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Airbag Pioneer Has AU Connection

You may not know the name George F. Kirchoff, but the invention he pioneered is most likely one that you sit within inches of every day yet hope never to see — the automobile airbag.

"A surgeon once told me, 'You've saved more lives than I have,'" recalls Kirchoff, 79.

He is not one to brag. But between 1987 and 2008, airbags saved 25,782 lives according to federal statistics.

In the automotive world, Kirchoff is known as "the father of the airbag," but the 1955 Auburn graduate emphasizes he was not alone.

It was a team effort, he explains, sitting at his home overlooking Mobile Bay, where he retired in 1998 with his wife, Gene. He stayed involved in the industry for another decade as president of the Automotive Occupant Restraints Council.

For 35 years at Thiokol Inc., Morton International and Autoliv Inc., Kirchoff led the efforts to create the airbag, and holds numerous patents for its assembly.

He spent the early part of his career in rocketry, and his knowledge of pyrotechnics resulted in insights into how to detonate the gases that whoosh into a nylon bag.

In his home study are photographs of him in airbag tests — his younger self leaning back in a car seat as a white balloon billows toward his face.

He is used to playing a powerful role, but behind the scenes.

"The inventors of the airbag technology have remained anonymous for too long," consumer advocate and former presidential candidate Ralph Nader said while presenting Kirchoff a safety award in 1992.

In 2011, German automaker BMW AG recognized Kirchoff with a lifetime achievement award, its citation praising him for "many years of tireless innovation on automotive airbags to help save lives and reduce serious injuries, anonymous to those you protected."

He fell in love with cars as a youth in Birmingham, the son of George Kirchoff, who worked for a dairy company, and Regina Marino, a native of Mobile.

His father drove a Hudson. When the fan belt broke, young George fixed it.

He got hold of a 1936 Ford from a junkyard and got it running.

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(Continued from page 1, "Airbag Pioneer Has AU Connection")

At Auburn, where he studied engineering physics, he had a 1946 Ford convertible.

"My dad thought I was going to be a grease monkey," he says.

His father was killed by a car, not while driving, but as a pedestrian.

After Auburn, Kirchoff went to Navy flight school and met Gene Golson, a Prattville native who was a student at University of Montevallo. The couple began a life together that now spans 55 years, with three children and four grandchildren.

In 1972, between jobs, he began to feel that he "needed to do something for other people."

Then he got his chance to turn his expertise in rocketry to saving lives.

The airbag was not a new concept, he says, but car companies had been unsuccessful in developing it.

He moved his family out to Thiokol headquarters in Utah, and soon headed up the first airbag program.

Gene Kirchoff recalls the years that her husband worked long days and nights, determined to find the right combination of factors.

The initiator — the pin that starts the airbag explosion — had to be perfectly calibrated. The inflator, releasing nitrogen gas, had to work just so.

And the airbag had to open in 35 milliseconds.

"There was hundreds of trials and errors," he says.

Once he got all the elements in place and car companies began to place orders for Kirchoff's airbag, there was the public resistance to deal with, too.

People worried that it would take away their "freedom," says Kirchoff.

Some resented the government imposing the device, he says. But by the 1980s, airbags became a part of American life. Kirchoff feels deeply gratified at how this safety measure has become used in many parts of the world.

In 1981, Kirchoff's own car, a 1981 Mercedes Benz S-class, was the first model in the Mercedes North American line to be equipped with an airbag.

(Written by Roy Hoffman of Mobile Press-Register, From The Birmingham News, December 11, 2011, Reprinted with permission)

National Work Zone Awareness Week And Other Safety Outreach Events

National Work Zone Awareness Week (NWZAW) has been set for April 23-27, 2012. The Missouri Department of Transportation has been asked to host the kick-off event on Monday, April 23. More information on NWZAW is available on the Federal Highway Administration website at:

http://www.ops.fhwa.dot.gov/wz/outreach/wz_awareness.htm

An article on the first decade of NWZAW was featured in the March 2010 issue of *Public Roads* magazine. This article noted the activities held in many states and listed the steps to follow in establishing local events. Several tips for ensuring the success of these events were also listed. It also featured the National Work Zone Memorial sponsored by the American Traffic Safety Services Association. This travelling memorial lists the names of roadway workers, drivers, and public safety personnel who lost their lives in work zones. The *Public Roads* article is available at:

http://www.fhwa.dot.gov/publications/publicroads/10mar/08.cfm

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(Continued from page 2," National Work Zone Awareness Week and Other Safety Outreach Events")

(Prepared by John R McCarthy, PE, Traffic Engineer III, City of Montgomery, AL)

In addition to NWZAW, there are many other weeks and months that are designated for times to pay special attention to the needs for traffic safety. Some of these include:

National Distracted Driving Awareness Month is April.

National Safe Kids Week is the fourth week in April.

National Work Zone Awareness Week is April 23-27

National Bike Month is April.

National Safety Month is June.

National Stop on Red Week is August 5-11

National Child Passenger Safety Week is September 16-22.

National School Bus Safety Week is October 15-29.

A calendar with some of these dates and others is available from Channing-Bete publications at:

http://www.channing-bete.com/events-calendar.html

A similar calendar with additional items is available from the National Safety Council at:

http://www.nsc.org/news_resources/Resources/Pages/NSCSafetyCalendar.aspx

The Stop Sign Wasn't Always Red

In the early automobile age, American streets existed in a Hobbesian, drive-or-be-plastered state of anarchy. "Not only were the streets in those days completely disgusting and filthy, but there were horses and bicycles, and it was just completely chaotic," says Joshua Schank, C.E.O. of the Eno Transportation Foundation, whose namesake and founder, William Phelps Eno, is widely credited with conceiving the stop sign at the turn of the 20th century.

At a time when there were no driver's licenses, speed limits or clear lane demarcations, the notion of a stop sign was revolutionary. In fact, aside from the occasional road markers letting riders on horseback know how far they were from the next city, there was no road or street signage at all. Eno, scion of a wealthy New England family who never learned to drive, helped change all that. In a 1900 article titled "Reforming Our Street Traffic Urgently Needed," for Rider and Driver magazine, he proposed placing stop signs at intersections. It was a civilizing notion."That was a new concept and really did introduce the idea that you had to watch out for other people," Schank says.

THE SIGN ENGINEERS

Eno became a key figure in a traffic-control awakening that would make great strides in the early 20th century. In 1911, a Michigan road got a center line. In 1915, Cleveland received an electric traffic signal. Detroit, the center of the automobile industry, is credited with installing the first proper stop sign that same year. According to Schank, it took the form of a 2-by-2-feet sheet of metal with black lettering on a white background.

We have the Mississippi Valley Association of State Highway Departments to thank for the stop sign's iconic shape. In 1923, the association developed an influential set of recommendations about street-sign shapes whose impact is still felt today. The recommendations were based on a simple, albeit not exactly intuitive, idea: the more sides a sign has, the higher the danger level it invokes. By the engineers' reckoning, the circle, which has an infinite number of sides, screamed danger and was recommended for railroad crossings. The octagon, with its eight sides, was used to denote the second-highest level.

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The diamond shape was for warning signs. And the rectangle and square shapes were used for informational signs. "You have to realize this was done by engineers, and engineers can be overly analytical," says Gene Hawkins, a professor of civil engineering at Texas A&M University and the nation's pre-eminent expert on the history of the stop sign.

BIG RED

It took a bit longer to determine the stop sign's color. It wasn't until 1935 that traffic engineers created the first uniform standards for the nation's road signage, known as the Manual on Uniform Traffic Control Devices. It was 166 pages long and recommended a yellow stop sign with black letters. The 1954 revision, however, called for the stop sign to be red with white letters, in step with the color-coding system developed for the railroad and traffic signals. "Red has always been associated with stop," Hawkins explains. "The problem was they could not produce a reflective material in red that would last. It just was not durable until companies came up with a product in the late '40s, early '50s."

Today the stop sign is so ingrained in collective international driving culture that some experts are, counterintuitively, recommending doing away with it entirely. (Ejby, Denmark; Ipswich, England; and Ostend, Belgium, are already experimenting with a post-stop-sign world.) "The theory is that people will pay more attention to pedestrians and other vehicles and slow down in pedestrian areas if there are no signs, because they won't know what to do," Schank says. "That wouldn't be possible if [Eno] hadn't first introduced the stop sign."

(Written by Hilary Greenbaum and Dana Rubinstein for the New York Times, December 9, 2011)

Myth: Traffic Signals Reduce Crashes

Residents often see traffic signals, commonly referred to as stop lights, as the safest way to move traffic through an intersection — and they can be. Signals provide a sense of security to drivers and pedestrians by assigning right-of-way to particular movements. They can interrupt traffic on high volume busy streets to let motorists in and out of cross-streets and businesses, and can also allow more traffic to pass through an intersection than if the same intersection was controlled by stop-signs. However, they are not the best choice for every intersection.

First, traffic signals are expensive to install and maintain. The total cost to install a traffic signal can be upwards of $100,000, and the annual electric bill per intersection averages $1,500. These numbers do not include the associated maintenance such as replacing bulbs and repairing pavement sensors damaged during the winter months.

Secondly, many believe that a traffic signal is safer and will reduce or eliminate crashes as the movements are controlled. In fact, traffic signals tend to increase the number of crashes at an intersection. A signal can reduce the likelihood of angle (or "T-Bone") crashes, but the number of rear-end crashes typically increases as drivers abruptly brake at the last minute. However, rear-end crashes are typically not as severe as angle crashes and are a reasonable safety trade-off.

Since there is a potential for intersection crashes to increase after the installation of traffic signals, it is important that the benefits outweigh the costs. The *Manual on Uniform Traffic Control Devices* (MUTCD), which presents traffic control device standards and guidelines, lists nine "warrants" that serve as the criteria for installing traffic signals. These "warrants" include the amount of traffic entering the intersection, the number of pedestrians trying to cross the road at the intersection, the presence of a nearby school with school children walking through the intersection, and trains crossing the road nearby. The MUTCD states that at least one of the nine warrants must be met before a traffic signal should be considered, but not that one must be installed if the criteria are met. The MUTCD has been adopted as state law, thus if a signal is installed without meeting the criteria, the road agency's liability risk can increase.

Similarly, just because a traffic signal is currently installed at an intersection, doesn't mean it needs to be there forever. Traffic patterns change, and businesses come and go. Traffic signals should be evaluated periodically to see if they are still needed. In some cases, removing an existing traffic signal can improve safety and traffic operations.

(From "County Roads & City Streets", West Virginia LTAP, Winter 2011)

Sandpit Accident

A Lincoln, Nebraska construction company faces $19,000 in fines from the Occupational Safety Health Administration after a Norfolk man drowned in one of the company's huge Caterpillars at a Kearney sandpit.

Bill Aschoff, 75, of Norfolk died Sept. 30 after the D9 Caterpillar he was operating went into a sandpit at the site of the new Cherry Avenue bypass southeast of Kearney near the city wastewater treatment plant. Aschoff was employed by Commercial Construction of Lincoln at the time.

Commercial Construction of Lincoln has been cited for failing to initiate and maintain programs for frequent and regular job site inspections; it didn't provide lifejackets or work vests while employees were working over or around water; it didn't have ring buoys with at least 90 feet of line when employees were working around water; and it didn't have a life-saving skiff available at the scene.

The proposed penalty for the violations is $19,600, said Bonita Winingham, the OSHA area director in Omaha. Commercial Construction has 15 working days after receiving the citations to either have an informal conference with OSHA officials, accept the penalty or pay the fine. It can contest the citation.

Aschoff's family believes the ground beneath the D9 gave way, which caused the machine to sink into the sandpit with Aschoff inside.

Emergency crews were called to the scene. Four hours later, divers from the Kearney Volunteer Fire Department recovered Aschoff's body.

("From Construction Pros", Cygnus Business Media, January 6, 2012)

Occupational Fatalities in 2011

From agriculture to mining to health care, the occupational fatalities that made the 2011 top ten list compiled by the National Council for Occupational Safety and Health (COSH) spanned many industries and highlighted notable gaps in regulatory attempts to address workplace hazards.

1)The list was topped by a massive grain elevator explosion in Kansas that killed six workers and was felt up to three miles away. The incident at the Bartlett Grain Co. in Atchison, Kansas on October 29 killed Chad Roberts, Ryan Federinko and Curtis Field, all of Atchison; John Burke of Denton, Kansas; Travis Keil of Topeka, Kansas, and Darrek Klahr of Wetmore, Kansas. They ranged in ages from 20 to 43.

"According to OSHA records, there have been more than 600 explosions at grain elevators, killing more than 250 people and injuring more than 1,000, in the past four decades," said COSH. "Last year, there were grain explosions or fires in several states including in Nebraska, Illinois, Ohio, South Dakota and Louisiana. Despite the obvious need, OSHA still has not issued a combustible dust standard."

2) The number #2 spot was filled by a series of dust fires rather than a single event, because they all occurred at the Hoeganaes facility in Tennessee.

"Although the workers employed by the Hoeganaes Corp., a manufacturer of metal powders, were not killed in a single incident, the sheer magnitude of the loss of life and the cavalier disregard for the health and welfare of their employees warrants the company's inclusion in this year's list," said COSH. "Since January, five employees have died and three others have been seriously injured in three separate accidents at the company's Gallatin location: a Jan. 31 flash fire killed Wiley Sherburne and Vernon Corley, a second flash fire on March 29 injured one, and a hydrogen gas explosion on May 27 killed Fred Tuttle, Rick Lester and Eric Hulsey and injured two others."

The U.S. Chemical Safety Board investigated and attributed the incidents to uncontrolled dust hazards and an absence of safety measures. The Board found that Hoeganaes ignored a series of smaller fires and failed to provide its workers adequate training to understand the hazards associated with the materials they handled every day. Hoeganeas was fined $129,000 -- about $24,800 per death -- by the Tennessee OSH agency.

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(Continued from page 5, "Occupational Fatalities in 2011")

3) Agriculture came into play again in the third position, for an incident in which two teenage girls died on July 25 while detasseling corn for Monsanto Corp. in northwestern Illinois. The 14 year-old girls –Hannah Kendall and Jade Garza -- were killed when they mistakenly wandered near a field irrigation system and were electrocuted. Eight other workers were injured in the incident.

Detasseling involves walking up and down rows of corn and removing the tassels, in order to encourage cross-pollination.

"In the days after the girls' deaths, Monsanto asked its growers to turn off the electrically powered irrigation systems before letting detasselers into the fields," said COSH. "According to OSHA data, electrocution kills as many as 62 farm workers each year, and more than 2 million workers under the age of 20 are exposed to farm-related hazards annually. Children working on farms die at a rate that is six times higher when compared to youngsters working in other sectors. Nationally, the Obama administration has proposed strengthening child labor laws to protect teenage farm workers, but agriculture interests continue to oppose these changes. Current federal labor standards allow children as young as twelve to work on farms."

4) A confined space accident involving a company with a long history of safety violations killed two employees in Durham, North Carolina on June 8. Jesus Martinez Benitez, 32, and Luis Castaneda Gomez, 34 died after they entered a manhole in Durham, North Carolina, without proper safety equipment. "According to investigators, one of the men was killed trying to rescue the other after seeing that his colleague had been overcome by a lack of oxygen. According to media accounts, the Bethesda Volunteer Fire Department and the Durham County Hazmat Team tested the area before sending someone down into the manhole to extract the bodies and found that oxygen levels were too low to sustain life.

"The men were working for the Triangle Paving and Grading Co. on a project that had been awarded to the company through the city of Durham's competitive bid process. An investigation by Raleigh, North Carolina, television station WNCN NBC-17 revealed the company had more than 60 construction-related safety violations and more than $200,000 in fines, including a previous worker fatality. As a result, the city of Durham, North Carolina, is considering changes to its public-bid process."

5) A trio of workers killed in an oil rig explosion in Wyoming on August 9, was part of a nearly 79 percent increase in occupational fatalities in that state from 2010 to 2011. The three died when the fuel line they were laying at an oil rig that was to be put back into production exploded. Of the 34 occupational fatalities in Wyoming last year, 10 were in natural resources and mining, according to the Wyoming Department of Workforce Services. A bill that would have increased employer penalties for workplace safety violations in the state died early last year in the Wyoming legislature.

6) The worst on-the-job accident in Las Vegas history claimed the lives of two city workers on May 18. Frank Romero, 49, and Gene Hern, 32, died when the walls of a nine-foot-deep trench they were working in collapsed on them. The men worked for the city's utilities department laying sewer and water lines.

"An investigation by the Nevada Occupational Safety and Health Bureau later determined that the accident was completely preventable and noted that there were no support mechanisms in place to prevent the trench's collapse and that the trench had not been inspected before the two were sent into it. The Nevada bureau has issued fines totaling nearly $81,000 in connection with the incident."

7) In the seventh position on the list, Jorge "Louie" Medina, 56, died after sustaining third-degree burns over 90 percent of his body and Steven Nichols, 59, was also killed in a blast at a chemical plant in Louisville, Kentucky that had not been inspected for four years. The March 21 explosion at a Carbide Industries plant caused a blaze that fire crews had to allow to burn out over four days, because the highly flammable calcium carbide produced by the plant reacts violently when it comes into contact with water.

8) The dangers of workplace violence are evident in the incident cited by COSH for the eighth spot; the death of a 25-year-old group home worker at the hands of a resident with a long history of both violence and mental illness. Stephanie Moulton was alone in the building when she was stabbed to death on January 20 in Revere, MA by Deshawn Chappell, who fled in her car after killing her.

"OSHA determined that the North Suffolk Mental Health Association, which operated the facility where Moulton worked, exposed employees to the "hazard of physical assault" while providing services to clients and failed to develop and implement adequate measures to protect employees against such assaults and fined the mental health agency $7,000. Moulton's death precipitated a statewide debate on whether or not years of budget cuts have eroded the Massachusetts mental health system to the point where workers' lives are threatened."

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(Continuation from page 6; “Occupational Fatalities in 2011”)

Workplace violence is among the top four causes of death in workplaces during the past 15 years. "According to the Bureau of Labor Statistics, more than 3,000 people died from workplace homicide between 2006 and 2010, and an average of more than 15,000 nonfatal workplace injury cases was reported annually during this time. OSHA issued a directive targeting workplace violence in September, but the problem persists."

9) An incident in which a 23-year-old was killed while laying a natural gas line in Bangor, Maine underlines the small size of the fines that OSHA has to work with. Danny Dodge of Jackson, Maine was killed on July 28 when a backhoe rolled over and crushed him. OSHA concluded that the backhoe overturned when it was operated on a slope ranging from 32- to 40-degree grade and determined that the violations committed by Dodge's employer, Bowdoin Excavations LLC, were serious but not "wilful," earning Bowdoin $13,600 in proposed fines.

"The fines assessed by OSHA in connection with Dodge’s death, as low as they were, were higher than those assessed in a typical workplace fatality. Under existing OSHA regulations, the maximum fine for a serious workplace safety violation is only $7,000, a figure that has not been updated since 1991. The average OSHA fine issued in connection with a workplace fatality is only $5,900, according to recent Congressional testimony by OSHA chief executive Dr. David Michaels."

10) Coal mining continues to be one of the most dangerous industries in the country, and the worker deaths don't always occur in mines deep underground. Darrel Winstead and Samuel Lindsey, who worked for Armstrong Coal in Kentucky, were killed on October 29 when they were buried by falling rocks after a highwall collapsed on top of the truck they were in.

According to media accounts, Armstrong Coal had been cited in April by the federal Mine Safety and Health Administration (MSHA) for failing to stabilize a highwall. The incident is still under investigation.

(From “For Construction Pros”, Cygnus Business Media, January 6, 2012)

How Pedestrians Behave

IMAGINE that you are French. You are walking along a busy pavement in Paris and another pedestrian is approaching from the opposite direction. A collision will occur unless you each move out of the other’s way. Which way do you step?

The answer is almost certainly to the right. Replay the same scene in many parts of Asia, however, and you would probably move to the left. It is not obvious why. There is no instruction to head in a specific direction (South Korea, where there is a campaign to get people to walk on the right, is an exception). There is no simple correlation with the side of the road on which people drive: Londoners funnel to the right on pavements, for example.

Instead, says Mehdi Moussaid of the Max Planck Institute in Berlin, this is a behavior brought about by probabilities. If two opposing people guess each other’s intentions correctly, each moving to one side and allowing the other past, then they are likely to choose to move the same way the next time they need to avoid a collision. The probability of a successful maneuver increases as more and more people adopt a bias in one direction, until the tendency sticks. Whether it’s right or left does not matter; what does is that it is the unspoken will of the majority.

That is at odds with most people’s idea of being a pedestrian. More than any other way of getting around—such as being crushed into a train or stuck in a traffic jam—walking appears to offer freedom of choice. Reality is more complicated. Whether stepping aside to avoid a collision, following the person in front through a crowd or navigating busy streets, pedestrians are autonomous yet constrained by others. They are both highly mobile and very predictable. “These are particles with a will,” says Dirk Helbing of ETH Zurich, a technology-focused university.

Messrs, Helbing, and Moussaid are at the cutting edge of a youngish field: understanding and modeling how pedestrians behave. Its purpose is not mere curiosity. Understanding pedestrian flows makes crowd events safer: knowing about the propensity of different nationalities to step in different directions could, for instance, matter to organizers of an event such as a football World Cup, where fans from various countries mingle. The odds of collisions go up if they do not share a reflex to move to one side. In a packed crowd, that could slow down lots of people.

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Continuation from page 7; "How Pedestrians Behave")

In 1995 Mr. Helbing and Peter Molnar, both physicists, came up with a "social force" computer model that used insights from the way that particles in fluids and gases behave to describe pedestrian movement. The model assumed that people are attracted by some things, such as the destination they are heading for, and repelled by others, such as another pedestrian in their path. It proved its worth by predicting several self-organizing effects among crowds that are visible in real life.

One is the propensity of dense crowds spontaneously to break into lanes that allow people to move more efficiently in opposing directions. Individuals do not have to negotiate their way through a series of encounters with oncoming people; they can just follow the person in front. That works better than trying to overtake. Research by Mr. Moussaid suggests that the effect of one person trying to walk faster than the people around them in a dense crowd is to force an opposing lane of pedestrians to split in two, which has the effect of breaking up the lane next door, and so on. Everyone moves slower as a result.

Up close and personal

Another self-organizing behavior comes when opposing flows of people meet at a single intersection: think of parents trying to shepherd their children into school as other parents, their sprogs already dropped off, try to leave. As people stream through in one direction, the pressure on their side of the intersection drops. That gives those waiting on the other side more opportunity to go through, until pressure on their side is relieved. The result is a series of alternating bursts of traffic through the gates.

This oscillation in flows is clever enough to have got Mr. Helbing wondering about its application to cars. Traffic-light systems currently operate on fixed cycles, with lights staying green on the basis of past traffic patterns. If those patterns are not repeated, drivers are left to idle their engines for too long at red signals, raising emissions and tempers. Mr Helbing thinks it is better to have decentralized, local systems, which—like parents at the school gates—can respond to a build-up of traffic and keep the lights on green for longer if need be. City authorities agree: Mr. Helbing's ideas will soon be implemented in Dresden and Zurich.

Trying to capture every element of pedestrian movement in an equation is horribly complex, however. One problem is allowing for cultural biases, such as whether people step to the left or the right, or their willingness to get close to fellow pedestrians. An experiment in 2009 tested the walking speeds of Germans and Indians by getting volunteers in each country to walk in single file around an elliptical, makeshift corridor of ropes and chairs. At low densities the speeds of each nationality are similar; but once the numbers increase, Indians walk faster than Germans. This won't be news to anyone familiar with Munich and Mumbai, but Indians are just less bothered about bumping into other people.

Another problem with assuming people act like particles is that up to 70% of people in a crowd are actually in groups. That matters, as anyone trying to get past shuffling tourists knows. It also leads to some lovely fine-scale choreography when small groups are squeezed. Observations of pavement crowds in Toulouse in France show that clusters of three and four people naturally organize themselves into concave "V" and "U" shapes, with middle members falling back slightly. If a group of three people cared about moving quickly, they would behave like geese and form a convex "V", with the middle member slightly in front to forge a path. Instead, they adopt a formation that enables them to keep communicating with each other; talking trumps walking.

Mr Moussaid's solution to such complexity has been to build a model based less on the analogy between humans and particles and more on cognitive science. Agents in this new model are allowed to "see" what's in front of them; they then try to carve a free path through the masses to get to their destination. This approach produces the same effects of lane-formation in crowds as the physics-based models, but with some added advantages.

In particular, boffins think it could help make emergency evacuations safer. Simulating evacuations is a big part of what pedestrian modellers do—the King's Cross underground fire in London in 1987 gave the field one of its starting shoves. One big danger in an emergency is that people will follow the crowd and all herd towards a single exit. That in turn means that the crowd may jam as too many people try to force their way through a single doorway.

The physics-based models do have an answer to this problem of "arching" (so called for the shape of the crowd that builds up around the exit). Their simulations suggest the flow of pedestrians through a narrow doorway can be smoothed by plonking an obstacle such as a pillar just in front of the exit. In theory, that should have the effect of splitting people into more efficient lanes. In practice, however, the idea of putting a barrier in front of an emergency exit is too counter-intuitive for planners to have tried.

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(Continued from page 8, "How Pedestrians Behave")
The cognitive-science model offers a more palatable option, that of experimenting with the effects of changes in people's visual fields. Mr. Moussaid speculates that adaptable lighting systems, which use darkness to repel people and light to attract them, could be used to direct them in emergencies, for example.

Where the cognitive approach falls down is in the most packed environments. "At low densities, behavior is cognitive and strategic," says Mr. Moussaid. "At high density, it's about mass movement and physical pressures." At a certain point crowds can shift from a controlled flow to a stop-and-go pattern, as people are forced to shorten their stride length and occasionally halt to avoid collisions. This kind of movement can develop into something much more frightening, known as crowd turbulence, when people can no longer keep a space between themselves and others. The physical forces that are imparted from one body to another when that happens are both chaotic and powerful: if someone falls over, others will be unable to avoid them.

Science meets religion

Working out precisely how and when these transitions happen is tough. Bringing a real-life situation under control once a stop-and-go pattern has started is equally hard. So the trick is to ensure that serious crowding is avoided in the first place. From big events such as the London Olympics to the design of new railway stations, engineering firms now routinely simulate the movement of people to try to spot areas where crowding is likely to occur.

A typical project involves using off-the-shelf software programs to identify potential bottlenecks in a particular environment, such as a stadium or a Tube station. These models specify the entry and exit points at a location and then use "routing algorithms" that send people to their destinations. Even a one-off event like the Olympics has plenty of data on pedestrian movement to draw on, from past games to other set-piece gatherings such as, say, city-centre carnivals, which enable some basic assumptions about how people will flow.

Once potential points of congestion are identified, more sophisticated models can then be used to go down to a finer level of detail. This second stage allows planners to change architectural designs for new locations and identify when to intervene in existing ones. "There should be many fewer crowd disasters given what we now know and can simulate," says Mr. Helbing.

The biggest test possible of these tools and techniques is the *haj*, the annual pilgrimage to Mecca in Saudi Arabia that Muslims are expected to carry out at least once in their lives if they can. With as many as 3m pilgrims making the journey each year, the *haj* has a long history of crowd stampedes and deaths. Indeed, video footage of a *haj* stampede is used by lots of modelers to validate their simulations of crowd turbulence.

The Saudi authorities have brought in consultants in recent years, focusing in particular on the layout of the Jamarat Bridge, where pilgrims perform a ritual in which they throw stones at three pillars. By making the crossing one-way, and changing the shape of the pillars so that people can stone them from a number of locations, they have improved the bridge's safety.

But according to Paul Townsend of Crowd Dynamics, a consultancy that has worked on the pilgrimage, the risks remain significant. He thinks that the use of gates that could be opened and shut would help to manage the flow. Yet the *haj* presents some very specific difficulties beyond its sheer scale. Part of the problem is not having a clear idea of how many pilgrims will turn up, which makes planning difficult. Another issue is the nature of the crowd.

"Pilgrims on the *haj* have the attitude that, if I die there it is God's will," says Mr. Townsend. "There is a willingness to get more and more dense in the space." Scientists can model many aspects of pedestrian behavior, but religious fervour is a step too far.
(From The Economist, " The Wisdom of Crowds", December 17, 2011)

PASS Training for Rural Transit Providers in Alabama

In 2011 the Alabama Rural Transit Assistance Program (RTAP) embarked on one of its largest training initiatives. The training program is called Passenger Service and Safety Certification or (PASS) Training. This is a two day program that trains rural transit drivers how to provide proficient passenger assistance, disability awareness, and emergency evacuation. PASS Training also provides hands-on experiences to guide a non-sighted or disabled individual how to secure a wheel chair in a transit bus or van.

The PASS training exposed over 700 of Alabama's rural transit drivers to the dos and don'ts of rural transit. Drivers from all over the state came to the five training cities over the course of four months. The training cities were Mobile, Montgomery, Huntsville, Pelham, and Auburn.

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This PASS Training was created by The Community Transportation Association of America (CTAA) to ensure that community transportation drivers have current expertise in passenger assistance techniques and sensitivity skills appropriate for serving persons with disabilities. Some of the advantages of offering the PASS certification program are: the ability to reduce organizational liability; comprehensive, up-to-date training on the assistance drivers should be providing to passengers with special needs; intensive emergency situation training; certification oversight provided by national leaders in the community transportation field; and updates for all participants on relevant regulatory changes.

Ed Rohrbach and Richard Grubbs with Training and Associates, LLC administered the training and testing for this program. Ed and Richard have both gone through the PASS Training and obtained the trainer certification from CTAA to provide this training. They enjoy the work they are doing to improve rural transit.

Judging by the evaluations that have come in so far, this training has been received very well by the drivers and their agencies, and has proved itself as a well needed resource for the rural transit drivers across Alabama.

(Written by Garry Havron of the Alabama Technology Transfer Center at Auburn University; February 10, 2012)

Video Library

A complete listing of the videos in our library is now available. More than 350 video and DVDs with capsule descriptions are described. New additions are presented herein.

Videos are available from the Alabama Technology Transfer Center on a loan basis. The loan period is seven days. To request a video or catalog, call Alice Fraasa in the AU Civil Engineering Department at (334) 844-4320 or email her at fraasak@auburn.edu

DVD-24 Drowsy Driving: It's Your Wake Up Call (20 minutes) This Wumbus corporation video presents factors to explain why drivers fall asleep behind the wheel: lack of sleep, night driving, stress, and food/liquid consumption. The signs of drowsy driving are covered. (Only one copy of this copyrighted video is available, therefore a waiting list will be prepared.)

DVD-25 Distracted Driving: Real Accidents, Real Stories II (15 minutes) This Wumbus Corporation video identifies the hazards of truck driving. Three fatal accidents attributed to distracted driving are described. (Only one copy of this copyrighted video is available, therefore a waiting list will be prepared.)

DVD-26 Backhoe Safety: Inspection and Walk Around (15 minutes) This Wumbus Corporation video instructs one to perform a thorough and accurate pre-shift inspection of a John Deere backhoe. A four quadrant system is used for a detailed inspection. (Only one copy of this copyrighted video is available, therefore a waiting list will be prepared.)

DVD-27 Slips, Trips and Falls: Stranger Than Friction (25 minutes) This Wumbus Corporation video points out the hazards that can cause slips, trips and falls at home and in the workplace. Shoe safety standards are covered. (Only one copy of this copyrighted video is available, therefore a waiting list will be prepared.)

DVD-28 Personal Protective Equipment: Awareness and Attitude (9 minutes) This Wumbus Corporation video emphasizes the need to use protective equipment on the job for safety reasons. (Only one copy of this copyrighted video is available, therefore a waiting list will be prepared.)