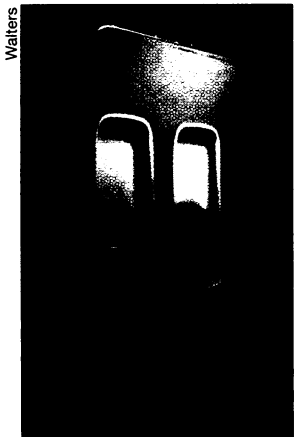


The windows and window shades on an airplane are made from molded plastic. Because they are small, they do not have to meet the same flammability standards that larger panels, ceilings, and partitions do.



want to have the polymer magically convert itself into something which is fire resistant," he explains.

Wilkie and his colleagues start with highly flammable polystyrene, best known as the Styrofoam of disposable coffee cups. Polystyrene is one of the most widely used plastics, forming the molded parts on many consumer goods. The researchers modify the plastic by adding a second polymer, called para-vinylbenzyl alcohol, and a catalyst. A new polystyrene forms with a network of bonds, or crosslinks, between polymer molecules.

To preserve the mechanical properties of the polystyrene, the chemists add only low concentrations of the second polymer. Wilkie and his team have found that use of a specific catalyst, phosphate ester, reduces the peak heat-release rate of

the plastic to less than 40 percent of that of pure polystyrene.

"It doesn't burn as hot, and it takes about three times longer to reach that hotness," Wilkie says.

Unlike pure polystyrene, the new material forms a char, which provides additional protection from burning. Wilkie suspects that charring is related to crosslinking of the polymer. "We're trying to clarify it, but it's not easy," he says.

Wilkie and his colleagues have also modified another plastic to increase its fire resistance. ABS, or acrylonitrile-butadiene-styrene, is used to make computer cases and automobile body parts. The researchers have added a surface coating of sodium methacrylate, which in a blaze decomposes into a sodium carbonate char. Once charred, the material's rate of heat release drops dramatically, and the time it takes for the modified ABS to reach its peak heat-release rate increases from 9 to almost 19 minutes.

"You have twice as long to get away from a fire, [and that fire] is between a

third and a fourth as intense," Wilkie notes.

These materials, though promising, are still a long way from commercialization, Wilkie cautions. For example, his group has looked only at ABS samples as large as a fingernail. "Maybe we will come up with something that is practical. We like to think that it's possible."

Fire-resistant materials will have to be very practical in order to supplant the inexpensive but flammable ones used today. Even in an area as important as airplane safety, the cost of a material plays a major part in whether manufacturers will adopt it.

"The problem with all this stuff is that fire behavior doesn't pull new products into the market," says Lyon. "They have to be fireproof but sell themselves in another way."

In the future, the FAA might upgrade its regulations to encourage the use of new fireproof materials, Lyon adds, but "it can't upgrade the regulations until the materials exist." Only then might passengers expect to sit on seat cushions that can not only serve as flotation devices in an emergency but can also squelch a flame. □

Behavior

Follow the rules, baby

Viewers of the movie *Look Who's Talking* hear the thoughts of a wisecracking baby who aims fully grammatical barbs at everything from loaded diapers to dimwitted adults. If real-life infants do the same, they're not telling. They have, however, given scientists a peek at how infants begin to make sense of all the gabbing that goes on around them.

Seven-month-old babies discern and remember simple rules for arranging speech sounds, an ability that may foster language acquisition, according to a report in the Jan. 1 *SCIENCE*.

In experiments directed by psychologist Gary F. Marcus of New York University, 7-month-olds developed an awareness of predictable patterns in three-syllable nonsense sequences that they heard.

Infants first listened to examples of a sequence in which two different syllables precede a repeat of the initial one. These included "ga ti ga" and "ni la ni." They then heard more versions of that sequence, such as "wo fe wo," and new sequences in which the second sound is repeated, such as "wo fe fe."

Babies looked much longer in the direction from which the sounds of a novel sequence came, reflecting surprise and curiosity about unexpected sound patterns. This reaction indicates that the tots had learned the rule that the first and third sounds are the same, the researchers contend.

Further trials showed that infants did not simply like the sound pattern of some sequences more than others or focus on particular syllables that occurred together more often in one sequence than another. Youngsters also distinguished between patterns such as "de ko ko" and "ji ji we," indicating that their insights were not based on whether sequences did or did not contain an adjacent pair of repeated sounds.

Other investigators have found that 8-month-olds detect the statistical tendency of certain spoken syllables to occur together (SN: 5/3/97, p. 276). They suspect that the ability to notice and

generalize statistical regularities in speech ushers kids into the realm of rule-based grammar. Research on connectionist computer systems, which use simple arrays of processing units to learn past tenses of verbs and other linguistic conventions, has bolstered the notion that rule use emerges from statistical learning.

Marcus' findings lend support to the contrasting view that prewired brain circuits regulate grammar learning. A connectionist computer system devised by Marcus failed to recognize syllable sequences as the babies had done.

Yet using a different connectionist system, psychologist Jeffrey L. Elman of the University of California, San Diego says he has successfully simulated Marcus' infant findings. Grammar skills may indeed grow out of babies' recognition of statistical patterns in the talk that they hear, Elman proposes. —B.B.

Youth violence defies predictions

New crime statistics for 1997 underscore an ongoing drop in youth violence rates, which had surged during the 1980s. Close inspection of the data shows that recent predictions of an explosion of youth violence as the juvenile population expands were "demonstrably silly," argues criminologist Franklin E. Zimring of the University of California, Berkeley.

Zimring analyzes U.S. crime data from 1980 to 1997 in *American Youth Violence* (1998, Oxford University Press). Arrest rates for teenage rape, robbery, and homicide in 1997 were the same as or slightly lower than in 1980, Zimring says. Both adult and teenage rates of aggravated assault rose sharply during that period, primarily because police became more apt to make arrests in cases of domestic violence, he holds.

Juvenile violence often rises and falls in several-year cycles that do not coincide with the juvenile population size, Zimring maintains. "Over the long run," he adds, "we don't know what will happen to youth violence rates." —B.B.