



# The genesis of GDL

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## Abstract

This paper discusses the early research that led to graduated driver licensing, some of the educational principals on which it is based, obstacles to its acceptance, and some of the early efforts in the U.S. and elsewhere. *Early research:* The research underlying the concept of graduated driver licensing was a 1971 North Carolina study that identified the overrepresentation of young drivers in crashes at night and when another young person was the right front passenger. *Educational principals:* Efforts to reduce the risk to young novice drivers applied what was known about learning. The concepts included distributed learning (i.e., over time) and progressing from simple to complex skills. *A proposal:* The proposed graduated licensing system based on learning principals included (a) initial experience under low risk conditions, (b) extended supervised practice, (c) gradual move to more complex conditions, and (d) harsher penalties for deliberate risk-taking. *Obstacles:* There were several most common objections raised against graduated licensing. Raising the licensing age decreased mobility. Some young drivers were “good” drivers. Enforcement is difficult. Fear of parental objections. Parents are not driver educators and some young people do not have an available parent. Administrative costs are too high. *Acceptance:* Driver educators were the first to see the benefits of a graduated system in the 1970s and 1980s. Toronto nearly adopted a graduated system in 1976. New Zealand was the first to adopt a graduated licensing system in 1984. Michigan in 1997 was the first state to require parental certification of extended supervised driving practice.

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## 1. An origin and destination study, North Carolina, 1971

The basis for originally proposing a graduated licensing system for young beginning drivers grew out of two studies conducted in North Carolina in the early 1970s. One involved linking enhanced origin and destination (O&D) data to crash data from the same time and area, and the other linked data on passengers derived from supplemental data collected on state crash report forms. There were major limitations to these early studies and many more comprehensive studies have been conducted since then confirming what was gleaned from these early efforts. Nevertheless, the findings of these early studies provided the basis for developing a proposal for a graduated licensing system to introduce young beginning drivers into the driving population.

In June of 1971, the North Carolina Highway Commission conducted an O&D survey in the area of Marion, NC. It had been determined that traffic counts at this time of year approximated the year round averages for the area. Information obtained included, among other things, number of

vehicle occupants, purpose of the trip, day of week, time of day, and route designation. For a special study requested by the University of North Carolina Highway Safety Research Center, additional information was obtained on North Carolina passenger cars, including driver race, sex, and age (exact age requested if the interviewer judged the driver to be under 25; estimated age if the driver was judged to be 25 or over); the race, sex, and estimated age group of the right front-seat passenger, if any; and the license plate of the vehicle. This information was collected on 1,736 North Carolina passenger cars in the O&D survey.

Crash data were also obtained for the summer months for the survey county and surrounding counties. Crash data were limited to North Carolina passenger cars in crashes occurring on the same day of week and time of day during which the survey occurred. There were 1,710 crashes that met these criteria. In addition, in the general area of interest, supplemental data were collected on crash reports, including age, sex, and seating position of all passengers. All together, O&D interviews came from five different stations, each one manned for 24 hours on a different weekday. No weekend survey data were available, so analyses were based on weekday data only. The supplemental data on passengers were collected on almost 14,000 North Carolina passenger cars.

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### 1.1. Higher risk for young drivers

Analyses of the data showed the usual U-shaped curve, with younger and older drivers overrepresented in crashes in relation to their presence on the road, and middle-aged drivers underrepresented.

### 1.2. Overrepresentation at night

Young drivers, primarily young males (fewer young females were licensed in 1971), were particularly overrepresented in crashes between midnight and 6 a.m.

### 1.3. Effect of passengers

Analyses of data on right front-seat passengers showed that, for young drivers, there was a marked difference in crash risk depending on the age of the front-seat passenger. Drivers under 16, who should have held a permit and been driving with a responsible adult, represented only 0.1% of the at-risk population but 4.1% of the crash population, more than a 40-fold risk. For trips in which the front-seat passenger was under 21, these drivers again represented 0.1% of the at-risk drivers but 11.1% of crash drivers, more than a 100-fold difference. When the right front-seat passenger was 21–44, the difference was less than threefold, with similar results for front-seat passengers age 45 and older.

The findings from these early studies were the initial basis for proposing that the driver licensing program be used to ensure that young drivers are introduced gradually into the driving population, with certain restrictions based on their initial skill acquisition (Waller & Reinfort, 1973).

## 2. North Carolina's system of introducing young drivers into the driving population

### 2.1. Thirty and six

In North Carolina, driver education was much the same as elsewhere, with 30 hours of classroom instruction and 6 hours of practice behind the wheel. The actual driving practice was often less than the official 6 hours.

### 2.2. Harsher penalties for young driver infractions

Like many other states, North Carolina imposed harsher penalties on young drivers in the event of a violation, although it was well known that these young drivers were more prone to driving errors.

### 2.3. Limitations on resources

Driver education instructors probably knew better than others that 6 hours behind the wheel was woefully inad-

equately preparation. Yet, they also knew how limited resources were, although at that time car dealers provided vehicles for the driver education course. There was no way that publicly supported driver education could meaningfully increase behind-the-wheel practice.

In the 1960s, Haddon (1969) defined two general goals for driver education. First, it should provide basic instruction in driving techniques, a knowledge of how to handle a car in special circumstances, and a knowledge of motor vehicle traffic laws and ordinances; and, second, it should turn out a far more knowledgeable breed of citizens who will know enough about highway safety to demand and support higher (safety) standards. Given the time and money constraints under which driver educators labor, I would argue that the course can provide basic instruction on how to handle a car, knowledge of vehicle traffic laws and ordinances, and something about safe driving practices, including the effectiveness of occupant restraints and the effects of alcohol on crash risk. Only very basic instruction can be provided in the behind-the-wheel portion of driver education. Realistically, driver education in its present form and with its limited resources can do little more. *Driver education in its present form cannot produce a proficient driver.*

## 3. What is known about learning and how it applies to driving

### 3.1. Mass versus distributed learning

It is well established that practice that occurs over time, that is, distributed practice, results in better learning than practice that occurs all at once. Consequently, driving practice over time should be better than mass practice. Early acquisition of driving skill should occur over an extended period.

### 3.2. From simple to complex

In teaching almost any other complex psychomotor skill, instruction begins with relatively simple exercises, with task demands gradually increasing. Yet historically, in young driver preparation, we have provided only rudimentary preparation, after which young drivers were allowed into the traffic stream. Although it was known they were more likely to make errors, we punished them more harshly when errors occurred.

### 3.3. All beginners are at higher risk

It is often suggested that limiting early driving experience “punished” the good drivers who would not have crashes. Although it is true that students with good grades are less likely to have crashes, it is also true that straight-A students who are model citizens may go out and kill themselves behind the wheel. Simply because a student

has good grades and is well behaved does not mean that they can acquire a complex psychomotor skill with minimal preparation. We would not expect such students to automatically acquire athletic skill or be able to play a musical instrument with minimal instruction because of their stellar personal attributes.

Anyone beginning to learn a complex skill, including beginning drivers of any age, will make more errors in the early stages of skill acquisition. Beginning drivers of any age go through a learning curve in which more errors are made in the early stages than later. Whether these errors translate into crashes is a function of other factors that have nothing to do with the beginning driver. For example, almost all beginning drivers at some time will run off the right side of the road and in returning to the road will overcompensate, going into the left lane or even off the left side of the road. If there is no oncoming traffic and no ditch or obstacle on the left side of the road, the driver may recover and continue driving. However, if there is oncoming traffic or a ditch, utility pole, large rock, or sign, the driving error may turn into a crash. The outcome does not define the driver as good or bad. *All beginning drivers are inexperienced and are more likely to make driving errors.*

### 3.4. Demonstration of skill is not a substitute for extended practice

It has been proposed that demonstration of adequate skill should be sufficient for licensure. However, it has been shown that high levels of skill do not necessarily translate into good performance on the road. On the whole, those who score best on tests of skill, for other reasons, have some of the worst driving records (Williams & O'Neill, 1974).

Ideally, all beginning drivers at any age should go through a graduated licensing system. In the United States, however, it is highly unlikely that we could obtain such a system, at least any time soon. Nevertheless, because all beginners are at higher risk, it would make sense to implement licensure gradually, with extended required supervised practice and adequate performance.

## 4. Inexperience versus deliberate risk taking

Although much of the problem of young drivers is attributable to inexperience, it is also true that young drivers may be more prone to deliberate risk taking. When this occurs (e.g., driving after drinking, not using seat belts, driving at exorbitant speeds), it is entirely appropriate to invoke harsher penalties. When inexperience is combined with risk taking, crashes are more likely to occur.

Graduated licensing is not designed to address deliberate risk taking behavior. Rather, it is aimed at the inexperience component of young drivers' crash risk. However, not all risky behavior on the part of young drivers is deliberate.

They may engage in high-risk behavior and be completely unaware that they are doing so. Extended supervised practice should help this kind of risk taking.

Data from England (Maycock, Lockwood, & Lester, 1991), where it is not unusual to obtain first licensure at a later age, indicate that delaying licensure from age 17 (the earliest licensure may occur in the UK) to age 18 results in about a 6% reduction in crash risk. However, at whatever age licensure occurs, the first year of experience results in about a 30% reduction in crash risk. In Sweden, changes in the age at which initial supervised driving experience may occur, from age 17 1/2 to 16, resulted in a marked increase in supervised practice and a marked decrease in crash risk (about 35%) after licensure at age 18. No corresponding increase in crash risk during the practice period was observed (Gregersen et al., 2000). These studies suggest that the higher risk for young beginning drivers may be more attributable to inexperience than to age.

## 5. A proposal based on what is known about learning

### 5.1. Initial experience should occur under low-risk conditions

Based on what is known about young driver risk, it was proposed that the initial stage of driving practice should be limited to daylight hours, with strict passenger restrictions. Because young drivers are at higher risk of crash, belt use requirements are especially important. Furthermore, because the higher crash risk does not level out until around age 25, alcohol restrictions should be extended to age 25, with zero alcohol below age 21 and no more than 0.05% BAC through age 25.

### 5.2. Extended supervised practice

The initial stages of driving should occur with a responsible adult in the right front seat, preferably a parent. As driving practice is acquired, the presence of the adult can be reduced, but as more complex conditions are added, the supervising adult should be included.

### 5.3. Gradual move to more complex conditions

As more experience is acquired at one stage, the driver should be allowed to move to more difficult driving (e.g., driving at night). However, it is also important that there be extended time spent at each level of practice, that is, it is not sufficient to accumulate extended practice in a short period and then move on to the next level of licensure.

### 5.4. Harsher penalties for deliberate risk taking

When beginning drivers deliberately engage in dangerous driving behavior, it is entirely appropriate to punish

### Proposed Graduated License System

Time	Restriction	Driver Age						
		14	15	16	17	18	19-20	21-25
Day	Parent required	0.00 BAC	0.00 BAC					
	No parent required ≤ 1 passenger			0.00 BAC				
	No parent required ≥ 0 passengers				0.00 BAC	0.00 BAC	0.00 BAC	≤ 0.05 BAC
Night	Parent required		0.00 BAC	0.00 BAC				
	No parent required ≤ 1 passenger				0.00 BAC			
	No parent required ≥ 0 passengers					0.00 BAC	0.00 BAC	≤ 0.05 BAC

Fig. 1. Proposed Graduated License System.

such behavior more harshly. Examples of such behavior include very high speed, driving after drinking, and nonuse of safety belts.

It takes years to become a good driver. Realistically, learning to drive requires extended practice, practice that cannot be provided at public expense. Utilizing the resources that are available through parental involvement provides an opportunity to introduce young drivers into the driving population much more gradually, with much less risk, and at minimal cost to the tax payer.

Many states had some version of what has been called provisional licensure, that has focused primarily on increasing threat of punishment when infractions occurred, and, based on infractions, delaying movement to the next licensure level. However, there is no requirement for practice to occur. Theoretically, one could move through the system successfully without acquiring any driving practice. Simply requiring the passage of time is not enough. If no practice occurs, there can be no learning. Graduated licensing attempts to address inexperience by providing extended supervised practice, over time, initially under relatively low-risk conditions with the task demands increasing as experience is acquired and extended successful experience is demonstrated (Waller, 1975, 1976a, 1976b, 1976c, 1977, 1986a, 1986b, 1988, 1989, 1993a, 1993b).

Fig. 1 illustrates the type of program that was proposed, with the added requirement for parental certification of a specified amount of supervised practice.

#### 6. Obstacles to acceptance

When a proposal for such a graduated licensing system for young beginning drivers was made in the early 1970s, the response was interesting. Objections to it fell primarily into the following categories.

##### 6.1. The age factor

There was considerable discussion about the age at which licensure should occur. Because crash risk is somewhat lower when the age of licensure is increased, it was proposed that raising the age of licensure would be the most appropriate measure to take. However, the mere passage of time is not a substitute for practice.

Raising the age of licensure may be fine theoretically, but by age 18 many young people are leaving home for college or work, and the opportunity for parental supervision of driving practice is lost. Furthermore, young people want their wheels and parents are usually eager to give up chauffeuring.

Lowering the age at which learning to drive is initiated (but *not* lowering the age of full licensure) means that whenever the young driver begins to drive solo, it is with more practice under his belt.

##### 6.2. Why penalize all young drivers when only some of them will have crashes?

The objection here was that many young people are “good” drivers and will not have crashes. We should be concerned about the “bad” drivers who will have crashes. As indicated earlier, all beginning drivers are at higher risk, and whether a driving error translates into a crash is a function of other factors.

##### 6.3. There is no way to enforce the graduated licensing requirements

The concern was that parents will lie about the amount of supervised practice that has occurred, and there will be no way to validate what they report. It is true that parents can misrepresent the supervision provided, but it is also true that many, if not most, parents will not. Even if they report 50 hours of practice when only 40 have occurred, that is still an improvement over the previous system. There should not be a major effort to enforce what is reported. However, the requirement for extended supervised practice communicates to the parent the importance of monitored experience. The aim is to modify crash rates, not to eliminate all young driver crashes.

##### 6.4. Fear of parental objections

There was concern on the part of legislators that imposing a requirement for parents to provide supervised practice would result in strong objection. Legislators are often very reluctant to place requirements on adults who may vote. Interestingly, the preliminary evidence indicates that parents are strongly supportive of the program. In Michigan, a survey of parents found that the average reported hours of supervised practice was far more than that required, and parents described how the experience brought home to them how much the young driver needed even more practice.

Most indicated that they would continue to place restrictions on their young driver, even after the state allowed unsupervised driving (Waller, Olk, & Shope, 2000).

### 6.5. Parents are not driver educators

This point was made by legislators, although, curiously, it was rarely heard from driver educators. It was also occasionally heard from parents who worried about their role. There was often confusion about the primary role of the parent in the skill acquisition process. Parents do not need to be driver educators, although there remains much room for improvement in collaboration between driver education and parents. The primary role of the parent is to provide psychological control. Young drivers simply will not try things with the parent in the front seat that they may try if their passengers are fellow teenagers.

### 6.6. Not all young people have a parent available to provide supervision

Some legislators raised this objection, saying that it would be unfair to young people with no available parent to help. Not all parents hold a driver license, and not all households have a motor vehicle available.

It is true that not all youngsters have someone who could provide supervision. However, that does not mean we should not take advantage of the parental help that is available. To help those young people without such resources, arrangements might be made through Big Brother–Big Sister organizations or other civic groups.

### 6.7. Cost

Instituting any new program requires revamping current procedures, programming of data systems, developing new forms, training personnel to function under the new system, and many other costs. State legislatures are experiencing major shortfalls already, and no matter how worthy a program, if it costs money, it is likely to meet with opposition.

The major problem with the cost objection is that the old system of licensing young drivers was extremely costly. The Federal Highway Administration estimates the average societal cost of a motor vehicle fatality to be around \$3 million. It could be argued that the loss of a young life might be even more costly. Even a modest reduction in teenage deaths would more than offset whatever costs may be associated with graduated licensing.

## 7. Was driver education the culprit?

In the 1970s and 1980s, there was a concerted attack on driver education. It was stated that, because licensure could not occur prior to age 18 unless one had completed an approved driver education course, driver education was the

problem and that if we eliminated driver education, we would be better off. Indeed, there were headlines that read “Driver education kills 2,000 young people a year,” attributing all young driver-related fatalities to driver education.

Driver education was never the basis for lowering age of licensure. Driver licensing was first implemented for purposes of identification and revenue. Testing applicants came later. It was possible in some states to pay \$2 for oneself and every family member age 12 and older and receive licenses for all of them. It is still possible to obtain licensure at age 14 in some states under certain circumstances. Driver education was added at a later time but was not the basis for establishing age of licensure.

It was never realistic to expect that a program consisting of 30 hours classroom instruction and 6 hours behind the wheel could transform a non-driver into a proficient driver. We make no such demands on any other course of study. For example, English is taught from elementary school through high school. However, when students use the language poorly, we do not propose eliminating English from the school curriculum.

Whether or not we have driver education, the fact is that young people will learn how to drive, and the question remains, how can we introduce them into the driving population with less lethal consequences?

## 8. Early efforts

### 8.1. Driver educators

In presentations to state and national meetings of driver educators, in the 1970s and 1980s, the response was almost unanimously positive and often enthusiastic. Driver educators are keenly aware of the unrealistic expectations that are placed on them in light of the limited time and resources available.

### 8.2. Toronto Blue Ribbon Panel

In 1976, I was invited to testify before a Blue Ribbon Panel of the Toronto legislature about this proposal for a graduated driver licensing system for young beginning drivers. They asked many questions, raising the points about the young driver’s age, concern about imposing on parents, the fact that parents are not driving instructors, and doubts about ability to enforce. At the end, they fell one vote short of endorsing and recommending such a system.

### 8.3. North Carolina Legislature

Again, it was concern about lowering the age at which practice is initiated that was the major objection. However, it was possible to get the legislature to lower the age at which a driving permit may be obtained from 15 1/2 to 15. In North Carolina, driver education may be initiated at

age 14 1/2, although it is often not possible to get into the courses in public school until close to age 16. Nevertheless, the lower age at which a permit may be obtained lengthens the period during which practice may occur.

#### 8.4. New Zealand

In 1984, I was invited to New Zealand to discuss several proposals for modifying the driver licensing system, including graduated licensing. Three years later, they implemented the first such program in the world.

#### 8.5. British Columbia

In 1990, I was invited to present this concept to a traffic safety meeting in British Columbia. They expressed interest, but nothing happened subsequently.

#### 8.6. Michigan Legislature

In Michigan, as in many other states, interest in doing something about young drivers was precipitated by an especially horrific crash, killing several young people, that occurred near the home of a legislator, Dan Gustafson. He was very serious about doing something but was not sure what could be done. We met with him and outlined what we considered an ideal program. It included a nighttime restriction and restricting passengers to no more than one. It also included a requirement that the parent or other responsible adult certify that at least 50 hours of supervised practice had occurred, at least 10 hours of which were at night.

Mr. Gustafson succeeded in getting most of what he sought, but the nighttime restriction was shortened to midnight to 5:00 a.m. In addition, we lost the passenger restriction. Some of the objections to this requirement were interesting and raised legitimate questions. If teenage passengers are prohibited, it could result in more teenage drivers on the road, as each took separate cars, thus increasing overall exposure to risk.

In addition, parents wanted their young driver to be able to chauffeur younger siblings to school and after-school activities. Parents also said they would much prefer that their teenagers double date than single date, suggesting that eliminating the presence of the other couple might raise the risk of other kinds of “accidents.”

In the end, we were able to retain the requirement for parental certification of extended supervised practice, becoming the first state to do so. It is hoped that as data become available from other states with the other restrictions, it may be possible to add them in Michigan.

### 9. Why now?

The system we have historically imposed on young beginning drivers violates almost everything we know about

learning. We have given them minimal training and then let them drive with essentially no constraints. Although we knew they were more likely to make mistakes, when they did so, they were in more trouble than the rest of us would be. There is no evidence in the literature on learning that increasing threat helps inexperience.

Suppose you are given 30 hours of classroom instruction on the game of tennis, including the history of the game, the dimensions of the court, the various kinds of court surfaces and how to play them, the scoring rules, etc., and then given 6 hours of actual practice on a tennis court with a coach. After this minimal preparation, you are told that tomorrow morning you are going to play a match against the most recent winners at Wimbledon, and if you do not win, you will be severely punished. The threat of punishment probably will not appreciably improve your serve. Yet this is essentially the approach we have been using with young beginning drivers. We know they are at higher risk of error, and so we increase the threat of the potential consequences should an error occur.

In the acquisition of virtually every other complex psychomotor task, the initial acquisition of skill occurs under relatively simple and risk-free conditions. Yet in the one skill that affects all young people and is related to the leading cause of their death and disability, we were ignoring everything that we routinely practice elsewhere.

We cannot meaningfully extend behind-the-wheel practice at public expense. Graduated licensing offers a way to provide extended practice under relatively safe conditions and at minimal cost to the taxpayer. Parents and youngsters give up little, and young drivers are better prepared.

In the last few years, most states have begun to implement at least some elements of a graduated licensing system. All this has occurred over a relatively short period. Why? It is hard to know why. Baby boomers who are now the parents of teenagers are much more aware of the risks associated with driving. Motor vehicle safety, as well as safety in general, is a much more popular concept than it was 20 or 30 years ago. But why there was so much reluctance in the 1970s to consider seriously modifying how we taught young people to drive and why there is now so much support for modifying the system remains unclear to me.

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