.

11.7.4.2 Practical

Driveway exiting practice in small groups.

11.7.5 Session 4

11.7.5.1 Lecture

Review yielding to crossing traffic.

11.7.5.2 Practical

Stop sign practice in small groups across a street with some slow traffic. Practice in estimating the speed and distance of cars and the conditions for safe clearance.

11.7.6 Session 5

11.7.6.1 Lecture

Yielding to cross traffic, quick oral review.

11.7.6.2 Practical

Class ride incorporating stop signed intersections.

11.7.6.3 Session 6 Lecture

Review of previous week's work. Looking over shoulder. Yielding to overtaking traffic.

11.7.6.4 Practical

Playground circuit practice of looking over shoulder and test.

11.7.7 Session 7

11.7.7.1 Lecture

Left turn technique.

11.7.7.2 Practical

Practice left turns in small groups at residential intersections.

11.7.8 Session 8

11.7.8.1 Lecture

Review left turn technique.

11.7.8.2 Practical

More left turn practice in small groups at residential intersections.

11.7.9 Session 9

11.7.9 Practical

11.7.9.1 Class recreational/instructional ride incorporating residential stop signs, right turns, left turns, and a short but fast ride for fun.

11.7.10 Session 10

11.7.10.1 Practical

Stop sign practice in small groups across streets with medium traffic. Practice in estimating speed and distance of cars to determine what are

safe clearance conditions.

11.7.11 Session 11

11.7.11.1 Practical
Class recreational/instructional ride that reviews all basics on residential streets.

11.7.12 Session 12

11.7.12.1 Lecture
The concept of taking turns at 4-way stop signs.

11.7.12.2 Practical
Small group practice at 4-way stop signed intersection.

11.7.13 Session 13

11.7.13.1 Practical
Class recreational/instructional ride with emphasis on stop signed intersections, may include both right and left turns also.

11.7.14 Session 14

11.7.14.1 Lecture
Traffic signals.

11.7.14.2 Practical
Rides to and practice in small groups at intersections with traffic signals. Select intersections with at least one 2-lane road, and enter the intersections only on 2-lane roads.

11.7.15 Session 15

11.7.15.1 Practical
Class recreational/instructional ride incorporating all the maneuvers covered so far.

11.7.16 Session 16

11.7.16.1 Lecture
Review yielding to overtaking traffic.

11.7.16.2 Practical
Small group practice of left turns on collector streets with medium traffic, where students can expect to interact with cars from both directions. Some groups may not reach this level; for them, more left turn practice on low traffic streets.

11.7.17 Session 17

11.7.17.1 Lecture
Repeat 16

11.7.17.2 Practical
Repeat 16, progressing as far as each group warrants.

11.7.18 Session 18

11.7.18.1 Practical
Review of all previous work on a class ride.

11.7.19 Sessions 19 & 20

11.7.19.1 Cycling proficiency tests of all students for final examination.

11.7.20 After the Course

11.7.20.1 Awards
Award of Effective Cycling League Patches and Certificates.

11.8 EFFECTIVE CYCLING FOR GRADE 5

11.8.1 Before the Course

Two weeks before course starts, send parents of each enrolled child the text Effective Cycling at the Intermediate Level, with instructions to:

1: Read the text and be prepared to discuss any questions the child may bring home during the course.
2: Inspect the bicycle to be used according to the instructions in ECIM and bring it up to acceptable standard.
3: Sign the inspection and permission forms and return them to the school.

11.8.2 Session 1

11.8.2.1 Lecture
Assign number placards & show how to don.
Collect bicycle inspection forms. With students on bicycles leaning against a wall, inspect for major mechanical defects and for correct posture adjustments. Give short lecture on the traffic system and cooperative cycling.

11.8.3 Session 2

11.8.3.1 Lecture

Show Bicycling Safety on the Road. Introductory talk first, discussion afterwards.

11.8.4 Session 3

11.8.4.1 11.8.4.1 Lecture
Yielding to crossing traffic.

11.8.4.2 11.8.4.2 Practical
Driveway exiting practice, residential street stop sign practice.

11.8.5 Session 4

11.8.5.1 Lecture
Review yielding to crossing traffic.

11.8.5.2 2 Practical
Stop sign practice across street with several cars a minute. Practice in estimating the speed and distance of cars and the conditions for safe clearance.

11.8.6 Session 5

11.8.6.1 Lecture
Yielding to overtaking traffic.

11.8.6.1 Practical
Playground circuit practice in looking over the shoulder, and test. When all students can look behind, move to residential street with substantially no traffic for practice of left turns. Work to get correct track and sequence.

11.8.7 Session 6

11.8.7.1 Lecture
Review of previous work. Left turns.

11.8.7.2 2 Practical
Left turns at intersections of residential streets.

11.8.8 11.8.8 Session 7

11.8.8.1 Lecture
Review left turns.

11.8.8.2 Practical
Left turns on collector streets with more traffic. Practice in estimating the conditions for safe clearance.

11.8.9 Session 8

11.8.9.1 Practical
Class recreational/instructional ride including stop signs, right turns, left turns on residential and collector streets.

11.8.10 Session 9

11.8.10.1 11.8.10.1 Lecture
Intersection positioning with left-turn-only lanes.

11.8.10.2 Practical
Left turns from a 2-lane road at an intersection with a left-turn-only lane.

11.8.11 Session 10

11.8.11.1 Lecture
Taking turns at 4-way stop signs.

11.8.11.2 Practical
More left turn practice. 4-way stop sign.

11.8.12 Session 11

11.8.12.1 Lecture
Review all previous work.

11.8.12.2 Practical
Class recreational/instructional ride that reviews all previous work.

11.8.13 Session 12

11.8.13.1 Lecture
Traffic signals.

11.8.13.2 Practical
Straight, right turn, left turn at traffic signals.

11.8.14 Session 13

11.8.14.1 Lecture
Intersection positioning by avoiding right-turn-only lane.

11.8.14.2 Practical
Practice in going straight at intersections with right-turn-only lanes.

11.8.15 Session 14

11.8.15.1 Lecture
Intersection positioning on 4-lane streets.

11.8.15.2 Practical
Class recreational/instructional ride with left, straight, and right turns at 4-lane intersections with light traffic.

11.8.16 Session 15

11.8.16.1 Repeat 14.

11.8.17 Session 16

11.8.17.1 Lecture
Speed positioning, with emphasis on not overtaking between slow car and curb, or between slow bicycle and curb.

11.8.17.2 Practical
Class ride performing all maneuvers in shopping traffic.

11.8.18 Session 17

11.8.18.1 Repeat 16.

11.8.19 Session 18

11.8.19.1 Lecture
Review. Talk about interacting with motorists in complicated situations, using examples that have arisen during the previous sessions.

11.8.19.2 Practical
Class ride in shopping traffic.

11.8.20 Sessions 19 & 20

11.8.20.1 Cycling proficiency tests of all students for final examination.

11.8.21 After the Course

11.8.21.1 Awards
Award of Effective Cycling League Patches and Certificates.

11.9 EFFECTIVE CYCLING FOR GRADE 7

11.9.1 Before the Course
Two weeks before course starts, send parents of each enrolled child the text Effective Cycling at the Intermediate Level, with instructions to:
1: Read the text and be prepared to discuss any questions the child may bring home during the course.
2: Inspect the bicycle to be used according to the instructions in ECIM and bring it up to acceptable standard.
3: Sign the inspection and permission forms and return them to the school.

11.9.2 Session 1

11.9.2.1 Demonstration
Teach students to do the bicycle mechanical check.

11.9.3 Session 2

11.9.3.1 Demonstration
Teach students the correct posture and show them how to adjust their bikes for correct posture.

11.9.4 Session 3

11.9.4.1 Demonstration
Teach students how to fix flats.

11.9.5 Session 4

11.9.5.1 Demonstration
Teach students how to adjust their brakes.

11.9.6 Session 5

11.9.6.1 Demonstration
Teach students how to adjust gear cables and stops.

11.9.7 Session 6

11.9.7.1 Lecture
Cyclists are drivers. Show Bicycling Safely on the Road.

11.9.8 Session 7

11.9.8.1 Lecture
Yielding to cross traffic.

11.9.8.2 Practical
Starting and stopping. Yielding to cross traffic 1.

11.9.9 Session 8

11.9.9.1 Lecture
Review yielding to cross traffic.

11.9.9.2 Practical
Yielding to cross traffic 2. 2-mile ride with no left turns.

11.9.10 Session 9

11.9.10.1 Lecture
Yielding to overtaking traffic. Left turns on 2-lane street.

11.9.10.2 Practical
Looking behind playground test. Left turns on 2-lane residential streets with some traffic.

11.9.11 Session 10

11.9.11.1 Lecture
Review left turns on 2-lane streets.

11.9.11.2 2 Practical
Left turns on 2-lane streets with moderate traffic. 2-mile ride.

11.9.12 Session 11

11.9.12.1 Lecture
Intersection positioning.

11.9.12.2 Practical
3-mile ride, partly in business district, left turns on 2-lane streets.

11.9.13 Session 12

11.9.13.1 Lecture
Changing lanes

11.9.13.2 Practical
Avoiding right-turn-only lanes. 3 to 4-mile ride.

11.9.14 Session 13

11.9.14.1 Lecture
Changing lanes.

11.9.14.2 Practical
Left turns on multi-lane streets. Left turns with left-turn-only lanes. 3 to 4-mile ride.

11.9.15 Session 14

11.9.15.1 Lecture
Review intersection positioning.

11.9.15.2 Practical
3 to 4-mile ride with left turns on multi-lane streets and streets with left-turn-only lanes, considerable traffic.

11.9.16 Session 15

11.9.16.1 Lecture
Speed positioning. Review changing lanes.

11.9.16.2 Practical
More cycling on multi-lane streets with considerable traffic.

11.9.17 Session 16

11.9.17.1 Lecture
Speed positioning. Avoiding getting on right-hand side of right-turning cars.

11.9.17.2 Practical
More cycling on multi-lane streets with considerable traffic. Have students try to estimate whether cars ahead will be turning right or going straight.

11.9.18 Session 17

11.9.18.1 Lecture
Cyclist's lane rule.

11.9.18.2 Practical
Left turns where there are multiple left-turn lanes.

11.9.19 Session 18

11.9.19.1 Lecture
Vehicular cycling principle. Where to learn more.

11.9.19.2 Practical
Review ride over intricate route, 3 to 4 miles.

11.9.20 Sessions 19 & 20

11.9.20.1 Cycling proficiency testing. Written examination.

11.9.20.2 After the Course
Praise the students, etc.
11.9.21.1 Awards
Award of Effective Cycling League Patches and Certificates.

12 TESTING PROFICIENCY OF STUDENTS

12.1 THE CYCLING PROFICIENCY TEST

12.1.1 IMPORTANCE OF THE TEST

The cycling proficiency test is very important for the student, the instructor and the Effective Cycling Program; and it has some importance for society. The cycling proficiency test must be reliable, accurate and respected, characteristics that cannot be acquired by cursory evaluations of the students' performances.

For the student, the purpose of the Effective Cycling course is not merely to pass the test, although many of the younger students might see it in that light. It is to develop the skills of safe and enjoyable cycling that will last a lifetime and be available whenever the former student wants to cycle, for whatever purpose he chooses to do so. Since cycling incompetently is dangerous, the test must detect the incompetent students for further training or eventual classification as persons who should not cycle. Those who pass ought to be able to handle themselves in all the situations that they are likely to meet on the roads, taking into allowance the more limited choices allowed to young cyclists. Respected tests have a psychological benefit also. The student must be convinced that the test reflects the real-life situations that he meets on the roads and that it is graded so that it is a test of real competence. Those who know that such a test lies before them they are much more likely to learn well, and those who pass a test that they believe is valid are much more likely to value and practice the knowledge and skills that they have acquired.

The instructor needs a reliable, accurate and respected test that will justify the grades that he assigns and will demonstrate to those who question it that his Effective Cycling courses have taught students how to ride properly, as demonstrated by the items tested and the scores achieved by the students.

The Effective Cycling Program benefits when its students pass reliable, accurate and respected tests because that demonstrates that the program is reliable and effective and provides continuing assurance that the instructors are teaching as they should. Today, all educational programs and teachers in the public schools are under some scrutiny to determine whether their students are learning what the public thinks is necessary. Because it is a non-academic program about a subject that the public believes has no content, Effective Cycling must develop great respect for it to succeed in the schools. That applies only indirectly to the Effective Cycling courses and instructors in areas such as adult education, recreation, cycling clubs and other cycling organizations.

However, we must also consider the broader aspects: the Effective Cycling Program has more goals than just teaching people how to ride properly. It aims to develop a public that is better informed about cycling, to raise the social status of cyclists as responsible drivers of vehicles, and thereby to protect the rights of cyclists against legal discriminations, both those that now exist and those that periodically threaten us. To ensure that Effective Cycling is, and is seen to be, an effective, high-quality program requires that its graduating standards are as high as the conditions that its graduates must meet on the road. The cycling proficiency test determines whether students are qualified to ride on the roads in traffic. Therefore, it is the most important part of the final examination. For younger students, it is the only final examination because it is the only way for them to demonstrate that they have acquired the skills. Older students also take a written examination because they can demonstrate their understanding of the theory of cycling in traffic and because they study additional matters that can be tested in written examinations.

12.1.2 COMPARISON OF TEST METHODS

The Effective Cycling Program's cycling proficiency test is an advance over previous methods in that it is both accurate and economical. The classic method of testing motorists is to have the applicant take the examiner for a drive. The examiner tells the applicant where to go and writes down his evaluation as the applicant drives over the test route. This can't be done for cyclists because the applicant's bicycle can't carry the examiner and the examiner can't write while riding his own bicycle. It also is expensive because the examiner can examine only one person at a time, and because bicycles are slower than cars each cycling examination is likely to take longer to cover the same scope. However, it does allow the examiner to vary the route according to conditions and to enable him to retest for any item about which he is doubtful.

The European nations where cycling is popular developed the multiple stationary observer technique for testing large numbers of students, as when a course has been given at a school. The test route is predetermined and observers are stationed at critical points around it. Each observer observes the one maneuver that is done at his location, and has a score sheet with that maneuver and its mistakes listed upon it. As each student passes him, the observer writes down the student's identifying number (printed in large numerals on a vest) and whether the student passes or fails in the maneuver. After all students have completed the test ride, the observers' results are collated and those students who have passed all maneuvers are awarded certificates.

This system has several disadvantages. It has the decided organizational defect of requiring a large number of observers for a relatively short time. In America, where qualified observers are scarce, this is a practical impossibility. It also has the scientific defect that the observers cannot see the whole ride, and in fact the observer assigned to one maneuver often cannot see the whole maneuver that he is evaluating. For example, when making a left turn on a busy multilane street the act of changing lanes may occur at any point in a quarter-mile and may be concealed from a stationary observer by intervening traffic. The Europeans avoid this difficulty by testing students only under unrealistically easy conditions, largely without traffic. Therefore their tests can show only that the students have learned the correct sequence of motions, without evaluating their skill at judging conditions and acting accordingly.

Some investigators have used a car to follow cyclists, with one person driving and another observing the cyclist and writing down the observations. This is both expensive and inaccurate. It is inaccurate because the slow-moving car upsets the traffic pattern so that the other drivers do not behave normally around the cyclist.

The Effective Cycling Program's cycling proficiency test uses a single cycling examiner who follows and observes a group of students and records his observations with a voice recorder. The students are identified by large numerals worn on the back. At intervals, the examiner catches up to the leaders and gives new instructions about the next portion of the test route and rearranging the students' positions in the group.

When the examiner is satisfied that he has observed all the students in the group under all of the standard conditions and is confident of his results, he directs the group back to the base. After all the test rides, the voice recorded observations are tallied onto individual score sheet forms and the individual scores are calculated. The score-sheet forms are given as Figs 7 and 8. This clerical process may be done by hand or by keying the observations into a personal computer program that assigns points, calculates scores and prints out the individual score sheets.

12.1.3 THE TEST SCORING SYSTEM

The cycling proficiency test evaluates each student throughout a test ride of any length and configuration. The score that is developed reflects the student's skill in handling all the conditions that he encounters during the test ride, and therefore, provided that all the standard conditions are encountered, it is independent of the length of the ride and of its particular circumstances. Each standard maneuver has been assigned a point value that the student earns whenever he performs that maneuver, and these are added to form his total possible points. Each of the common mistakes in that maneuver has also been assigned a point value. For each mistake the student makes, the point value of that mistake is subtracted from his total possible points to form his actual earned points. The ratio of actual earned points to possible points is the percent score for his test. The point values have been selected according to several considerations. The possible points for each maneuver have been selected according to the difficulty, importance and danger of the maneuver. If the maneuver is difficult, important in cycling, and if improperly done is quite liable to produce serious adverse consequences, it has a high point value. If the maneuver is easy, not of great importance, and has little likelihood of adverse consequences, it has a low point value.

The points for mistakes have been assigned so that a maneuver in which student makes the worst tolerable mistake contributes a value of 70% to the final score. A maneuver in which any greater mistake is made, or more than one mistake, contributes a value of less than 70%. In this way the final score is a weighted average score that considers both the importance of the maneuvers and their frequency in a ride, and is based on a 70% passing score. In this way the score reflects the student's actual ability in rides similar to those of the test.

The instructor may adjust each run of the test to correct for statistical or accidental variations. If he plans a test ride that includes three stop signs,

and at every one of these there is so much traffic that the students have to stop in any case, he can redirect the ride to include another stop sign where the students can show the proper behavior when there is no traffic to enforce it. This change will not upset the scoring system because it is based on the proportion of maneuvers done correctly, not upon any preselected number of maneuvers.

12.1.4 GIVING THE PROFICIENCY TEST

The instructor must first decide whether he can give the test to all the students in the class at one time or whether he must break the class into groups. The age of the students and the type of class determine the maximum size of test groups. For school-type classes with short sessions, in which the training is limited to traffic cycling, the best arrangement is to break the class into groups of no more than eight students who ride a short test circuit of about two to three miles that has several examples of each type of maneuver. The instructor can examine two of these groups in each session of 40 minutes while the assistants ready the other students for test rides and give written tests, opinion questionnaires, or tests of mechanical safety inspection skill. For adult-type classes in which all the cycling skills are taught in three-hour sessions under one instructor, the final examination session typically starts with a written examination, continues with a traffic ride of ten miles or so in which all students are evaluated and the class moves to the site of the time trial, and ends with the final time trial. During the longer ride, the students are observed in groups of up to 10 at a time and a full class of 30 students can be tested. The instructor should also consider how the route can be amplified to obtain additional observations of any maneuver if for some reason he does not obtain good observations of that maneuver.

With the desired duration in mind, the instructor must design a route that includes several examples of all the standard maneuvers and at least one of any unusual maneuvers or conditions that may be found locally, such as diagonal railroad tracks. For an adult-type course with a single long test route, there should be sufficient examples of the standard maneuvers so that each test group has to handle several. If only one example of each of the rarer conditions and maneuvers can be found, then the instructor must be careful to observe all the students at those places.

Before the test the instructor must see that the batteries in the voice recorder are fresh and the recorder is working properly. The instructor must obtain sufficient score sheets for the size of group, allowing for some spoilage. He needs to review the test score sheet so that he remembers the names of the maneuvers and the names of the listed mistakes for each one. Even if number placards were not used in the normal sessions, the students need to wear these for the test.

At the start of the test, the instructor assembles the test group and reminds them of certain principles. Each rider is to rely only on himself and must not merely follow the leader; the leader may be wrong, or conditions may change after the leader makes any maneuver. If the instructor sees that students are following each other, he will order them to change positions. This is not a test of speed, and those in the lead must not leave the others behind. If the rear of the group is delayed, for instance by a traffic light, then the leaders must wait for the rear to catch up. They must all stay within sight of the instructor, so that he can observe their behavior. He then describes the test route, or at least the first part of it.

To ensure that the records are kept straight, the instructor then records on the voice recorder the date, location and class and group numbers and the name and number of each of the students in the test group. He then starts the group off and follows.

As each maneuver or condition occurs, the instructor gives its name. The assumption is that all students in the group perform the maneuver or handle the condition, unless otherwise stated.

The instructor then gives the number of any student who makes a mistake and then the name of the mistake. If the mistake is an unusual one that is not listed, then the instructor describes the mistake. If some unusual condition occurs and some student handles this condition especially well, then that is also described.

Whenever necessary, the instructor moves to the front of the group and gives instructions about the next sections of the route or to rearrange the sequence of the students. The instructor considers whether he has been able to make valid observations of all the standard maneuvers and any others that he thinks should be included, and if he has not he directs the group to take an additional section so that he can obtain valid observations. When satisfied, he directs the group back to base. At the close of the test he records any last comments and states the end of the test record for

that group.

After all the tests have been run, the instructor sets up to tally the observations. He rewinds the voice recorder's tape to the beginning and connects the recorder's foot switch. He sets out his score sheets and electronic calculator on a large table or starts up the computer program. The paper method will be described here, and if the instructor has the computer program he will follow the slightly different instructions given with it. He starts the tape and as each student and his number is read the instructor makes out a score sheet for that student. He then spreads out the score sheets on the large table in numerical order. Alternatively, if he has many assistants or has older students who can tally for students not themselves, he assigns one sheet to each person. As the voice recorder gives the name of a maneuver, all sheets are marked with a tally mark in the top box for that maneuver, thus indicating that the student has performed that maneuver. As the number of a student is given, followed by the name of a mistake that he has made, that student's score sheet is marked with a tally mark in the box for that mistake. Whenever unlisted conditions or mistakes are described, a short note is made on the appropriate score sheet. When the recorder says that the test record is complete, tallying is complete and the scores may be calculated. The instructor first considers any comments about unlisted conditions or mistakes, and determines the points for each of these. Then all the scores are calculated. The total possible points are first calculated. This is done by running a cumulative total of the number of times each maneuver is performed multiplied by its point value. The total possible points is recorded on the score sheet and, if possible, in the calculator's memory. Then the points lost is calculated by running a cumulative total of the number of times each mistake was made multiplied by its point value. The total points lost is recorded on the sheet and, again if possible, in the calculator's memory. The percent score is then calculated by the formula:

$S = 100(P - L)/P$

where:

S is the score in percent

P is total possible points

L is total points lost

The minimum passing score is 70%.

12.2 WRITTEN TESTS

In the course for older students we teach information and ways of thinking about cycling as well as skills. For these older students, even the skill of traffic cycling ought to have its verbal component, for they benefit by being able to express in words the theory that they are following. This allows them to generalize so that they can apply the theory to situations that they have not been taught and so that they can describe the skill and the theory to other people. In addition, we teach information on mechanical maintenance and on the various ways to enjoy cycling and to excel at it, matters that would take an enormous time if they were taught by having the students copy demonstrations. More than imparting skills and information, in some ways more important, we aim to change our students' thinking about cycling, to replace the conventional cyclist-inferiority superstition with the vehicular-cycling principle. This is not merely teaching students to make the vehicular-style left turn or to ride on congested roads; they may do these things while still believing that they are doing something wrong or dangerous. It is changing their beliefs to accept these actions as normal and prudent. It is giving them the confidence to continue to ride as we have taught them in class. It is giving them the gift of rational thought about cycling, so that they can ride properly, vote properly on cycling matters, and influence others through rational discourse.

Written tests are necessary to make sure that our older students have learned this information and believe the vehicular-cycling principle.

They are also important in demonstrating to educational institutions that the course has a book-learning component that requires study time in addition to class hours, and should be given appropriate credits.

There are two kinds of question for written tests, multiple-choice and essay. Each has its advantages. Multiple-choice questions rapidly screen for knowledge of those facts that are easily stated. Essay questions disclose depth of understanding as well as knowledge, and are applicable to matters that are not easily stated or for which there are several correct answers or several aspects to the correct answer.

There are also some misconceptions about these types of question. One is that multiple-choice questions provide objective results while essay questions give subjective results. This is not so; both types depend on the opinions and skill of the instructor who wrote the questions. The fact that a given multiple-choice answer sheet may be graded in only one way does not make it an objec-

tive test, merely one that has only one grading system. I have reviewed multiple-choice questions about cycling in which the correct answer was not graded as correct but as wrong, and seen others in which none of the choices was the correct answer, and others in which no answers were possible to the question as asked. There are also frequent cases in other subjects where partly-informed students choose the answer that is graded as correct but where well-informed experts choose another answer. In short, the student taking the test often bases his choice of answers on which one he thinks the instructor wants rather than on which is most correct. Contrariwise, essay questions do not require subjective grading. If an answer ought to have five points, say A, B, C, D, E, F, the student who makes those five points gets a perfect score for that part of the grade. If these points should be logically related in the sequence C, D, A, B, F, then the student who shows this relationship gets a perfect score for that part of the grade. Certainly, some students will express their answers with better logic and clarity than others, but since one aim of the course is to develop people who are well-educated about cycling, logic and clarity in expressing cycling thoughts deserve some weight in the grade.

Another misconception about the differences between multiple-choice and essay questions is that multiple-choice questions are easier and take less time to administer. This is not so. Good multiple-choice questions are extremely difficult to design, even when the question involves a simple question of fact. It is not sufficient to invent a question and a correct answer; you have to invent three other equally-plausible incorrect answers to the same question. Take a very simple question: Which transfers power to the chain: A, chainwheel; B, sprocket; C, crank; D, handlebar? The obviously correct answer is A, but this is correct only if the bicycle has a free-running freewheel and we are talking about the cyclist's power. (On a fixed-gear bicycle, the sprocket also transfers power to the chain.) Even then, answer C is also correct, for the cranks carry the power that ends up in the chain. Answer D, the handlebar, is obviously incorrect, so that the question really is a choice of one in three instead of one in four, a probability that upsets the correction factor that is applied to allow for correct wild guesses. Once the question involves more than a simple question of fact, designing multiple-choice questions becomes extremely complicated. They must also be verified, to determine that in fact well-informed subjects uniformly give the answers that are assumed to be correct. Essay questions do not involve so much difficulty, for they are somewhat self-adjusting. If the instructor does not put all the conditions into the question, then the students need to give different answers for each of the possible conditions, and that shows their understanding of the problem. Certainly, it is easier for the instructor to give and grade a multiple-choice examination that somebody else has prepared for him, but that will not give the results that we want for the Effective Cycling Program.

The Cycling Proficiency Test is as standardized as we can make it, considering the different circumstances and surroundings under which it is given, because driving techniques are standard. The written tests should vary because the other parts of the course vary according to the skills and interests of the students. The instructor should design the written test to test the knowledge that he or she has tried to impart, to the degree of complexity that the best students have comprehended. The subjects of the questions should be allocated in two ways. Matters of driving technique should be allocated according to their importance in safe and effective cycling, which is how they should have been presented during the course. Other matters should be allocated according to the emphasis given in the rest of the course.

For the typical adult course of thirty hours, the written examination should be allowed one hour. When grading the answers to essay questions, the instructor should have in mind a standard that contains the minimum for passing each question. By and large, that ought to be the minimum knowledge that will enable the student to ride effectively and keep out of probable trouble. Students who give this answer ought to receive Cs. Students who give more complete answers deserve Bs and As, while students who give less must fail. Students who give substantially perfect answers deserve As. When preparing to grade papers, I sort them into three groups. The first I can read and understand. The second I can read but not understand, the third I have difficulty reading and understanding. By the time I reach the third group, I have acquired some understanding of the typical answers, both correct and incorrect, that aids me in grading the last papers.

12.2.1 TIME TRIAL TESTING

The time trial test should not be used to determine whether a student passes or fails the course, in fact its results should only rarely influ-

ence the final grade that a student receives. As is the principle of time-trialling, the standard is not the speed of the student relative to other students or to some arbitrary standard, but it is the improvement that each student makes between the first and last time trials. Nearly all students will improve markedly during the course; the average improvement in my classes has been 20%. Naturally, if the second trial is held under severely adverse conditions, then the speeds may show a decrease. If the students are already experienced club cyclists, then there may be little or no improvement.

The time trials have several purposes. They give students an incentive to develop their speed and endurance. They introduce students to an enjoyable sport. They show students that riding hard for half an hour or so does not destroy them for the rest of the day (as most of them initially think). They give excitement to the course. Using the time trial tests wisely to accomplish these purposes requires that you don't let the students know that their actual speeds have little effect on their grades. However, in your discussions after the first time trial always emphasize that the real criterion is the amount of individual improvement, not the final speed.

12.3 MECHANICAL SKILLS TEST

The mechanical skills test substitutes for the written test for those children who have been taught some mechanical inspection and maintenance skills but who are not old enough to give clear written answers to questions on the subject. In essence, the student is presented with the bicycle or part of the bicycle with the appropriate tools and is required to demonstrate some procedure. The most frequent task is the mechanical safety inspection, but another can be tire changing or tube patching. The student should perform the safety inspection complete because that is important and takes little time. For any more complex task there usually is insufficient time. For these tasks, the student is asked to show which tools are used when, and how they are to be used, with-out actually doing the work. This may require several test objects. A complete tire repair demonstration requires three test objects: a complete bicycle, a complete wheel, and a tube, each with its appropriate tools. The examiner may help the child give a quick explanation by saying, "I understand. Now what's next?", and even by pointing to some other tool and asking, "What's that for?" This is not a quick test and it must be given to each child in turn, but it can be given by the assistant instructors while the lead instructor is giving the cycling proficiency tests to another group of students.

12.4 TESTING FOR THE EC CERTIFICATE

It is possible for cyclists to earn the EC certificate without taking the course, by taking the tests given at certain cycling events. The applicant first takes a written test and then, if he passes it, he may take the Cycling Proficiency Test. The Cycling Proficiency Test is similar to those that are given for the course, but the written test is different. The written test is a fifty-question multiple-choice test whose questions are selected from the pool of questions. The pool now (July 1986) contains 91 questions. The written test differs from the written tests given as part of the courses for several reasons. One reason is that a large number of applicants must be tested and graded in a short time, so that they will know whether they are qualified for the Cycling Proficiency Tests to be given shortly. Another reason is that the questions must be part of the core of the Effective Cycling Program that everybody must know, and must not go into matters that are considered in some courses but not in others. For this reason, I consider that an Effective Cycling Certificate earned through the direct test procedure does not represent as much as one that has been earned through a full adult course.

13 SPECIAL PROBLEMS

13.1 THE CYCLIST INFERIORITY COMPLEX

The most serious difficulties in teaching Effective Cycling are those that are caused by the cyclist inferiority complex. Nearly every adult American has been raised with deep-seated but unrealistic fears about cycling in traffic. These fears permeate his thinking about cycling and make it very difficult for him to accept cycling instruction. When he is first considering the Effective Cycling program, his fears tell him that Effective Cycling is dangerous because traffic is dangerous, and that Effective Cycling must be useless because traffic is so omnipotent that there is nothing that the cyclist can do to prevent being hit by cars. Even if he thinks that Effective Cycling training can help prevent being hit by cars, he

thinks of it as only a better way to escape the cars.

These fears may keep him from ever joining an Effective Cycling class. If he becomes a student in an Effective Cycling course, these fears prevent him from understanding that cycling in traffic is little different from driving a car in traffic. His fears will color his understanding of the instructor's words, in effect translating the instructor's thoughts into a different language. In other words, even though the instructor gives the correct instructions the student learns incorrect instructions because his thoughts cannot accept instructions that contradict his fears of traffic.

In another context, one would think of this as a psychological disturbance like the other common phobias, fears of crowds or of closed spaces, for example. These require psychological treatment to bring their victims to a more correct view of reality and to enable them to function better in the real world. That is exactly the view that one would adopt if an English person developed the American view of cycling, because then that prson would have developed his view in a society that does not create it.

However, in the American context we must recognize that the cyclist inferiority complex is the normal and natural result of the bike-safety training that Americans are given. American bike-safety training is irrational because it contradicts reality and attempts an impossible task. Because it is based on the idea that traffic is so dangerous that the cyclist can do nothing about it, bike-safety training tries to create a system of cycling in which the cyclist is driven by fear to stay away from the cars yet is allowed to ride in traffic without having any knowledge of how the traffic system operates or any of the skills of cooperating with other drivers. This is impossible; it can't be done; the cyclist who follows such advice is going to kill himself. Therefore, the American bike-safety system can only be taught through fear alone without the help of reason.

Of course, American bike-safety programs use concepts that sound reasonable. For example, they frequently repeat as a premise the undoubted truth that cars are much heavier than cyclists, coupling that with the conclusion, a second undoubted truth, that cyclists must take special care to avoid collisions. However reasonable this sounds, this is not logic but merely creates unreasonable fears of cars and unjustified belief in the bike-safety system. It is not logic for two reasons. First, the reason for avoiding collisions is not the difference in weights but the fact that any collision, even between objects of equal weights, produces detrimental consequences that may be extremely serious. Second, this seemingly logical statement is used to justify the bike-safety method of avoiding collisions, while in truth it does not address the real question, whether vehicular behavior or cyclist inferiority behavior best avoids collisions. Thus, the seemingly logical statement actually carries no reasonable content but doe carry two strongly emotional concepts: cars are big, heavy and dangerous and they act in dangerous ways because they are too big to have to worry about collisions. Thus, this common statement says two things in strongly emotional ways: the only way to be safe on the road is to stay away from the cars by following bike-safety instructions, and cars have no organized code of behavior except that of bullying those who are weak, the cyclists. This emotional statement that no traffic laws exist, or that if they do exist they are irrelevant to interactions between cyclists and motorists, has far more effect in determining people's beliefs, and hence ultimately their actions, than does bike-safety's other statement, that cyclists ought to obey all the other rules for motorists. The parents, teachers and traffic officers who teach bike safety are frightened of car-bike collisions and express themselves in sentences that convey fear to the students. The normal child's reaction when his mentors show and express fear of some object is to develop the same fear in himself. Normally, this is a life-preserving result; fear is automatic and overrides rational thought, thus providing a fast, automatic response to moments of danger. However, this has its limitations. When the fear is irrational, that is, the object is not dangerous in the way feared or the automatic response is not the best way of avoiding whatever danger does exist, then the fear becomes a hindrance to learning the correct beliefs and methods.

The emotional state of fear prevents the mind from accepting thoughts that contradict or invalidate that fear. That fear is life-preserving; matters of life or death must be immediately obeyed in order to preserve one's life. Therefore, anything that would weaken that fear must be rejected. Even when the words get through, even when they are remembered, they do not of themselves affect either beliefs or actions. We have different memory mechanisms for declarative memories and for procedural memories. We can change the verbal knowledge about proper behavior in traffic without changing the memory of

the previously-learned procedures about how to behave in traffic. And neither of these changes necessarily will change emotions, which are determined by a different mechanism entirely and which ultimately will control the use that we make of our knowledge of facts and of procedures.

The greatest task of the Effective Cycling Instructor is to replace the cyclist-inferiority complex in the minds of the students with the vehicular-cycling principle at all three levels, verbal, procedural, and emotional. This change must be produced despite the strong resistance that is the natural strength of any complex of fears. Only when this change is complete can a cyclist be effective. During this process but before it becomes complete, the cyclist is hampered by the conflict between the vehicular-cycling principle and his belief in the cyclist-inferiority superstition. Because the superstition has been inculcated by fear and is based on emotion, so long as the emotion continues the superstition will ultimately control the cyclist's behavior, no matter what he says. Fortunately, the facts of the situation assist the instructor. Truth is on the instructor's side, and will assist the conversion process even after the course has ended.

We have discovered only one way to cure the cyclist-inferiority complex: repeated satisfactory experience of cycling in traffic. This discovery is not unique to cycling, for after it was made we found that this type of treatment (that is, repeated exposure to the feared object under safe conditions with a satisfactory result) is the treatment of choice for the other common phobias. The difference is this: when someone suffers from fear of crowds (agoraphobia) his condition is recognized, by others and even by the victim, as an unusual disturbance that requires treatment, and treatment is conducted on that basis. With the cyclist-inferiority complex, the victim doesn't recognize that he suffers from a psychological condition and insists that his superstition is the correct description of the world. If he were told that he suffered from an abnormal psychological condition he would say that what he believes must be true because everybody else believes the same things, that is, everybody except a few screwball cyclists. In America this is hard to refute because cyclist-inferiority is the prevalent and official opinion; in England it would not be because only a few people have the cyclist-inferiority opinion. Therefore, the Effective Cycling instructor must administer treatment to his students without letting them recognize what he is doing. He must know it in order to do it correctly, but they must not or they will quit.

Repeated satisfactory experience in traffic makes the transformation. However, the instructor cannot just take the class out into traffic in order to give students the experience. For one thing, the class wouldn't go. The instructor must never tell the class that next week we will have intensive practice in traffic cycling, for that is the session that everybody will miss. For another thing, taking an unprepared class out into traffic is likely to cause a traffic accident, because the students don't have the skills of cycling in traffic or have learned them with cars but won't use them for bicycles. So the instructor must first develop traffic cycling skills on both a conceptual verbal basis and a practical skills basis.

The Effective Cycling curriculum allows sufficient time for most adult students to make the intellectual and emotional changes that are necessary. This is not the place to discuss the details of how to teach each concept and skill, but the gradual, week-by-week increases in the difficulty of the maneuvers and the intensity of traffic provide the repeated satisfactory experience of traffic that is necessary for starting the emotional change.

Don't hurry the course, because experience shows that students who are hurried remain fearful of traffic. (A really intensive experience, such as military recruits are deliberately subjected to, would probably make the changes in a short time, but that is not practical in normal life.)

You, the instructor, must take care to present traffic cycling as the most ordinary thing in the world. There is no need to talk of the dangers of traffic and the need to be careful; your adult students already have more fear than they can use, so much fear that it adversely affects their learning. Exude confidence; effective cycling technique is the best and proper way to ride, the instructional program works, the students learn, accidents are extremely rare, practically nobody fails the course.

Naturally, you do have to discuss accident types and statistics. Knowledge of these is not necessary to learn the bicycle driving skills, and they are not included in the courses in schools. They have been put into the adult course for two reasons. Adults have entirely inaccurate ideas about which accidents are frequent and which are rare. First, presenting the truth about accidents to cyclists shows them that the Effective Cycling techniques are a reasonable approach to achieving a low accident rate, rather than a gamble made to increase one's speed. Second, the discussion of collisions shows that collisions are

caused when one or both parties disobey the traffic system. You should present the accident information in ways that emphasize that a traffic system exists and that cyclists benefit from obeying it. This is designed to counter the beliefs created by the bike-safety system that there is no traffic system or that if there is one it does not benefit cyclists. Say that the cyclist who understands and obeys the system, including the techniques of Effective Cycling because they conform to the system, will not cause his own collisions and has a better chance of detecting and avoiding the mistakes of other drivers.

When discussing the necessary safety precautions, such as looking for and yielding to traffic that has the right-of-way, discuss these in the context of the traffic system. Cars travelling along an arterial are not dangerous per se, but because their drivers know that they have the right-of-way they are not prepared to stop for drivers from side streets. Therefore the cyclist who wants to cross the arterial must look for and yield to them. Contrariwise, the cyclist who uses the arterial also has the right-of-way, so that crossing motorists must yield to him. The stop signs are not installed to protect the crossing traffic from the traffic on the arterial, but to protect the arterial traffic so that it can move continuously at reasonable speed. The cyclist benefits from this just as much as the motorists, because stopping for stop signs tires him out as well as slows him down. Also discuss how the safety precautions work, so that the students will understand that they are designed to be effective, not just to comply with some law that has little rational basis.

When on the road, be calm. The curriculum enables you to have great confidence in the abilities of the students before taking them to more difficult conditions. Almost certainly, they will do well. Even if unexpectedly difficult conditions occur, such as when a motorist runs a stop sign in front of the cyclists, do not emphasize the danger. Don't say, "Boy, that was a dangerous motorist and you just got out of the way in time." If some student handled the difficulty well, compliment him by saying that he recognized the mistake and took the appropriate action. Depending on the time in the course that this occurs, you may add that you will instruct them in how to detect such mistakes and what to do to avoid a collision. Build up their senses of accomplishment and of competence, and of operating within a logical system that benefits its users and responds to skillful usage. By the sixth session (more than 15 hours into the course) I think that the students are ready for a session of maneuvering in really heavy traffic. I use a major arterial that carries 40,000 cars a day at 40 to 45 mph, and we do every left turn off it for several miles. As I've written above, I have learned never to tell them in advance that this is the schedule for this week, because if I do few students show up. I close the session by finding a grassy spot for a short talk. I start out by telling them that I am sorry that they have had such a dull morning, but that now we have finished most of the dull work and can concentrate more on cycling for enjoyment. For them it's not been dull, for their eyes are shining with the excitement of discovering that they can work with other traffic and go places that they never before thought possible.

That kind of emotional effect is required to change the emotions about cycling in traffic that had been created by bike-safety training.

The later parts of the course also help in making the change. While these are not intensive training in traffic cycling, they all involve cycling in traffic under enjoyable circumstances. The students' skills and confidence improve, as does their understanding of the traffic system. Even if the change is not complete by the end of the course, you have given them the basis for further change. They have the confidence and skill to continue cycling for whatever purposes they choose, and the more they cycle the more they will come to appreciate the value of using the traffic system as it was meant to be used by drivers. The facts of the traffic situation demonstrate that vehicular-style cycling works in clearly obvious ways. People who once learn vehicular-style cycling don't regress to cyclist-inferiority cycling.

13.2 CONFUSION ABOUT SIGNALLING

The confusion about signalling is a typical product of bike-safety training. That training instructs cyclists to extend their left arms before turning left, on pain of death if they don't, but it never discusses changing lanes or moving to the center of the road. This creates two irrational superstitions. First, that the act of extending your arm provides protection against a probably fatal collision; second, that the signal protects the turn to the left rather than the move to the center of the road. So you see people who swerve across the lanes without looking, reach the center of the road and then extend their arms while waiting to make the turn. Others signal before changing lanes, but

don't look behind. It is fairly easy to convince these people to look behind and yield to traffic before changing lanes, because these are such reasonable acts and work so well.

However, learning to look behind and yield does not end the objections of those who insist that Effective Cycling is wrong because it disparages signalling. You, the instructor, are likely to be berated for not insisting that every student signal every lane change and every turn. Even though you know that signalling does not prevent collisions, you could consider it a harmless aberration and require all students to signal at each opportunity. I disagree with that view. The insistence on signalling in the American context has done a great deal of harm. Those who insist on the safety necessity for signalling have still not overcome their confusion caused by the cyclist-inferiority superstition and bike-safety training. Getting people over their confusion about signalling helps them learn and understand the vehicular-cycling principle.

You, the instructor, must ensure that there is no doubt in any student's mind that extending the arm does not make it safe to change lanes. The argument is that the law allows the overtaking driver to continue to overtake and requires the driver who wishes to change lanes to wait until the new lane is clear. That situation exists whether or not a signal is given. Therefore, giving the signal does not prevent a collision, and to the extent that giving signals detracts from looking behind it causes collisions.

Since this position cannot be disputed, the objectors return with a different bike-safety superstition: signalling makes you predictable, it's telling motorists what you are going to do. This is so far from the truth that it's malarkey. Extending your left arm does not tell motorists what you are going to do. In the lane-changing situation that is most delicate, it says only that sometime, someplace, you want to change lanes. It does not say when you will do it or where you will do it. So the motorists don't do anything as a result of the cyclist's extended arm. The truth of the matter is somewhat different. Motorists are continually worried that cyclists will swerve in front of them, as well they should since the motoring establishment has tried so hard for so long to teach cyclists to swerve without first looking behind. The motorists could think of only one way to reduce their worry.

That is, to establish a system in which they didn't have to worry about the cyclists who didn't signal, but only about those who did signal. Therefore they developed the superstition that cyclists' must signal to save their lives, and emphasized it strongly because, of course, unless they convinced practically all cyclists they could not be confident that a cyclist who didn't signal did not intend to swerve in front of them.

One other argument is possible, but I have never heard it given. If a cyclist gives a signal and then swerves in front of a car, it is just possible, if the circumstances are just right, that the alerted motorist might be able to avoid hitting the cyclist when an unalerted motorist would not be able to do so. While this is undoubtedly the only correct argument, it is also obvious that it is an extremely weak one and contrary to motorists' interests. The signal might enable the motorist to avoid perhaps as many as 10% of the cyclists whom he otherwise would have hit as they swerved in front of him, but at the expense of disrupting the motor traffic with swerving and stopping motorists whenever a cyclist extended his arm. Since extending an arm does not cause this mass confusion among motorists, it is obvious that the motoring public has no intention of keeping its side of that bargain.

Since the arguments to support the belief that signalling is a life-preserving action are so utterly absurd, the belief is merely one more pernicious effect of the cyclist-inferiority complex. Since one important task of an instructor is to extirpate the cyclist-inferiority complex, it is better to confront and destroy those arguments rather than to permit the public expression of that belief by any student. Furthermore, extirpation is necessary to substantiate the principle that Effective Cycling technique is the correct way to ride. If some students compel you, the instructor, to conform to the belief that signalling is necessary for safety, then obviously you have admitted that looking behind and yielding is insufficient for safety. Don't let them get away with that.

However, do not let the opposition to signals as safety measures obscure the use of signals as courtesy measures. By the use of signals the cyclist can enable other drivers to move more smoothly or get moving earlier. The cyclist who is traveling on an arterial and intends to turn right at the next intersection, upon seeing another driver waiting at the stop sign where he will turn, is courteous to make a right turn signal so that the other driver doesn't have to wait for him.

Signals are also vital when cycling with others in a closely-spaced group in which the cyclists are more like many passengers in one bus than

separate drivers. If the group is to turn at the next intersection, particularly if making a right turn for which no preliminary move to the center of the road is necessary, it is vital for the leaders to signal so that the others will be prepared to make the turn immediately after the leaders do.

13.3 THE STOP-SIGN PROBLEM

In both lecture and ride you will be facing the stop-sign problem. Effective Cycling instruction about stop signs arouses lots of controversy that you must be ready to face. The controversy comes from the superstition that stopping at stop signs saves your life by some magical means, so that failing to stop in the full legal sense endangers your life. The believers in this foolish superstition forget four things: stopping and then starting without yielding is just as dangerous as failing to stop in the first place, you ride into danger only through failing to yield the right-of-way to cross traffic, yielding to traffic has nothing to do with stopping behind the stop line, and yielding saves your life even where there are no stop signs, such as at driveway exits.

The problem has two causes. The first is a defect in the highway system: stop signs are used where yield signs would be the correct treatment. Stop signs are the correct treatment for blind alley exits or other places where the driver cannot see far enough along the major road to yield, and so must give the traffic on the major road time to avoid him as he creeps out without being able to see as he should. When the problem is merely one of informing drivers which ones should yield, the YIELD sign is appropriate and equally effective, as is shown by its use in England for all of these situations.

Although this problem really exists, it rarely bothers motorists. They treat stop signs as yield signs because they recognize the situation. The second cause of the stop-sign problem is bike-safety training and the cyclist-inferiority complex.

The reason is the same as that through which signalling for turns has been ascribed such magical powers. The authors of 'bike-safety' programs believed that cyclists could not judge the speed and distance of approaching traffic. Therefore, cyclists could not yield. Given this deficiency, nothing else could be done except to insist on stopping as a life-preserving measure, even though it is not and it does not give you the right-of-way to cross the major road. Since this utterly illogical position has been taught as a life-preserving measure, those people who believe it are immune to logical discussion of the subject, and will remain so until they have sufficient experience to explode their superstition. Be prepared to explain the rationale of the EC instruction, that it is scientifically accurate for all yielding situations (rather than merely those with stop signs) and does not advocate any actions that are not generally accepted for motorists.

The important action is yielding to that cross traffic that has priority. That's what's necessary, and it must be done wherever the cross traffic has priority, whether or not there is a stop sign. It is necessary to extirpate the opinion that stopping is a life-preserving action for exactly the same reasons as in the signalling problem. If you don't extirpate the opinion, you haven't destroyed the cyclist-inferiority complex, and students will believe that you are teaching and instructing an unlawful and dangerous system. You have to show that looking and yielding is sufficient for safety, and to admit that stopping per se is a life-preserving action admits that looking and yielding is insufficient for safety.

13.4 REAR-VIEW MIRRORS

The rear-view mirror presents two problems for instructors. The first is that it is not safe to use; the second is that those cyclists who use one are likely to cling to it and refuse to turn their heads properly.

If rear-view mirrors were safe and effective we would all use them and there would be no problem, but in my judgement and according to my tests they are ineffective for ensuring that the adjacent space is clear when changing lanes, which is the one time that the cyclist really needs to see behind.

There are two kinds of rear-view mirrors: one kind is mounted on the bike and the other on the cyclist's head. The handlebar type may be dismissed immediately. The cyclist changes position so much while riding that he cannot keep the mirror pointed at the correct location on the roadway, the handlebar vibration jiggles the image so much that the image is blurred and identification is uncertain, and the necessary steering movements constantly cause the point of aim to wander about. These defects peculiar to the handlebar-mounted type make it clearly inferior to the head-mounted type.

The mirror that is mounted on the eyeglass or helmet can avoid these problems, but it has its

own. When properly mounted for use in the dropped handlebar posture, it has a field of view of about one lane width at a distance of 100 feet.

This limited field of view requires the cyclist to rotate his head to see all the places where an overtaking car might be, and that rotation has to point the cyclist's face away from those cars. So far as can be judged by any other driver, the cyclist is looking to the right to move to the right when he actually wants to move to the left. The limited field of view also prevents the cyclist from seeing the whole rear area at one time, and leads to errors about the position and speed of the objects that he sees.

Neither the handlebar-mounted mirrors nor the helmet-mounted mirrors can be used for looking to the right rear.

While we do not look on signalling with the arm as really necessary when preparing to change lanes, we recognize that the cyclist does make two other kinds of signals, one by his position in the lane and one by whether he turns his head to look behind. Turning the head to look behind is the signal that most motorists best recognize for the intention to change lanes. The cyclist who uses a handlebar-mounted mirror does not turn his head in any obvious way, while the cyclist who uses a helmet-mounted mirror turns his head in the opposite direction. The use of mirrors, particularly the helmet-mounted type, destroys the head-turning signal and therefore reduces, to some extent, motorists' knowledge of the cyclist's intent.

The cyclist who turns his head to look has everything within his field of view at one time, so he can judge location, distance and speed much more accurately and in less time. He can turn his head to the left to look left behind and to the right to look right behind with equal facility and accuracy.

Its limitations make the rear-view mirror obviously unsuitable for changing lanes or otherwise moving sideways on the roadway. To be safe, the cyclist must turn his head to look.

Furthermore, turning the head has an instructional purpose. When the student turns his head the instructor knows that he has been able to see the traffic and knows whether this was at the appropriate time. Therefore, you, the instructor, must insist that students do not wear mirrors in class and insist that all students learn to turn their heads properly. This is a responsibility that you must carry out properly, and it may be necessary to argue the point.

Those who wish to use a rear-view mirror may argue that the mirror is a safety measure. As discussed above, the rear-view mirror is unsafe for making lane changes. The other safety argument for the rear-view mirror is the cyclist-inferiority argument that the cyclist can see the traffic coming up from the rear and can avoid it. Refuting that argument is easy. Since the cyclist must spend most of his time looking ahead, he is unlikely to be looking behind at the precise moment when he would see that the car behind will hit him. That can't be determined until a second before the crash, and in that second the cyclist can't get out of the way. The only thing that the cyclist could do with the information that the mirror can supply is to get off the road whenever any car appears behind, and that's stupid.

As with signalling, however, mirrors may supply convenience rather than safety. If you tend to ride faster than others in the group, a mirror enables you to see that you are not too far ahead. If you intend to turn left from a multi-lane street and see a large platoon of cars coming from behind, you know that you should wait for it to pass before considering a look behind, and this information might suggest that you slow down so the platoon will be past you while you still have sufficient distance for the lane change. These are quite justified uses of rear-view mirrors for those who think that carrying the mirror is worth these conveniences. Don't argue against these uses. Only argue on the danger of relying on mirrors for safety, and in class for the necessity of all students to learn the safe practice of turning the head and the instructor's need to be able to verify that the students do look behind.

13.5 NIGHTTIME PROTECTIVE EQUIPMENT

You probably will not teach a class in the dark, but you will have to give good instruction about riding in the dark. Recent events have created more foolish superstitions that now make it even harder than before to teach cyclists the truth about the function and value of various items of nighttime protective equipment. Some cyclists don't want to use the proper equipment while others insist that safety demands the use of additional equipment that has little or no value. Those persons who want to avoid using proper equipment are generally motivated by laziness and can be persuaded by a discussion of the functional needs that must be met. Those persons who insist

on valueless equipment are motivated by fears and are therefore difficult to deal with. The whole problem is made more difficult by the deplorable state of the laws and of official opinion, which now reflect the use of everything conceivable in a desperate attempt to do something, without an analysis of the functional needs that must be met and the ability of the available items of equipment to meet those needs.

It is your task as instructor to persuade your students of three things:

1: To use the proper nighttime protective equipment, which is a headlamp and a bright rear reflector, with an optionally additional rear lamp.
2: To understand why that is the proper equipment to use.
3: To oppose all laws, regulations and pronouncements that require any other equipment.

To do this in the current chaotic situation with many false statements and beliefs in circulation requires a good grasp of the true facts. Perhaps the best way to learn these is in historical sequence.

The nighttime protective equipment that was required from early times was a headlamp and a rear reflector that had to be mounted and in use whenever the bicycle was used during darkness. This equipment was required by the traffic laws of the various states. It is pretty obvious that these requirements were based on an accurate analysis of the facts as then known and the equipment then available. Neither the lamp nor the reflector had very high performance, but within the limits of their performance these items met all the functional needs for nighttime protection.

In the late 1960s the bicycle manufacturers adopted a standard that contradicted these requirements of state law by requiring 10 permanently-mounted reflectors without a headlamp. They adopted this standard because they were afraid that otherwise they would have to equip their products with lamps. The bicycle manufacturers then attempted to get the states to adopt this standard. The states did not do so because it was obvious to their traffic experts that riding at night without a headlamp was extremely dangerous and, if allowed by law, would make motorists liable for hitting cyclists whom they could not see in time to avoid a collision. However, without any scientific analysis, at various times various states added requirements for some of the reflectors specified in the bicycle manufacturers' standard without abandoning any other item. The result was a crazy quilt of inconsistent requirements that had no scientific justification.

The bicycle manufacturers advocated their system on three points. Naturally, none of these points was the damning absence of a headlamp. The first point was that the reflectors were positioned so that at least one could be seen from any angle. The idea was that no matter how a potential car-bike collision situation might occur, the driver would see reflectors lighted-up by his headlamps and therefore would not hit the cyclist. This became known as wide-angle reflectivity, from the reflector design that this required. The second point was that the motion of the reflectors that were attached to wheels and pedals would attract the attention of motorists, so that they would see the bicycle earlier than they otherwise would. The third point was that the shape and motion of the reflectors showed that the object carrying them was a bicycle. That propaganda was widely accepted. The public superstitiously came to believe that these three points, wide-angle or all-around reflectorization, motion for early detection, and recognition of bicycles as bicycles, were extremely important in the prevention of nighttime car-bike collisions.

There is no scientific justification for any of these superstitions and good reasons for not believing the arguments that were presented. All-around reflectorization is unimportant for two reasons. The only car-bike collision type in which the motorist's headlamps shine on the bicycle early enough for the collision to be avoided is the motorist-overtaking-cyclist type, so that the rear reflector is the only one that had a useful function. Since the cyclist needs a headlamp to alert drivers and pedestrians of his approach and to see the roadway, the headlamp performs all the functions that the front and side reflectors might otherwise perform, and does them better. Moving or flashing lights do attract eyes that are directed elsewhere and are useful in searches for accident victims at sea or in wilderness, but they cannot attract eyes that are already focussed in the area. It is well known that motorists at night spend most of their time looking along their headlamp beams, so their eyes are already directed to observe any light or reflector in that direction. Also, quite obviously, reflectors cannot be seen unless they are in the headlamp beams of the driver's own vehicle, so if they are outside the beams (as on a sharply winding road) they cannot be seen even if one looks in the correct place. The idea that recognizing a

bicycle as a bicycle makes a driver less likely to hit it has no basis whatever. Motorists don't want to hit anything that has lights or reflectors, if for no other reason than the possible damage to their vehicle and injury to themselves.

Throughout this period and continuing to the present the manufacturers of reflective materials published much propaganda about the accident-preventing virtues of their products. Naturally, since the bicycle manufacturers' all reflector system used a large number of reflectors, this system was particularly publicized. There is no doubt that in some situations reflectors do reduce accidents, for example when used to mark the edges of winding roads and when used as rear reflectors on bicycles, but in the popular mind it produced the shallow belief that reflective materials greatly help in preventing all types of nighttime car-bike collisions, a belief that is false.

Then in the first half of the 1970s the federal government's Consumer Product Safety Commission adopted the bicycle manufacturers' all-reflector system but with slightly brighter reflectors.

This confused the law and the public further, because the CPSC requirements are law that supersedes the state laws. Furthermore, the CPSC law prohibited the selling for bicycle use of the still brighter reflectors that are available, so that those who wished to use them had to buy them at auto-parts stores and make special brackets to mount them on bicycles. The result of this was that bicycles had to be sold with the equipment that the CPSC required but used with the equipment that the states required, and the best rear reflectors were nominally unavailable for bicycle use.

Although the CPSC reflectors were brighter than those that had been used before, the rear reflector, the only one that has a real function in preventing accidents, still had only 10% to 12% of the brightness of others that were then available for motor vehicles or for highway markers.

At about this time a supposedly scientific investigation was made as part of a personal injury lawsuit, an investigation that was intended to show that rear reflectors were unsafe. The investigator, Zwahlen, showed that the dim rear reflectors of previous times were hard to see at a long distance when the headlamps beams were not directly on them and the motorist was looking elsewhere. This does not show that even these dim rear reflectors are unsafe; it only shows that bad drivers with misaligned headlamps are dangerous. To settle this confusion and provide guidance for both legislators and cyclists, the then League of American Wheelmen, under my presidency in 1980, adopted its first policy on nighttime protective equipment. This specified a front headlamp and the use of a rear reflector chosen from the brighter types then available for motor vehicle and highway use. At the insistence of directors who believed, quoting the Zwahlen report, that rear reflectors were unsafe, this policy approved the use of an additional, optional rear lamp.

At about this time it became recognized that a very high proportion of the fatal accidents to cyclists occur at night. This recognition stimulated both the emotionally desperate advocacy of all possible items of nighttime equipment and some research into the problem. The voices of advocates of brighter headlamps, rear lamps, still brighter rear lamps, reflective materials, the CPSC all-reflector system and even of white clothing rose into an emotional clamor without any scientific sense. None of these people asked how the nighttime accidents were occurring and therefore what might be the best way of preventing them. All the superstitions about reflective materials were especially amplified.

The recognition that a large proportion of deaths to cyclists were caused by nighttime car-bike collisions in which the motorist was overtaking the cyclist stimulated another investigation, this one for the National Highway Traffic Safety Administration. Its investigator placed dummy cyclists with various items of equipment alongside roads (actually, an unused airport runway), and measured the distances at which drivers approaching from behind saw the various items of equipment. However, the investigator chose the wrong kinds of equipment. For rear reflectors he chose the deliberately dim CPSC reflector instead of the eight to ten times brighter reflectors that had been recommended for the previous ten years. So all he proved was that he didn't know very much about nighttime protective equipment and that the badly-designed CPSC reflector was not very good, although it gave adequate sighting distance in this test.

A third investigation was done for the British Transportation and Road Research Laboratory and was designed to justify the British standards for rear lamps. It was based on the following hypothetical situation that represents the worst possible case. The road is so narrow that a motorist cannot overtake a cyclist but must stop when he sees the cyclist. The cyclist is preparing to turn left (actually, right in Britain because they drive on the

other side) from the center of the road and is waiting for a stream of cars from the opposite direction. The test motorist must see the cyclist despite the glare of the raised headlamps that are two feet to the cyclist's left, and see him at sufficient distance to come to a stop from a high speed. This may have relevance to British conditions, for many of their main roads are very narrow, but it has no relevance to the conditions of American nighttime car-bike collisions, even the fatal ones that people are most concerned about. In this test, also, even the smaller British reflectors (similar to our older ones) provided adequate sighting distance to steer around the cyclist, and the larger and brighter ones performed considerably better.

American nighttime fatal car-bike collisions typically occur on roads with little traffic, under conditions where the motorist has plenty of room to overtake, and are not caused by seeing the cyclist too late but by never seeing him at all, frequently caused by the motorist driving under the influence of alcohol. Most American nighttime car-bike collisions are not fatal and do not involve overtaking. They occur from ahead or from the side and therefore do not involve the question of conspicuity from the rear but instead the question of whether the cyclist had a working headlamp. Unfortunately, there has been no investigation into the types of nighttime equipment used by the cyclists involved in nighttime collisions, nor into the proportions of the various types of equipment that are in use in nighttime riding. Therefore we can say nothing about the relative accident rates of the various types of nighttime protective equipment. All of our recommendations must be made from analysis of the performance characteristics of the various types of equipment compared to the characteristics that are needed in various types of potential collision situations.

All this emotional commotion has caused both the public and officials to read into the scientific reports their personal recipes for reducing nighttime car-bike collisions, most of which are culled from the superstitions that were described above. As a result, many people who should know better are disseminating a new false superstition that the scientific investigations justify their own superstitiously-created recipes for proper nighttime equipment, even though the investigations covered only the points I discussed above and demonstrated nothing of importance. In 1985, after the League of American Wheelmen became Bicycle USA, its president, Bill Feldman, the bicycle coordinator for the state of New Jersey, rewrote its nighttime policy for adoption by its board of directors. Feldman writes that he didn't change anything, but if he did it was based on the NHTSA and the TRRL reports discussed above.

In fact, he did make changes and none of the changes are based on either of these reports. Quite clearly, Feldman simply believed the conventional introductory platitudes of the reports' authors, instead of reading the reports to find out what tests were performed and what visibility distances were measured, and then reasoning out the consequences, if any. The new policy reflects the "use everything" superstition by requiring all the reflectors, front and rear lamps, flashing beacons, and white and reflective clothing, and recommending that the states pass laws to require both front and rear lamps.

Certain accident facts must be recognized. Traffic law is so structured that collisions can occur only if one driver violates the right-of-way of another. If the cyclist violates the motorist's right-of-way, such as by running a stop sign, a collision is likely even in broad daylight. In this type of nighttime collision the quality of the cyclist's nighttime equipment cannot be considered the cause of the collision. If the motorist violates the cyclist's right-of-way at night, however, as when the motorist restarts from a stop sign just as the cyclist comes along, then the quality of the cyclist's nighttime equipment may be the cause of the collision.

If that equipment did not allow the motorist to see the cyclist at the time that the decision had to be made, then it was defective. The normal good-quality bicycle headlamp allows the motorist to see the cyclist in all the situations in which the motorist must yield the right-of-way to the approaching cyclist. No reflector system can do this because in many of these situations the motorist's headlamp beams do not strike the reflectors until too late to avoid the collision. The only other way in which the motorist can violate the cyclist's right-of-way is when the motorist is overtaking the cyclist. In this situation the motorist's headlamp beams strike the cyclist's rear reflector early enough for the motorist to react and steer around the cyclist. When curves are sharp, the headlamp beams strike the reflector later but the curves force the motorist to travel slow enough that he still has time to steer around the cyclist. The geometry of curves and headlamp beams limits the angles at which the reflector must operate to those of the conventional Society of Automotive Engineers reflector. Since wide-angle reflectors achieve their wide-angle performance at

the cost of a 2/3 dimming in brightness, they are not advisable and the rear reflector should be an SAE type. While rear lamps do not rely upon the motorist's headlamp beams to be seen, they are liable to go out without the cyclist's notice, and, with generator types, when the cyclist stops. The logical result is that if a rear lamp is used a reflector must also be mounted for the times when the rear lamp goes out. Since nobody has shown that a bright rear reflector of the recommended type cannot be seen at the necessary distance under realistic conditions of use, when the tests that have been made show that under all the tested conditions it can be so seen, there is no reason to require the lamp and reflector combination and to disallow the reflector alone.

Since the headlamp and the bright rear reflector fulfill all the functional needs, anything else is pure window dressing. Rechargeable batteries powering LED lights now make bright rear lamps really practical and capable of overcoming the disadvantages of reflectors. Recommend such. One may say that using more equipment than scientific knowledge justifies is a matter of personal taste and doesn't matter to anybody else. Unfortunately, this is not so. The use of additional equipment shows that the person believes that the headlamp and rear reflector are ineffective and that the other equipment is better. People who believed these emotional superstitions are those who confused the public and persuaded legislators and regulators to adopt their present bad laws and these people are continuing to do so. The laws now require cyclists to buy and use bad and excessive equipment as well as good, and failure to use the bad or excessive equipment allows police to charge the cyclist with violating the law and creates, in accident cases, the presumption that the cyclist was negligent. This emotional foolishness must be stopped, and the only way to stop it is to create a body of responsible opinion. That is one more reason why your duties, as an Effective Cycling Instructor, go beyond merely teaching cycling to include developing well-informed cyclists who will help bring reason to cycling's political affairs.

13.6 PHYSICALLY HANDICAPPED STUDENTS

If the instructor is presented with a physically-handicapped prospective student he will have to decide whether that student should be accepted and whether the handicap will require special behavior by the student.

Handicaps may be divided into those that are obvious but will not get worse, such as the loss of a hand, and those that are not obvious and may be aggravated by cycling, such as certain heart problems or chemical conditions such as diabetes. The instructor may make the decision himself for handicaps that will not get worse, and that decision should be based on whether the student can learn to ride with reasonable safety and facility despite the handicap. If the handicap might get worse, the prospective student should consult his physician or a specialist in athletic medicine to learn whether cycling is not advised, or how to manage his handicap, what conditions may aggravate it, and what the danger signals are. In special cases the instructor might inform the physician of the conditions to which the student will be exposed, so the physician can better advise the prospective student.

For handicaps that probably will not get worse, the instructor himself has the best ability to decide whether the prospective student should be accepted. The question he must answer is: "Which of the cycling maneuvers or abilities will the handicap affect, and will the effect be so great that the cyclist either cannot do it or will not be able to do it safely?"

For example, I have had one student with one hand missing, amputated at the wrist. What do hands do for a cyclist? Basically, hands are used for four purposes: to support the cyclist's upper body, to steer the handlebars, to apply brakes and to pull on hills. This student had carefully padded the handlebar so that his wrist stump could take his weight, at least for the duration of the class rides. Steering can be done with one hand. This student used a tandem-type brake lever in which both brakes are actuated by one lever. This prevented him from achieving the maximum deceleration, so that he had to be more careful in both riding and in adjusting the brakes, but with this extra care he could safely do everything but the maximum braking maneuver. On hills he used low gears and had developed a high cadence, so that he could still make the rides without pulling up and no slower than the other slow riders. This student managed the class perfectly well and was well up with the other sporting riders during the rides.

Another student was a cripple. He could barely walk, dragging one foot sideways in a crouched-over position. But he was comparatively better on his bike than walking - he had a real

incentive to ride. His problems were bicycle size and mounting. He solved those by using a woman's frame so that he could crawl across the bottom bracket instead of swinging his leg over.

He was not the most powerful rider by any means, but he was not the slowest in the class. Operationally, he was slow to get started, so we tried to get him at the front when we stopped for red lights.

One-legged cyclists are well known, and so are those with one stiff leg. Both use only one crank, but the stiff-legged cyclists use a foot rest for the stiff leg. They are weak on acceleration and on hills, but often have good endurance.

One-armed cyclists are as badly off as one-legged ones, possibly worse. Since they cannot transfer their upper body weight equally to both handlebars they have problems with steering and back strain. The typical adaptation is to put the one good hand upon the handlebars next to the stem and to steer by twisting the wrist. This requires also that they use a tourist-type, double-cable tandem brake lever positioned at the center of the bars and operating both brakes. The division of force between the front and rear brakes is adjusted through the fine adjustments of the brake levers. These cyclists are unable to achieve the maximum deceleration and must therefore ride a bit more carefully. In their normal cycling position with the hand near the center of the bars they have little resistance to forces that would turn the front wheel, such as those from tracks and slots. Upon approaching these obstacles they should shift their hand to the normal position so they can exert greater control torque on the front wheel. They might also adopt a somewhat more upright position to reduce the weight on the arm.

I have had several students who suspected, or complained of, joint or back problems. Nowadays I have a small back problem myself, and since my university days I have had a weak cartilage in one knee. As is normally true of cyclists, most of these improved while cycling and none happened to get worse. I have myself worked out the soreness of a sprained ankle (a skiing injury) by cycling. I rode in low gears on the level, starting the afternoon of the day I took the fall, barely using my injured leg but rotating the pedals entirely with my good leg. I rode to work the day after, and the worst part was climbing the stairs to my office with only one good leg. Each day I increased the force on the injured leg until the first tiny bit of pain, then eased off to ride without pain. As I rode the swelling and the irritation decreased, and I healed with good speed and without any secondary stiffness. Although cycling demands the full freedom of motion of the leg joints it doesn't subject them to heavy loads or shocks, so as a result cycling is more likely to improve a joint than to injure it.

In cases where the handicap might be aggravated by cycling the student should have the advice of a physician. Since most physicians are unfamiliar with cycling, the instructor's explanation of the conditions to which the cyclist will be exposed can enable the physician to give better advice. Selecting a physician with cycling experience or a specialist in sports medicine is a great help. In my estimation, physicians tend to overestimate the severity of cycling but to underestimate the long-term chemical demands. They tend to expect that cycling exposes the cyclist to sudden strains or demands on the muscles, joints, heart or circulatory system. These only happen when racing, climbing steep hills, or in a fall. But for the type of cycling that is practiced in this course, or the kind of cycling that most graduates will soon progress to, these are minor hazards unless the cyclist was in terrible initial condition. The cyclist who finds that he pants and heaves when he rides around the block is indeed subjecting his body to severe demands, but for most people the act of learning to ride is not strenuous although it does make them tired and weary. The hazards of cycling at moderate speed are those associated with glucose consumption, water loss, heat loads and the pressure points of long-continued sitting on the saddle, supporting weight with the hands on the handlebars, and, due to poor pedalling action, failure to relieve the weight on the feet during the upstroke. Even in severe hill climbing the hazards are more the self-caused muscle injury of cramped leg muscles than the external hazards of straining on the pedals. Under most circumstances the cyclist quickly gets too tired to develop sudden extreme demands.

Diabetes is one condition that I would expect to have an adverse effect on cycling, and which the glucose consumption of cycling might aggravate into a short-term problem that requires immediate care. I have had only one diabetic student, and he gave me a written instruction sheet in case something went wrong. He did not ride hard, but rather moderately for his age - he was a young man - and I never had to take any action.

Another student suffered from muscular dystrophy, which is a handicap that doesn't get better and probably will get worse regardless. She had

difficulty in keeping her feet on the pedals because she couldn't feel them in position as the pedals rotated, but her cycling improved as soon as she learned to use toe clips and straps. In this kind of situation the proper course is to give the cyclist as much chance to enjoy cycling for as long as possible. Since we are all afflicted with the fatal disease of Death, this is no different an instruction than the one that we aim to give students a life-long enjoyment of cycling.

There is one very rare condition whose victims should not cycle at all. The lubrication for the tendons that run over the front of the knee fails, so that the tendons are constantly rubbing against the rest of the joint. Since cycling constantly requires almost the full motion of the knee joint, it aggravates this condition. This condition is very rare, and demands the care of a specialist.

The prospective student should also consult his physician if he has incurred a recent severe injury or disease and is still recovering from it.

However, if the injury was of the common athletic type (sprains, muscle cramps, abrasions, bruises and the like) the instructor who has either experience or education in athletic first aid is probably qualified to decide.

Because the instructor knows cycling conditions he can make a good judgement for many kinds of handicaps, he can also advise a physician of those conditions, and he should recognize those physiological conditions which he is not trained to handle.

13.7 MENTALLY HANDICAPPED STUDENTS

Cycling, even cycling in traffic, is not an activity that requires great mental powers. Although I have not trained any, I have heard of mentally retarded cyclists who cycle quite competently in traffic. Slim Sanders writes that a mentally-impaired person is one of the best traffic cyclists he knows. This is one more indication that cycling in traffic is a motion-judging activity, not a verbal one, and that the verbal instruction and testing (if any) of common bike-safety training requires a different type of thinking than that which is actually used in cycling. In America this might be even more true than in Europe or Asia, because the American is subjected to verbal misinstruction. The person who is sufficiently retarded to miss the verbal misinstruction might well be in a better position to learn traffic cycling himself than is the educated adult who is handicapped by the superstitions that have been inflicted on him.

I know of several institutions for the moderately retarded where cycling is taught because the students are not allowed to drive motor vehicles but must have means of transportation. There seem to be few difficulties when the instruction is like that for children, by example and repeated practice rather than by relying on verbal instruction to convey concepts that the students will later put into practice.

However, there is one mental handicap that prevents people from becoming successful cyclists. This is the inability to coordinate the body into smooth motions while thinking about something else, such as traffic. The symptoms of this condition are similar to those of inexperience. The cyclist wobbles, shifts gears badly or not at all, changes speed for unknown reasons, uses the brakes jerkily, all mistakes that grow worse as the course progresses and the cyclist is required to think about other matters. The initial symptoms are typical of the beginning cyclist; with this condition the sufferer improves little with practice.

In one case the student could not shift gears because she could not remove one hand from the handlebars without wobbling several feet to each side. I attempted to train her by asking her to lift one hand very slightly from the bar and to regrasp it at the first severe wobble, expecting that the duration of one-handed cycling would become longer and longer. It did not. The student's steering arm was rigidly pushing on the handlebar as if fighting itself, creating jerky movements entirely unsuited to cycling. Of course, the normal cyclist riding one-handed must use some arm muscle to counteract the one-sided push on the handlebars, but he normally reduces this problem by supporting his upper body, at least partially, by his back muscles. This cyclist showed no signs of doing that. In other cases I noticed only the general jerkiness, but made no special examination of cycling technique. During traffic maneuvers the jerkiness increased.

Naturally, I would not have allowed any of these students to ride in pace lines or in moderate or heavy traffic, but each one realized for himself that he would not be able to complete the course and quit before either of these events. One returned some months later for the next course, supposedly after individual practice, but was not better.

These students obviously paid great attention to their cycling. Riding as badly as they did

required all their attention. Yet they were not simple-minded people, and every one of them drove to class in his own car.

It is commonplace to say that one never forgets how to ride a bike; it is less common to recognize that one does not forget how to ride a bike because the skill cannot be put into words to remember. Cycling smoothly, particularly steering smoothly, is an unconscious activity that develops by itself, and the main initial task of learning to ride is to develop this unconscious activity and to relinquish conscious control to the unconscious skill. I believe that this is a process of adapting to a different mechanism the basic unconscious ability to walk upright. (Notice that other primates and bears have been taught to ride toy bicycles, all animals that to some extent walk upright.) I deduce that for one reason or another these students were unable to make this transition, so they always had to think about the act of cycling. They were certainly frightened, but whether the fear was the cause of the problem, or merely the result of the constant prospect of falling, I do not know. I believe that this is not a defect in the sense of balance itself, because I know a cyclist who has no sense of balance at all. He can ride smoothly in daylight or halflight by relying on visual cues, but he cannot stand or ride in total darkness or with his eyes shut. His symptoms seem so different from these that I do not believe that these students suffer from the inability to balance, although I have never tested any to see if they can stand with their eyes closed. I can suggest two explanations. The first is the emotional explanation that the person was so afraid of falling over that the fear demanded his full attention to ensure that this feared event did not happen. The second is the neurological explanation that each of these persons suffered from some neurologic defect that either prevented the unconscious activity from forming, or, much more likely, prevented it from exercising control through hand motions rather than through the legs as it is normally exercised. I estimate that perhaps 2% of the population suffers from this condition.

As I have written, these students quit voluntarily before I had to terminate them. If an instructor notices such behavior of a student who does not quit, I advise that he instruct this student to leave the class before the fourth session. If the student wishes, he may practice on his own on playgrounds and quiet streets to develop smoothness in bicycle maneuvering, and if he succeeds he may attempt the course the next time it is given.