

Safe at Any Speed

By Pearl Tesler

This is not your high school driver's ed class.

Screeeeeeeech! Flying down the pavement in a red sports car, Courtney Springfield, 17, slams on the brakes and swerves—*hard*. The tires squeal and the car lurches, flinging the passengers around like rag dolls until the car skids to a halt. The acrid smell of burning rubber fills the car.

Guess what? Courtney pulled that stunt right in the middle of her driver's ed class. Uh-oh!

Not to worry. In any normal driving school, a wild maneuver such as that might get Courtney kicked out of class. But here at the Bob Bondurant School of High Performance Driving in Phoenix, it earns her kudos from her teacher. "Looks great! Try turning a little more aggressively next time," the teacher says, smiling.

Courtney is smiling too. "I was so nervous about coming here; I almost puked," she admits. "But this is *really* fun." Courtney is one in a class of eight students in today's Teen Driving Program, an advanced class for drivers who have either a learner's permit or a freshly minted driver's license.

"We don't teach the turn-signal, check-your-mirror kind of thing," explains instructor Danny Bullock. "We don't teach people to drive. We teach them to drive *better*."

Ground School

The day begins with a 30-minute "ground school" to prepare the students for the exercises ahead. Bullock informs the students that some of the lessons they might have learned in other driver's ed classes are either impractical or wrong.

Take hand position. Some people are taught to put their hands on the steering wheel at 2 o'clock and 10 o'clock. But as Bullock demonstrates, putting the hands at 3 o'clock and 9 o'clock gives the arms and shoulders more range of motion, allowing the driver to turn the wheel a full 180 degrees instead of just 90 degrees.

Some people are also taught to brake before making a turn and to accelerate during the turn. But Bullock tells the group that they should brake while making turns. Controlled braking during a critical turn can actually help a car turn, by increasing the *friction* between the car's front tires and the road. Friction is a force that resists the sliding of one object relative to another. The friction between a tire and the road depends partly on the weight pressing down on the tire. Due to a phenomenon called *weight transfer*, braking shifts some of a car's weight forward, from the back tires to the front tires. That

extra weight increases the force of friction between the front tires and the road, helping the car turn.

Behind the Wheel

Ground school's over. It's time to get behind the wheel, starting with an exercise in extreme braking. Driving at 64 kilometers (40 miles) per hour and then 105 kph (65 mph), students practice slamming on the brakes. That gets them used to the strange pulsing sensation—*thump! thump! thump!*—in the brake pedal that's caused by the *antilock brake system (ABS)*. An ABS senses when the tires are beginning to skid and automatically reduces the braking force just enough so that the wheels start to spin again. It's important to keep the wheels spinning because that allows the driver to keep steering. Otherwise, the skidding car is guided only by its own *inertia*, the tendency to keep moving in the same direction—whether the driver likes it or not.



Bob Bondurant School of High Performance Driving

Student driver Shelby Brown knocks over a cone on the precision maneuver course.

"People tend to panic when they feel the ABS. They take their foot off the brake pedal. They think they won't be able to steer," says Bullock. "But we like to say that ABS stands for 'absolute braking and steering.'"

Accident Avoidance

Next up at the driving school is the accident avoidance exercise. Students drive at highway speeds down a lane that splits into three lanes. Each lane has a signal light over it. At first, all three lights are green. Then, suddenly, one or more of the lights turns red, and students must immediately switch lanes to avoid an "accident" ahead. Cones between the lanes serve as telltale markers of each student's success at avoiding the collision.

"The natural reaction is to slam on the brakes, but you don't always have time," says Bullock. "Cars are much better at turning than they are at stopping."

Courtney's turns are quick, though not quick enough. She topples two cones. "And that's when you *knew* something was going to happen," points out Bullock. "Will you be able to get around that situation when you *aren't* expecting it?"

Hitting the Skids

The unique and very hands-on approach at the Bondurant School draws students from all over the country, including 15-year-old Shelby Brown from Indianapolis. Her dad wants her to learn to handle driving in winter weather, when ice and snow reduce friction drastically. "He's had me practicing on snow in parking lots," she says, "but there's only so much of that you can do."



Bob Bondurant School of High Performance Driving
Clockwise from top left: prepping students for the day's lessons at the driving school; a car negotiating the cone-lined lanes for the accident avoidance exercise; a car outfitted with outrigger wheels for the skid lesson; hands held in the correct (3 o'clock-9 o'clock) position

Shelby is about to get what she came for. It's time to drive the skid car, an unusual vehicle built to skid on purpose. Four outrigger wheels, which look something like training wheels, are mounted at the four corners of the car. With the press of a button, the instructor can use the outrigger wheels to lift up the front or back end of the car, reducing friction at the front or rear tires, causing either an understeer or an oversteer skid. The student's job is to correct the skid and regain control of the car.

Shelby enters a left turn going about 55 kph (35 mph). Bullock presses the button, and suddenly the car's tail end swings to the right—an oversteer skid. Shelby does what she was taught in her first driver's ed class: She turns the steering wheel to the right, in the direction of the skid. But the skid continues, blossoming into a full, nauseating 360-degree spin.

What went wrong? "Two things," instructs Bullock. "First, you were looking where the car was going. Keep your eyes focused on where you *want* the car to go. That'll help you do the right amount of turning. Also, try giving it a little gas."

Give it gas? Really? Although everyone's first impulse in a skid is to slam on the brakes, a little gas actually helps correct an oversteer skid, says Bullock. It shifts weight to the skidding rear wheels, adding friction where it's needed.

Shelby tries again, keeping her eyes focused on where she wants to go and remembering to use the gas, not the brake. This time, she straightens out the fishtailing car like a pro.

Cone Killer

"Stop! You're hitting another one!" cries Shelby. Shelby is Courtney's driving partner for the precision maneuvers exercise, an obstacle course of orange traffic cones that simulates an exceptionally challenging parallel parking situation. There's a *thump*, followed by the lumpy feeling of a cone going under the wheel.

"I'm definitely going to win the Cone Killer Award," rues Courtney, referring to an actual prize handed out at the end of class to the student who hits the most traffic cones. "Parking's not my thing."

Most teen drivers live in fear of putting a dent in the family car. That fear is justified. One in five 16-year-olds will get into a car accident in the first year of driving. However, fender benders should be the least of their worries. A 16-year-old is 20 times more likely to be killed in a car crash than is an adult, according to the California Office of Traffic Safety. In fact, teenagers are more likely to die in their first year of driving than any other year of their lives. It's statistics such as those that inspire parents to send their kids to the Bondurant School.

Class is over, but no one is eager to leave. Instead, students share stories of close calls on the road. One boy admits that he lost control of his car on a highway when he hit a "road gator" (a truck tire tread). He overcorrected and went into a skid that took him across two oncoming lanes of traffic.

Would the lessons he learned today have made a difference? "Definitely," he says. "I wouldn't have freaked out so much. And I could have fixed that skid."

Where the Rubber Meets the Road

As you drive, the weight of your car isn't always spread equally among four wheels. It shifts from front to back and from side to side. That phenomenon, called *weight transfer*, is as important for ordinary drivers as it is for race car drivers, because it changes the friction between the tires and the road—that is, the tires' resistance to sliding.

When a car is parked or traveling straight ahead at a steady speed, its weight is distributed evenly among the four tires. The *contact patch*—the area of the tires where they meet the road—is the same for all four tires.



Bob Bondurant School of High Performance Driving

When you accelerate, weight transfers to the rear wheels from the front wheels. The car squats: The front of the car lifts, and the rear drops. Weight and friction increase for the rear wheels and decrease for the front wheels.



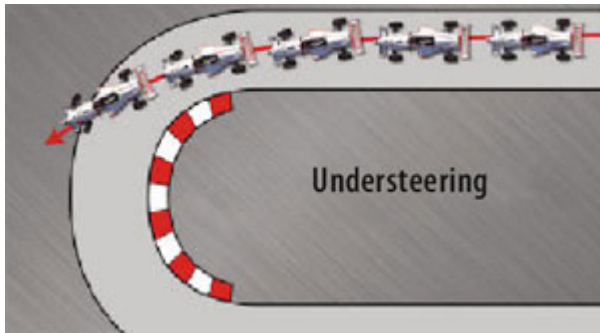
Bob Bondurant School of High Performance Driving

When you brake, weight transfers to the front wheels from the rear wheels. The car nosedives: The front drops, and the rear lifts. Weight and friction decrease for the rear wheels and increase for the front wheels.



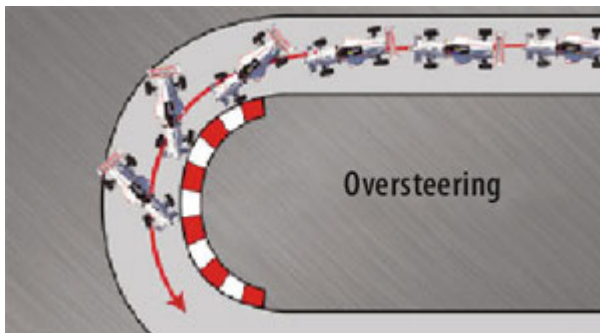
Bob Bondurant School of High Performance Driving

Reduced friction at the front of the car can lead to *understeering*—you turn the steering wheel, but the car doesn't turn or doesn't turn as much as you want it to. To correct understeering, reduce speed to shift more weight to the front wheels.



Goodyear/Bob Bondurant School of High Performance Driving

Reduced friction at the rear of the car can lead to *oversteering*—a skid where the rear of the car fishtails or swings around to the front. To correct oversteering, turn in the direction of the skid and accelerate to shift weight to the back wheels.



Goodyear/Bob Bondurant School of High Performance Driving

Road Rules

Driving instructor Danny Bullock shares these safe-driving tips:

Stay focused. If you're driving while texting, daydreaming, tuning the car stereo, or holding a burger in one hand and a drink in the other, then you aren't driving. You're an accident waiting to happen.

Elevate your vision. Don't fixate on the taillights in front of you. Instead, look up and ahead—at least 10 car lengths—to anticipate situations before they develop.

Steer with your eyes. Look where you're going, right? Wrong. That can lead to *target fixation*, the situation in which drivers focus on the one thing they don't want to hit—and then hit it. Instead, look where you want the car to go.