

CALIFORNIA ASSOCIATION OF ACCIDENT RECONSTRUCTION SPECIALISTS

SKIDEMARKS

MARCH 2014 – VOLUME 16, NUMBER 1



DUI detection...up in smoke?

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CALIFORNIA ASSOCIATION OF ACCIDENT RECONSTRUCTION SPECIALISTS

THE BOARD BEAT

Where did winter go... Wait we really didn't have one this year. What horrible year for us skiers out there, but for you runners and bikers..... well I guess it was your winter. Personally I'd much rather ski downhill than run down.

It's been an awesome start to 2014. The Board of Directors, especially our training coordinator Sean Shimada, has been hard at work putting together training for this year.

First-quarter training which occurred on January 28 in Northern California, and January 30 in Southern California was a hit. The first quarter topic was The Application and Analysis of Video in Collision Reconstruction, with Case Studies presented by Kurt Weiss and Mark Hunt.

The topic was very interesting and well presented. Kurt and Mark's presentation was a well rounded, mix of techniques and methodologies for determining speed from video, and presented several case studies using one or more of the methodologies. In Northern California a few of the case studies sparked, good natured debate between the speakers and attendees.

Northern California had 45 attendees, though we had to close registration for Northern California due to a limitation of seats at that venue. Southern California had 65 attendees.

The second quarter topic will be Traffic Signal Light Timing and Phasing, and Case Studies presented by Mr. Larry Neumann.

It's been several years since CAARS has presented training on signal light timing and phasing. I expect it to be a popular topic as controlled intersection collisions are commonplace. I believe signal light timing and phasing analysis, is an aspect frequently overlooked in our field.

The CAARS board of Directors has been, and continues to work on the 2014 conference. This year's conference will be held at the Embassy Suites, state line in Southlake Tahoe, California. The tentative dates are October 23rd, 24th and 25th, with ACTAR test being held on October 22nd.

The Board of Directors are always looking for suggestions from the membership on future training. We try to have quarterly training set up well ahead of time, so if your suggestion of training is not seen within that calendar year, it may be that that year has already been set.

As always a venue is usually the most difficult thing to acquire. If you have access to facilities for training please contact the CAARS Board of Directors at training@ca2rs.com or ca2rs@ca2rs.com with information on training sites.

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CAARS Board of Directors

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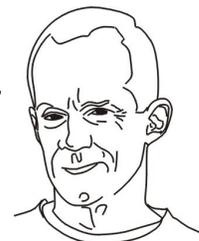
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Letter from the editor

Dear CAARS members,

A little bit of a change in format with this issue. We have all of the normal articles, like the Board Beat, the review of the previous quarter's training, a Technical Note. But instead of a bunch of small blubs from articles with Internet links to the entire text, I've selected out a few that appeal to me more and included almost their entire text. This is just a test, so if you don't like it, complain about it, and I may change back.

I try to keep abreast of the accident-reconstruction press, but it is difficult. My consulting business is taking on steam, and taking the time to read and keep up with what's going on in our AR world becomes more and more of a luxury. Still, like any professional, this is part of the territory, and one must keep current in his/her field. My attempts at keeping up can be found at a page of links to articles on my company's website: www.aoengr.com/AccidentReconstruction/articles.html. This is by no means an exhaustive list of links, it's just what I have found time to read. Also, due to my own interest in keeping up with the European press, you will find there articles that I've translated from German and French that cover new trends in automotive technology and other items that impinge on the AR world. I now have a new, long-term project in Italy, and I'll utilize that opportunity to see some AR up close Italian style. Stay tuned.



Also in this issue you will find a "Meet the member" article concerning our motorcycling member and photogrammetry expert Louis Peck. This is the second "Meet the member" column. These columns are probably the best thing about the newsletter, in my opinion. The newsletter should serve as a vehicle for having members get acquainted with each other, and this column takes on this task head-on. So thanks Louis for volunteering to tell your story to us. If you would like your story told, it's free publicity for you. Just let me know. I email you a questionnaire, you fill it out, telling your story, provide me with some pictures, and then we have a nice, get-to-know you article.

I have many ideas for upcoming articles and ever and ever less time to work on them. I guess it's better to have too much to write about than not enough. I hope you find this issue interesting, and, as always, if you have suggestions to make, I'm open to hearing them.

Best wishes,
Frank Owen
editor@ca2rs.com

Upcoming ACTAR Examination Dates and Locations

May 2014

27 May – Seattle, WA, sponsor: WATAI. New applications must be received by 27 March. Exam registration cut-off date is 27 April. Held at Seattle PD, Airport Way Center.

June 2014

1 June – Las Vegas, NV, sponsor: WATAI. New applications must be received by 1 April. Exam registration cut-off date is 1 May. Held before ARC-CSI Conference - Palace Station Casino.

October 2014

22 October – South Lake Tahoe, CA, sponsor: CAARS. New applications must be received by 22 August. Exam registration cut-off date is 22 September. Held before annual CAARS conference, Embassy Suites hotel.

There are other tests offered in other parts of the country and Canada. Please go to ACTAR test website listed below for these dates. All test dates above subject to new testing regulations, which prohibit the use of electronic devices for testing. Go to www.actar.org/test.html for additional information.

CAARS FIRST-QUARTER TRAINING

Using video footage in collision reconstruction

By Frank Owen and Jim Gerhardt, Alpha Omega Engineering, Inc., San Luis Obispo, California

It's not that Big Brother is watching. He doesn't have to be. Everybody else is already.

That's one of the messages that fell out of the CAARS first-quarter training, held 28 January at the San Jose PD and 30 January at the Santa Ana PD. Presenters were Kurt Weiss of Automotive Safety Research, Inc. of Santa Barbara and Mark Hunt, with the Santa Barbara PD. Nowadays video surveillance cameras are everywhere...and they can be put to a use that they never were intended for, namely accident reconstruction.

Kurt's and Mark's presentation was built on a series of case studies, analyses they have performed with video footage as an essential part of that. But first they talked about some of the technology involved in video footage--frame rates, resolution, containers vs. codecs, bit rates, etc. They ran some tests of their own, with a variety of cameras, including an iPhone, on a stretch of street in Santa Barbara leading up to a stop sign. They wanted to see how well they could determine the deceleration rate of the cars from their video footage, compared with what their speed-measuring equipment recorded. The results were not bad.

Mark said that now, as part of his accident investigation, he makes a round in the area of a crash, looking for surveillance cameras and also asking neighbors if they have surveillance cameras that might have captured the crash or the vehicles involved just prior to the collision. He does this often on a day off, dressed in shorts and flip-flops. Most of the time he has no problem getting video footage; people want to help, Mark explained. He has wound up using video footage captured by a neighbor's surveillance camera, a surveillance camera at a bank, a security camera at a gas station, etc. An important first thing to do is to take photos showing the location of the video camera relative to what it's recording. A diagram of its location relative to the crash scene is also an important part of the documentation for the reconstruction.

The case studies were interesting because each was quite different from the others. The video cameras are not placed to capture accident or pre-accident events, so it is quite random what they capture relative to accident reconstruction.



Typical video screen shot of passing traffic.

Continued on next page...

CAARS second-quarter training

Topic: Reconstruction of Red Light/Green Light Accidents

Presented by Larry Neuman

Northern California: 29 April 2014, 0800-1700, Davis PD, 2600 5th Street, Davis, CA 39618, maximum attendees: 40.
Southern California: 9 May 2014, 0800-1700, USC, Davis School of Gerontology Auditorium, 3715 McClintock Ave., Los Angeles, CA 90089

Often the quality is poor, and often what is pertinent to the reconstructionist happens peripherally in the video. A surveillance camera for a bank catches action on its left-hand edge, where its field of view includes a street. But even then a truck might pass by at the critical moment and block the actual view of the collision. In one case study involving a fatality in a motorcycle collision, a camera set up by a homeowner to watch over his driveway entrance caught three motorcyclists zooming past on a straight stretch of road leading to a curve where the collision occurred. In another case, a camera set up in the back of a business to surveil against shoplifting caught a collision between a vehicle and a pedestrian in a tiny portion of the screen through the store-front window. The image of the outside was very vague, because it was dark, but the pedestrian could be seen, barely, and the lights of the vehicle were clear. In one case a bank camera directed at the street caught a speeding van passing by the bank just prior to jumping up on a sidewalk

and hitting and killing a pedestrian. The trajectory of the van was also evident from the post-collision tracks left through vegetation and also the end position of the van. The camera did not actually capture the crash, just a small portion of pre-crash movement. But analysis of the video, knowing the frame rate of the camera,



Big rig equipped with forward- and aft-facing cameras.

allowed Mark to calculate the pre-crash speed of the van. Thus the video was not the sole or even main source of information about the crash. But it, together with other crash-scene data, formed a more complete, consistent picture of what happened than would have been possible without the video.

In another interesting case in which a pedestrian wandered out into traffic on a curve and was hit and killed, a video of at nearby convenience store captured the victim with her boyfriend buying alcohol just prior to the crash. It showed the young couple weaving around the store, selecting beverages and then paying for them, obviously inebriated. This thus became an important piece of the evidence to explain why the young woman wandered out into traffic and was hit.

Yet another interesting case involved a collision between a car and an eighteen-wheeler in a merge zone of US 101 in Santa Barbara. Here, the two video cameras that captured the collision were actually in the truck cab itself. One was mounted above and behind the driver overlooking the front hood of the truck. The other was actually directed into the cab and captured the actions of the driver. The driver of the car passes the truck on the right, in the merge lane, comes to a very short distance forward of the truck, cuts in front of the truck and then brakes. The truck collides with the vehicle, sending it left and into other traffic. The action captured by the two videos needed to be pieced together-- showing the car/truck collision and the driver's reaction to it, and this needed to be pieced together with the other accident data to form a complete picture. Opinions were quite different in the audience about who was at fault in this collision.

At the end of the day, prior to hitting the road, I (Frank Owen) visited the men's room, and there found Mark Hunt performing his switcheroo...into shorts and flip-flops.

NEW TECHNOLOGY

Self-Driving Cars Can Be Relaxing, As The Rinspeed XchangeE Concept Shows

by Matthew de Paula, *Forbes*, 28 February 2014

Imagine getting in your car for the daily commute and instead of stressing about traffic, you push the steering wheel aside, recline the driver's seat and use an iPad in the dashboard to watch a movie or catch up on email.

This is the future of motoring that Swiss design firm Rinspeed envisions with its XchangeE concept car debuting at the Geneva Motor Show.

Equipped with swiveling recliners, a wide-screen television in the rear and an Italian espresso maker in the center console, the XchangeE redefines life behind the wheel.

It is purely a hypothetical vehicle, based on the idea that at some point in the not-too-distant future cars will be smart enough to drive themselves. With various automakers racing to bring self-driving cars to market before the end of the decade, that idea has some basis in reality.

The XchangeE is actually a modified Tesla Model S electric car. Rinspeed dressed up the exterior with special trim, but the interior is the true show-piece. It is patterned after a business-class cabin on a jetliner, with plush, reclining front seats that include folding foot rests.



Inside the XchangeE concept car, everyone can relax, even the driver. (Photo: Rinspeed)

The steering wheel slides out of the way so that the driver can kick back and read, conduct a video conference, or make an espresso. Front occupants can spin their seats around to face passengers in the back and create a lounge-like environment. Or, if no one is in the rear of the car, the backrest folds down to expose a huge flatscreen.

The carefully chosen upholstery, coated Plexiglass roof with rainbow-hued reflections, and hundreds of light-emitting diodes in the headliner and dash create a soothing environment in which occupants can relax as the car calculates the best route based on real-time traffic and weather updates from cloud-based servers.

Although experimental, the Rinspeed XchangeE was developed in partnership with real equipment manufacturers as a way to illustrate that its technology is indeed feasible. For example, TRW Automotive, a Michigan-based parts supplier, made the steering wheel, which incorporates controls for the transmission. Georg Fischer Automotive created the sliding steering column, while the infotainment system came from Harman. Deutsche Telekom was tapped to provide connectivity through its LTE network.

Zurich-based Rinspeed has a long history of innovation. Some of its work is quirky, like the Splash amphibious car, and some of it is visionary, like the autonomous MicroMax people mover, an electric-powered concept vehicle that debuted in Geneva last year.

The 2014 Geneva Motor Show is open to the public from March 6 to 16, following two press days.

See YouTube concept video of the [Rinspeed XchangeE](#).

See YouTube report about Rinspeed XchangeE from [Geneva Auto Show](#).



L.A. TIMES: OPINION

Can car-happy L.A. learn to share the road?

by the L.A. Times editorial board, 24 February 2014

September brought sweet victory to the growing community of California cycling advocates: Gov. Jerry Brown signed into law a bill that will prohibit the driver of any motor vehicle from passing a bike rider on the road unless there is 36 inches of space between them. Or, if for some reason that minimal passing distance just isn't possible, drivers will have to slow to a speed that is "reasonable and prudent."

The "3-foot rule" seems quite modest. A yard's worth of pavement between a cruising car or truck and a cyclist, pumping uphill or holding on for dear life on a downward slope, is hardly excessive. Fines are paltry as moving violations go — \$35. The law doesn't even take effect until this fall, giving drivers plenty of time to get used to the idea and cyclists and state officials plenty of time to educate them.

**It's no longer
just paint**

But Brown had vetoed two earlier versions of the bill, leaving the impression that California was stuck in a postwar baby boom world in which streets were meant for automobiles alone. The governor's turnabout, after his concerns regarding potential state liability were addressed, was a big deal for cyclists, and perhaps a bit irksome to motorists in a state where car culture enjoyed its blissful adolescence and aggressive young adulthood.

As the bill was being signed, The Times editorial writers were beginning RoadshareLA, an online exploration of the seemingly sudden arrival of cyclists as not just a cultural but a political force in California. Bicycle advocates, for example, helped promote and pass a law — at just about the time the first 3-foot bill was being run off the road — that requires cities and counties to re-imagine their streets as transportation arteries that accommodate the increasing number of cyclists and pedestrians and de-emphasize cars. The law was designed in part to reduce greenhouse gas emissions, in part to improve road safety, in part to enhance the quality of life in neighborhoods where streets had become commuting-hour freeways, and in part, some argue, to reduce obesity. And, others insist, to keep cities here in competition for young professionals who reject their parents' car-oriented outlook and want to live and work in cities that accommodate their car-free lifestyles.

Assembly Bill 1358, known as the Complete Streets Bill, brought to California a nationwide revolution in how we think about our streets, how they're engineered and how they're ultimately used. Los Angeles has begun to notice some of the effects of that law, not just in the number of bike lanes and cyclists who use them but in "road diets" that remove automobile lanes.

Those lane changes may enhance some communities and protect the safety of cyclists. But they also affect the commuting patterns — and needs — of a city laid out for drivers. Consider the 2nd Street tunnel, an east-west passage between downtown and the rest of the city, and an iconic location featured in countless Hollywood chase scenes and car commercials. It's now in part a bike path, with one less car lane in each direction. Has that change added five or 10 minutes — and untold spewing pollutants from idling cars — to the twice-daily downtown commute? How well are we thinking through such changes? Are cyclists and drivers sharing the road, or are they locked in a struggle for street hegemony?

Until now, cycling advocates and transportation planners have responded to complaints about road diets and slower car traffic by pointing out that restriping is relatively cheap. "It's just paint," they said, and can be scraped off if the new traffic patterns prove undesirable.

But Los Angeles is now preparing its first truly "complete street," on Figueroa, creating bike lanes separated from car traffic by concrete curbs. Road diets will no longer be temporary. It's no longer just paint.



FOLLOW UP...

Court says reading smartphone map while driving is not a crime

by Robin Abcarian, *L. A. Times*, 28 February 2014

Good news for Wazers: On Thursday, a California appellate court ruled that looking at a smartphone map while driving is not against the law.

A three-judge panel of California's 5th District Court of Appeal threw out the distracted driving ticket Steven Spriggs got two years ago for looking at his cellphone map while stuck in highway traffic in Fresno.

The court unanimously concluded that the state Legislature meant only to prohibit "talking and listening" – and not any other cellphone activity – when it passed a distracted driver law in 2006.

"This is not surprising," wrote the court, "given that when the statute was enacted in 2006, most wireless telephones were just that – a telephone – rather than an electronic device with multiple functions." (But don't get too excited, textaholics. The Legislature specifically banned texting while driving in 2009.)

Still, the decision was an important clarification, as many people behind the wheel pick up their smartphones for map and traffic applications such as Waze or Google Maps, to check the time, or even, as the court noted, to use as paperweights.

(Here's what the law says: "A person shall not drive a motor vehicle while using a wireless telephone unless that telephone is specifically designed and configured to allow hands-free listening and talking, and is used in that manner while driving." The court determined that "use" in the context of the law only refers to holding the phone and having a conversation, not merely holding it or looking at it.)

"Right now the police jurisdictions should be on notice," said Spriggs, 59, a soft-spoken Cal State Fresno fundraiser. "I've been contacted by dozens and dozens of people who have traffic court scheduled in the next week, and they've been asking me how I beat the case."

Turned out, the third time in court was the charm for Spriggs, who first challenged his \$165 ticket in traffic court (and lost), then fought the ticket in Fresno County Superior Court's appeal division (and lost again).

His appellate attorney, Scott Reddie of Fresno, had a personal interest in the case. Some years back, Reddie was ticketed for driving while eating a hamburger and drinking a soda. The officer said Reddie had no hands on the wheel, but the ticket was dismissed when Reddie showed a judge an In-N-Out receipt showing he had not purchased a drink.

In an illustration of how confusing the law can be (and how versatile cellphones are), Spriggs said that during oral arguments on Feb. 13, the presiding judge asked the prosecutor, Deputy Atty. Gen. Doris Calandra, whether it would be legal to use a cellphone as a flashlight to illuminate a paper map at night if a car's dome light did not function? (Probably illegal, she said.) What about holding up a cellphone to block the sun shining in the driver's eyes? (Probably legal.)

The decision takes effect in 30 days, and the state has 10 days after that to decide whether to appeal the decision to the California Supreme Court.



A California appellate court has overturned the distracted-driving conviction of Steven Spriggs of Fresno, who was cited in 2012 for looking at his iPhone's map app while driving. (Photo: Robin Abcarian)



DISTRACTED DRIVING

Talking on cell phone not as dangerous as dialing or texting while driving

The Associated Press, 2 January 2014

A new real-world study confirms that dialing, texting, or even reaching for a cell phone while behind the wheel raises the risk of crashing, especially for younger drivers. The study did not find that simply talking on the phone caused the same risks that other studies have found.

A sophisticated, real-world study confirms that dialing, texting or reaching for a cellphone while driving raises the risk of a crash or near-miss, especially for younger drivers. But the research also produced a surprise: Simply talking on the phone did not prove dangerous, as it has in other studies.

This one did not distinguish between handheld and hands-free devices - a major weakness.

And even though talking doesn't require drivers to take their eyes off the road, it's hard to talk on a phone without first reaching for it or dialing a number -things that raise the risk of a crash, researchers note.

Earlier work with simulators, test-tracks and cellphone records suggests that risky driving increases when people are on cellphones, especially teens. The 15-to-20-year-old age group accounts for 6 percent of all drivers but 10 percent of traffic deaths and 14 percent of police-reported crashes with injuries.

For the new study, researchers at the Virginia Tech Transportation Institute installed video cameras, global positioning systems, lane trackers, gadgets to measure speed and acceleration, and other sensors in the cars of 42 newly licensed drivers 16 or 17 years old, and 109 adults with an average of 20 years behind the wheel.

The risk of a crash or near-miss among young drivers increased more than sevenfold if they were dialing or reaching for a cellphone and fourfold if they were sending or receiving a text message. The risk also rose if they were reaching for something other than a phone, looking at a roadside object or eating.

Among older drivers, only dialing a cellphone increased the chances of a crash or near miss. However, that study began before texting became more common, so researchers don't know if it is as dangerous for them as it is for teens.

See [full story](#).

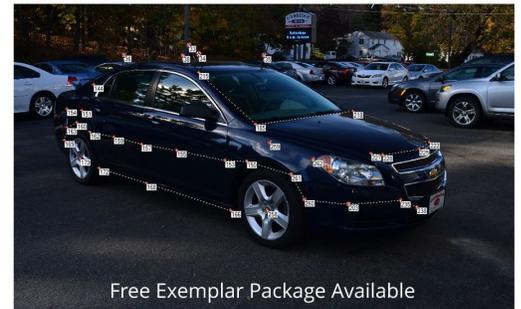


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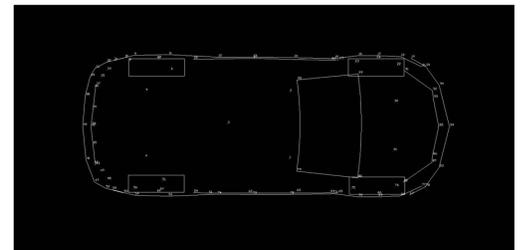
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LAW ENFORCEMENT TRAGEDY

2 CHP officers killed in Highway 99 crash near Kingsburg

by Tim Sheehan and Jim Guy, *The Fresno Bee*, 17 February 2014

Two California Highway Patrol officers were killed in the pre-dawn hours Monday when they slammed into a guardrail and then a freeway exit sign as they responded to a collision on Highway 99 in Kingsburg.

Officers Juan Jaime Gonzalez and Brian Mitchio Law, who were friends as well as graveyard-shift partners, are the first Fresno CHP officers to die in the line of duty in more than 50 years.

The CHP said the officers were racing to a call when a tragic turn of events cost them.

Capt. Dave Paris said the CHP received multiple calls about a collision in the northbound lanes of Highway 99 south of Sierra Avenue just before 6 a.m.

But the accident stretched across the southbound lanes of the highway, north of Sierra, and the officers unwittingly sped into it. Gonzalez, who was driving, took evasive action to avoid striking any of the other parties and struck a guard rail and an exit sign just north of the Sierra Street/Conejo Avenue exit before their Crown Victoria flipped on its roof. The officers died at the scene.



CHP officers Juan Gonzalez (left) and Brian Law.
(Photo: special to *The Fresno Bee*)

"Everybody that comes on the CHP understands the risks," Paris said. "Their biggest goal is to help their community, to strengthen their community. They understand that they can become a victim of an assault or a traffic collision. It's always in their mind and they prepare for it."

California Highway Patrol Commissioner Joe Farrow, in a briefing at the crash scene, said the two officers were friends and partners who trained together and graduated together from the CHP Academy about six years ago.

"Obviously what we have here is a tragedy. We lost two fine officers," Farrow said.

Gonzalez, 33, and Law, 34, graduated in 2008 from the California Highway Patrol Academy, where they were classmates, Paris said. The men were both initially assigned to the Bay Area.

They then both came to the Fresno office, where they teamed up to work the night shift and became the best of friends.

Law, of Clovis, is survived by his wife, Rebecca, and three children. Gonzalez, who lives in the Fresno area, is survived by his mother Maria, a sister, Sandra, and was talking about marriage with his girlfriend, Paris said.

Services for the men are pending.

The officers are the first from the Fresno CHP office to die in the line of duty since Jerry E. Turre was struck and killed by a hit-and-run driver while laying flares at an accident scene near Fresno on April 21, 1962, according to CHP records.

The most recent fatalities in the Central Division, which stretches from Kern County to Stanislaus County, involved Officer Earl Scott, who was fatally shot during a traffic stop on Highway 99 in Ripon on Feb. 17, 2006, and Officer Erick Manny, who was killed Dec. 21, 2005, in an automobile accident on Interstate 5, near the Grapevine in Kern County, CHP officials said.

This is the first time since 1998 that the CHP has lost two officers in the same incident.

A GROWING PROBLEM

Driving under the influence, of marijuana

by Maggie Koerth-Baker, *The New York Times*, 17 February 2014

If you are pulled over on suspicion of drunken driving, the police officer is likely to ask you to complete three tasks: Follow a pen with your eyes while the officer moves it back and forth; get out of the car and walk nine steps, heel to toe, turn on one foot and go back; and stand on one leg for 30 seconds.



A billboard in Newark. A highway safety official in Colorado, where marijuana is legal, said that “a lot of people don’t think D.U.I. laws apply.” (Photo: Carlo Allegri/Reuters)

Score well on all three of these Olympic events, and there’s a very good chance that you are not drunk. This so-called standard field sobriety test has been shown to catch 88 percent of drivers under the influence of alcohol.

But it is nowhere near as good at spotting a stoned driver.

In a 2012 study published in the journal *Psychopharmacology*, only 30 percent of people under the influence of THC, the active ingredient in marijuana, failed the field test. And its ability to identify a stoned driver seems to depend heavily on whether the driver is accustomed to being stoned.

A 21-year-old on his first bender and a hardened alcoholic will both wobble on

one foot. But the same is not necessarily true of a driver who just smoked his first joint and the stoner who is high five days a week. In another study, 50 percent of the less frequent smokers failed the field test.

As more states legalize medical and recreational marijuana, distinctions like these will grow more and more important. But science’s answers to crucial questions about driving while stoned — how dangerous it is, how to test for impairment, and how the risks compare to driving drunk — have been slow to reach the general public.

“Our goal is to put out the science and have it used for evidence-based drug policy,” said Marilyn A. Huestis, a senior investigator at the National Institute on Drug Abuse. “But I think it’s a mishmash.”

A 2007 study found that 12 percent of the drivers randomly stopped on American highways on Friday and Saturday nights had been drinking. (In return for taking part in the study, intoxicated drivers were told they would not be arrested, just taken home.)

Six percent of the drivers tested positive for marijuana — a number that is likely to go up with increased availability. Some experts and officials are concerned that the campaign against drunken driving has not gotten through to marijuana smokers.

See [full story](#).

NATIONAL PUBLIC RADIO BROADCAST ON DUI-MARIJUANA

No Easy Answers For DUI Concerns As Marijuana Gains Support

By the NPR staff, 23 February 2014

The Lodo Wellness Center in Denver has been selling medical marijuana for several years. But since Jan. 1, when marijuana in Colorado officially moved from underground to behind the counter, the center has also been selling legal, recreational pot.

A majority of Americans now say they support full legalization, and the trend is spreading to other states.

Meanwhile, the public health community is warning of a potential safety problem: more people driving while stoned. But health officials and law enforcement don't yet have the data or the tools to address the concern.

Public Perception



A customer smells a strain of marijuana while being helped by employee Billy Archilla inside the retail marijuana shop at 3D Cannabis Center in Denver. (Photo: Brenan Linsley/AP)

Inside Lodo Wellness Center, shoppers don't seem particularly worried about getting behind the wheel with pot in their systems.

"You could smoke about an ounce and still have your motor skills," says 39-year-old Dante Cox.

"When it comes to one shot of alcohol, all that goes out of the window."

Like Cox, several others say it's OK to smoke before driving, and definitely safer than drinking and driving.

For advocates of traffic safety, their words are concerning.

"I think this is the next big issue in highway safety," says Jonathan Adkins, executive director of the Governors Highway Safety Association. He tells NPR's Arun Rath that there's a prevalent feeling in American culture that marijuana is no big deal.

"Well, it is a big deal if you use it and then get behind the wheel," he says. "We need to have the

same cultural intolerance for marijuana use behind the wheel as we do with alcohol."

Alcohol-related crashes still kill around 10,000 people a year, and research clearly shows how drinking alcohol affects driving. The impact of marijuana is much less clear.

The National Institute on Drug Abuse has done extensive research on marijuana's effect on driving ability. The results, senior investigator Marilyn Huestis says, should give smokers pause.

"We have so many processes in our brain that help us to do a complex behavior of driving, and under the effects of marijuana, we just don't perform as well," she says.

Assessing Crash Risk

After using marijuana, Huestis says, people generally have more trouble staying in lanes, they struggle to do multiple tasks at once, and there's a real problem maintaining concentration on long, monotonous drives.

But does that translate into more accidents? Studies of the crash risk associated with marijuana have produced mixed results, says Anne McCartt, senior vice president for research at the Insurance Institute for Highway Safety.

"Not only do we not have consensus on the risk associated with the presence of marijuana — we don't have information on the crash risk for different amounts of marijuana," McCartt says. "We don't even have good information on how many drivers involved in fatal crashes test positive for marijuana. So there's a lot we don't know."

Continued next page...



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McCartt says the evidence so far suggests that alcohol has a stronger effect than marijuana on crash risk, and that there is simply a larger body of research on the strong association between blood-alcohol concentrations and crash risk.

"We've used that science, for example, to enact in all 50 states laws that make it illegal to drive with [blood alcohol contents] of 0.08 percent or higher," she says. "We don't have comparable information on marijuana."

As marijuana use becomes more accepted in the U.S., McCartt says, the public safety issue is concerning. As a researcher, she says, it's frustrating not to have the science needed to craft effective, enforceable laws for drugs, including marijuana.

Testing For Marijuana

Even with laws establishing a specific limit, police might not have a way to enforce them. For alcohol, police around the country carry hand-held breathalyzers. But coming up with a similar test for marijuana is not quite as easy.

For one, the alcohol content of, say, a Budweiser is on the label. But it's much more difficult to know the potency of a wide variety of marijuana products.

Another complication is marijuana's main psychoactive ingredient, THC. It can linger in the body long after the initial high.

"THC is a molecule that really loves human fat, and when you ingest it, it sticks in the fat, and then it slowly seeps out over the course of a week, or a month if you are a heavy user," says Timothy Fong, an addiction psychiatrist at the University of California, Los Angeles.

The most reliable test for THC is the blood test. A few states, like Washington and Colorado, have even established a kind of legal limit of marijuana in the blood: 5 nanograms of THC per milliliter.

But performing that test often requires that police drive a suspect to a hospital. And Fong says it's tough to interpret exactly what those tests mean for driving ability.

"Most of the marijuana testing has been done in human laboratories, and there you get a wide variety [of reactions]," he says. "So if you take 100 people and have the same blood level of marijuana, you'll have 100 different reactions."

California, the first state to legalize medical marijuana, recently conducted a roadside study at night, finding around 7 percent of drivers had marijuana in their systems.

Los Angeles is now at the forefront of law enforcement's response. The city has a federal grant to try out a new roadside drug test: oral swabs. City Attorney Mike Feuer calls the technology "the wave of the future."

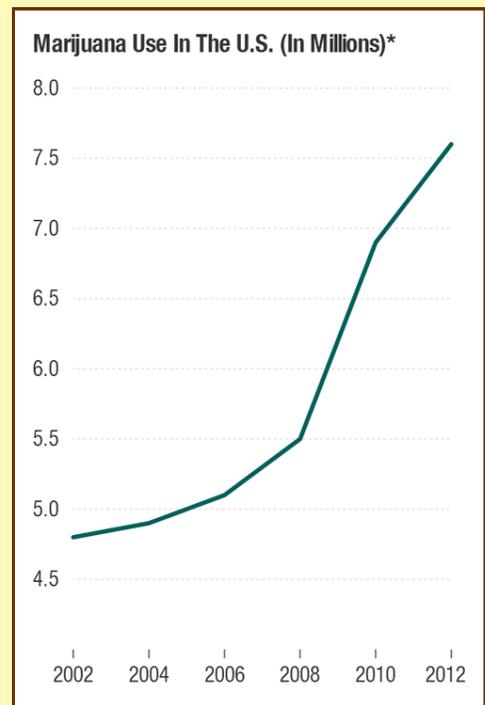
"This is a technique under which, in the field, at the time of the traffic stop, an officer can test the saliva of the driver and get an immediate result as to whether there are drugs present in his or her system," Feuer says.

Feuer says the admissibility in court of the swabbing hasn't been tested in California but is likely to be tested in the coming months or next year. Legislation regarding the swabs could be down the road as well, he says.

The goal of all of this, Feuer says, is to assure that there is an effective means of determining whether a driver is impaired, not just for prosecution but also to prevent people from driving under the influence in the first place.

"The more commonly known it is that we have a quick and effective technique for determining that, the more I hope people are deterred from getting behind the wheel with drugs or alcohol in their system," he says.

See the [rest of the story and listen to the radio broadcast](#).



Colorado troopers get training on spotting drivers under influence of pot

By John Ingold and Monte Whaley, *The Denver Post*, 24 February 2014

Colorado State Patrol troopers cited 60 people in January for driving offenses in which marijuana was believed to be involved, a CSP sergeant said Monday in reporting the first such numbers in the state.

Trends in stoned driving have proved difficult for state officials to track, and the State Patrol began keeping tallies on impaired-driving cases involving marijuana only in January. In that month, stoned-driving citations made up about 15 percent of the total impaired-driving citations for the month, Sgt. Mike Baker said.

"This is the first year we've had such specific, quantifiable totals for marijuana-related citations," Baker wrote in an e-mail. "We won't be able to make an educated, reasonable assessment about the effect of the new marijuana laws for a few years at the earliest."

The State Patrol cited 332 people in January for driving under the influence of alcohol. Another 17 people were believed to be under the influence of a drug other than marijuana.

The state is stepping up training so that law officers will be able to spot drivers who are high on marijuana and to differentiate them from drivers who are impaired by alcohol.

"Pot use behind the wheel is really the big bear in the room," Colorado State Patrol Trooper Brian Pettit said Monday in Golden. "You know it's there, but nobody wants to touch it."

"But I want to protect my community," added Pettit, who works out of Weld County's State Patrol office. "And I want to protect my family."

Pettit is among 25 state troopers who are taking an intensive nine-day course on how to recognize and prosecute drivers under the influence of marijuana.

"In my opinion, I think marijuana-impaired driving is going to become more prevalent, so this was a good opportunity to better detect these things," he said.

See [full story and training video](#) on recognizing stoned drivers.



Colorado Department of Transportation holds a class at the Colorado State Patrol Academy in Golden to train officers on how to recognize stoned drivers.

(Photo: R.J. Sangosti, *The Denver Post*)



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IIHS SMALL-OVERLAP FRONT CRASH TESTS

Chevy Spark only subcompact car to pass insurance group crash test

by Jerry Hirsch, *L.A. Times*, 21 January 2014

Of the 11 economy cars crash-tested by the leading insurance industry group, 10 failed a new safety standard for front-end collisions.

Only the Chevrolet Spark earned an “acceptable” grade on the test, in which 25% of the front end, on the driver's side, strikes a 5-foot-tall barrier at 40 mph.

The Honda Fit, Fiat 500, Hyundai Accent, Nissan Versa, Toyota Prius C and Mitsubishi Mirage all received “poor” grades, according to the Insurance Institute for Highway Safety. The Mazda 2, Kia Rio, Toyota Yaris and Ford Fiesta earned “marginal” scores.



None of these subcompacts earned a “good” mark.

[Updated, 12:57 p.m. PST Jan. 22: After seeing the results Wednesday, Consumer Reports removed the Honda Fit from its list of recommended vehicles. However, a Honda representative noted that the model was being phased out and would be replaced by a newly designed Fit this spring.]

The vehicles were the worst-performing group of any evaluated so far by the institute, which spends about \$3 million a year crashing cars and evaluating the results for the insurance

industry. The tests are important because they play into safety ratings, car reviews and consumer perceptions, said Karl Brauer, an analyst with auto information company Kelley Blue Book.

Consumer Reports, for instance, dumped some its favorite vehicles — including Toyota's Camry, RAV4 and Prius V — from its list of recommended cars last year because the vehicles scored poorly in the test. The influential magazine put the Camry back on its recommended list in December after Toyota modified the car's structure to earn an “acceptable” rating.

“Crash tests are one of those things that a dedicated minority of buyers look at,” Brauer said. “They won't even consider a car unless they are sure the crash-test scores are good.”

Toyota has typically scored poorer than companies such as Honda and Volvo in the tests, Brauer said.

“We are looking at a range of solutions to achieve greater crash performance in this area,” Toyota spokesman Michael Kroll said. “This is a more-stringent test, and we will adapt. In fact, we moved very quickly with Camry to make changes that resulted in an improved score.”

The insurance group established the “small overlap front crash test” because front-corner collisions can be particularly severe.

The institute said the test is more difficult than the head-on crashes conducted by the government, or even other assessments by the institute, because most of the vehicle's front-end crush zone is bypassed and the passenger compartment can collapse, the group said.

See [full story](#).



CAARS Meet the Member

Editor's note: This month we meet Louis Peck, who has been CAARS member since the 2012 CAARS annual conference in South Lake Tahoe. Louis is a motorcycle enthusiast and has developed expertise in motorcycle accident reconstruction, high-quality photography, and photogrammetry as a focal points of his AR business, [Lightpoint Data](#). If you want to be featured in this column or if you know a member whose story needs to be told, please let me know at editor@ca2rs.org.

CAARS: How long have you been a member of CAARS?



Peck: *I joined CAARS in 2012 after presenting at the South Lake Tahoe Conference. I've known Chris Kauderer for several years, and after meeting many of the other members during that event, and making plans to conduct future research with some, I was compelled to join what is clearly a tight-knit community of reconstructionists with a wide array of technical skills.*

CAARS: How long have you been involved in accident reconstruction?

Peck: *I was fortunate to be exposed to accident reconstruction in 2004 at a relatively young age, 22, as one of my undergraduate professors at Fresno State was a consulting reconstructionist. He would usually warm up the class with a tale from past cases, and I found it to be very intriguing. After the semester came to a close, I approached him about working together. He taught me the ropes and my interest in the field continued to grow.*

CAARS: In the wide variety of specialties that comprise the science of accident reconstruction, where do you think your strong points are?

Peck: *I have worked hard to make motorcycle accident reconstruction one of my biggest strengths. Specifically, I have conducted research analyzing the real-world behavior of motorcyclists, ranging from eye-movement, to braking rates, swerving behavior, acceleration behavior, and speed selection. Some of that data has been published, and thanks to an incredible concerted effort, one paper based on the acquired data became a Transportation Research Board Record. I have also conducted a great deal of research regarding the sliding behavior of downed motorcycles. Some of that data came from actual crashes at track days and races, while the remainder was gathered during controlled testing performed by many CAARS members and myself. That data will hopefully be published this year. I'm also an avid rider and acquired my expert road racing license in the Champion Cup Series in 2012. I built my race machine from a crashed Suzuki SV650, which proved to be a great learning experience.*

Photogrammetry is another area in which I specialize. I took a class taught by guru Dan Mills back in 2009 and got hooked. The process of modeling vehicles and crush meshed well with my previous background and education in solid modeling. I recently launched a photogrammetry-based project, called Lightpoint Data, providing fellow reconstructionists with exemplar vehicle models and consulting services, such as measuring crush from appraisal photographs or placing scene evidence using police photographs.

CAARS: Are you involved in other related activities not strictly within accident reconstruction?

Peck: *I spend a good amount of time at the race track in the New England summer months, working for a top-notch track day outfit called Tony's Track Days. We help beginner and advanced street riders improve by working on corner-*

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ing/braking skills, rain riding, visual attention, and traction management in general. That experience has been really rewarding as the riders often make quick improvements over the course of a day or two. Naturally, it also gives me the opportunity to talk to riders who crashed that day, and I'm often the first one to the "collision scene" when tip-overs occur, so there is ultimately a bit of a tie to accident reconstruction.

CAARS: Do you have any special stories to relate in your activities as an accident reconstructionist that might interest the membership?

Peck: One of the most poignant cases I've worked on over the years was a single vehicle rollover that killed one of the two teenage occupants. The vehicle was speeding excessively prior to colliding with a tree and the surviving occupant, as is often the case, stated the deceased was the operator. After spending years gathering evidence ranging from statements to DNA analyses, it was possible to establish that the deceased was in fact the passenger, not the operator. The effect of that analysis, not only legally, but with respect to the emotions of the decedent's family, was substantial. Promoting justice via science was one the major factors that attracted me to this profession from the beginning. Reconstructionists often make a significant difference in people's lives and I am proud to have a career where that's the case, despite the pressure of such a responsibility, which can be taxing at times.

CAARS: How has accident reconstruction impacted your everyday life?

Peck: I'm absolutely more hesitant to ride a motorcycle on the road, and more paranoid when I do. For the most part, I've only ridden on the track for the past few years, and while there are dangers associated with that as well, they're usually less grave. With three children in the picture now, the thought of any disabling collision is more disturbing than it was in the past. What will likely be the biggest impact is how I deal with teaching my children to drive. I have done a lot of work with Jeff Muttart over the years. After learning about the statistics regarding novice drivers, observing some of their behaviors, and reconstructing collisions involving teenage drivers, teaching my children how to operate a vehicle safely will be a paramount concern. From traction management and hazard detection, to appropriate behavior such as avoiding distractions, I will likely border on overly-protective when the time comes.

CAARS: Do you have words of wisdom or lessons learned that you would like to impart to the membership?

Peck: I learned pretty quickly that despite being an expert in the field of accident reconstruction, it's okay not to know everything. Sometimes the right answer is, "I don't know, but I will find out." Accident reconstruction is such a broad field, it's just not possible to know the depths of every facet. Some experts fall in to the trap of feeling like they have to know everything because they're the expert. Sometimes, your credibility is enhanced by admitting that you don't know the answer at the moment. When in doubt, turn to the library of published data that the community has worked diligently to build, or call a colleague who knows more about the specific subject. There shouldn't be any guesses in reconstruction, only science.



CAARS: What other activities are you involved in outside of accident reconstruction?

Peck: Though I'm only semi-athletic, I've always enjoyed action sports such as wakeboarding, snowboarding, motorcycle racing, surfing, and paintball. I'm also a music fanatic, but with little musical talent myself. I play the guitar, but find most gratification in others' music. I recently had triplets, and that is, without question, my biggest project at the moment. If everything goes well, my wife and I will have created three successful, happy people.

CAARS: Is there something you would like CAARS to do in the future that it is not doing now? Suggestions for improving the organization.

Peck: I only have positive things to say about CAARS at this point in my membership. The conference that I attended was exceptional, with great topics and speakers. In addition, the people I've met have been consistently welcoming, supportive, and knowledgeable. Also, the crash testing project that I was involved with was well organized and the team worked together extraordinarily well. I hope to become more and more involved with the association in the upcoming years, and look forward to helping with improvements if any weaknesses become apparent.

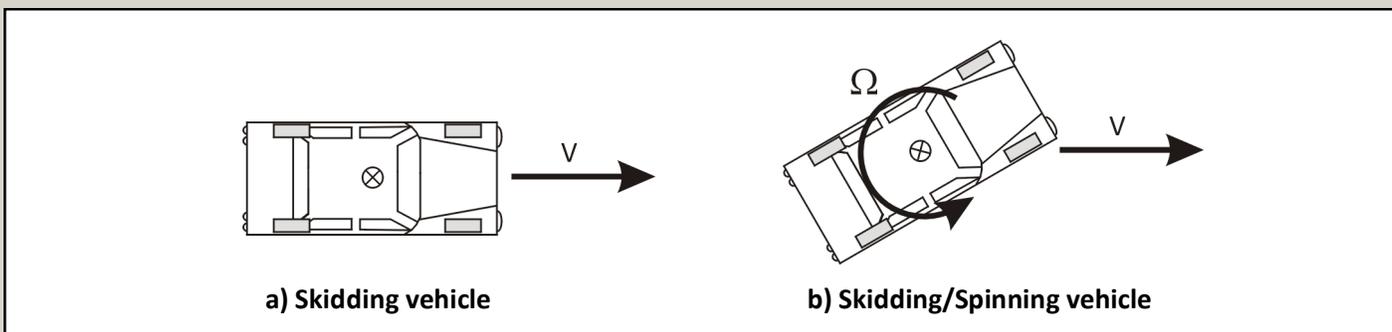
TECHNICAL CORNER

Vehicle rotation in a skid

by Frank Owen, Alpha Omega Engineering, Inc., San Luis Obispo, California

At a CAARs training seminar recently, someone asked me if I understood how rotation affects a skidding vehicle. That is, the vehicle is spinning about a vertical axis as it is skidding at the same time. We cover rotation in Dynamics in Mechanical Engineering, so I thought I'd take a stab at explaining this topic here, since it seems to confuse a lot of accident reconstruction specialists. So here goes.

Let's start off simple, with the easiest case possible, just to see what's involved in this topic. In engineering, it's always good to start off with the simplest case, then embellish it with more complicated things if the need is there. Consider the two cases of a skidding vehicle—one with no rotation and one with rotation. These two cases are shown in the accompanying figure. It helps to compare these two situations, so let's assume that they have the same straight-line skid velocity, V , but that the vehicle below is yawing counterclockwise as it is skidding with the spinning velocity Ω .



What causes the spinning is not part of this explanation. Normally spinning is caused by a collision that is not *central*—that is, the collision force on the vehicle did not pass through its center of gravity. In any case, the vehicle was set into spinning motion as well as straight-line motion.

An initial point to make is that the spinning/skidding vehicle has more kinetic energy than the non-spinning vehicle with the same straight-line velocity. Any motion carries with it kinetic energy.

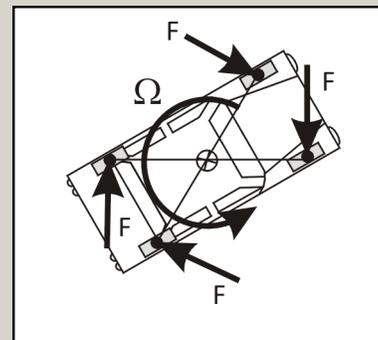
Thus the kinetic energy (T) of each of the above vehicles would be

$$T_a = \frac{1}{2} \frac{W}{g} V^2 \quad \text{vs.} \quad T_b = \frac{1}{2} \frac{W}{g} V^2 + \frac{1}{2} J \Omega^2$$

Thus the kinetic energy of the spinning/skidding vehicle would exceed that of the non-spinning skidding vehicle by the term $\frac{1}{2} J \Omega^2$. This is the *rotational kinetic energy*. J is the vehicle's *mass moment of inertia*, which simply is its resistance to changes in its spin velocity. Mass, $\left(\frac{W}{g}\right)$ in the above equations, is simply a vehicle's resistance to changes in its straight-line motion. J is simply the rotational analog of mass. I checked under vehicle properties on the ARC-Network website, and J is not given. But under vehicle properties on the NHTSA website, J is indeed given. What forces would be acting on the spinning/skidding vehicle because of the spinning? How is the spinning analyzed?

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Let's consider the simple case of spinning/skidding with completely locked wheels. The spinning motion is treated simply by laying its motion on top of the straight-line skidding motion. This is called the principle of *superposition* in Dynamics. Take the case where $V = 0$. So the first vehicle is not moving, and the second vehicle is simply spinning in place. The forces at the locked wheels are always against the direction of motion. The spinning will be about the vehicle's center of gravity, so the braking forces of the street on the wheels will simply be perpendicular to a radius from the CG to the tire patch on the ground. The second figure shows how these forces will act to stop the spinning.



Continuing with our simplification, assume the vehicle weight, W , is evenly distributed on all four wheels. Then

$$F = \left(\frac{1}{4}W\right) \cdot f$$

The torque (or *moment*) of one of these forces, working to stop the spinning motion is the force times the radius (or *moment arm*) against which it works. The radius is just $r = \sqrt{\left(\frac{w}{2}\right)^2 + \left(\frac{l}{2}\right)^2}$, by the Pythagorean Theorem, where w is the track of the tires and l is the wheelbase. The total torque is just 4 times the torque of one force. Thus the total torque braking the spinning is

$$M = 4 \cdot F \cdot r = 4 \cdot \left(\frac{1}{4}W\right) \cdot f \cdot \sqrt{\left(\frac{w}{2}\right)^2 + \left(\frac{l}{2}\right)^2} = W \cdot f \cdot \sqrt{\left(\frac{w}{2}\right)^2 + \left(\frac{l}{2}\right)^2}$$

Just like you can calculate the skidding distance of a vehicle with locked wheels, you can also calculate the angle of spin of a spinning vehicle with locked wheels. For the skidding distance, reconstructionists use the formula $d = \frac{v^2}{2 \cdot f \cdot g}$ if the initial velocity is known. Usually, however, this formula is used to find the initial velocity from the skidding distance. This formula becomes, in the English system of units, the well-known $V = \sqrt{30 \cdot f \cdot d}$, which gives V in mph if d is given in feet. This formula comes from the principle that the energy taken out of the system by the braking force is equal to the initial kinetic energy at the start of the skid. If this same principle is applied to the spinning motion

Thus if you know the initial spin velocity, you can calculate the angle (θ) through which the vehicle will spin before the spinning stops.

$$\theta = \frac{\left(\frac{1}{2}J\Omega^2\right)}{M} = \frac{\left(\frac{1}{2}J\Omega^2\right)}{W \cdot f \cdot \sqrt{\left(\frac{w}{2}\right)^2 + \left(\frac{l}{2}\right)^2}}$$

Or if you somehow knew the total angle of spin—from skid marks, the likely initial direction of travel and the final orientation of the vehicle—you could calculate the initial spin velocity:

$$\Omega^2 = \frac{2 \cdot M \cdot \theta}{J}$$

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$$\Omega = \sqrt{\frac{2 \cdot M \cdot \theta}{J}} = \sqrt{\frac{2 \cdot W \cdot f \cdot \sqrt{\left(\frac{W}{2}\right)^2 + \left(\frac{L}{2}\right)^2} \cdot \theta}{J}}$$

All of this applies specifically to the spinning motion alone. As we shall see in a future article, superposition allows you to analyze the spinning separately from the straight-line skidding. You can then lay these results on top of each other to arrive at the total motion.

I shall continue this article in a future issue of the CAARS newsletter and hopefully lift the veil of confusion regarding spinning in skids. Coming, some examples showing how the equations developed above can be used for practical purposes...

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