aggressive behavior, depersonalization, depression and paranoid behavior have been reported, especially when marijuana is combined with other drugs."

The Medical Letter continued, "Indolence and neglect of personal hygiene may follow prolonged heavy use and intellectual functioning and memory may be impaired."

But just last month, the American Medical Association came out with this statement: There is no evidence that marijuana causes lasting physical and mental changes. Casual, episodic use is probably not medically dangerous, said the AMA, but continuous use may be associated with the development of psychiatric illness (SN: 8/19).

The word "associated" is the crux of the problem. In fact, no one knows whether chronic marijuana smoking causes emotional troubles or is a symptom of them. Most, if not all the reports, on either side of the issue, are fragmentary and based on anecdotes rather than controlled studies.

This dearth of evidence has a number of explanations: serious lingering reactions, if they exist, occur after prolonged use, rarely after a single dose; marijuana has no known medical use, unlike LSD, so scientists have had little reason to study the drug. But also, marijuana has been under strict legal sanctions in this country for more than 30 years. Smoking it has long been under ground and adverse reactions almost never surface in hospitals where they might shed light in this complex medical-legal problem. ◈

INDUSTRIAL TECHNOLOGY

Giant corporations resist change

"Conventional wisdom" is the term popularized by economist John Kenneth Galbraith to denote the things everybody knows, but which aren't necessarily so. Dr. Galbraith and other students of the modern industrial scene have preached that technical change in industry requires large corporations able to shoulder the heavy expense of research and to bet their capital on high-risk ventures.

Last week his phrase was turned against him by a string of witnesses before a Senate anti-trust subcommittee, who maintained that his contentions about bigness and technological change had themselves become conventional wisdom.

Giant corporations are ponderous and slow to accept innovation, the subcommittee was told, because of their heavy stake in existing technology. Worse, they lock up scientific talent that might help solve pressing public problems, and refuse to use fresh ideas when they are generated, even when the ideas are in their own fields.

Individuals and small companies are the source of a large share of the technological innovations of the past 30 years, said Dr. Donald A. Schon, president of the Boston-based Organization for Social and Technical Innovation.

And most of these innovators worked for a time in research laboratories in large corporations or universities, then left because their employers lacked interest in new ideas, a survey he conducted indicates.

A prime example of an industry alledgedly efficient because of its immense size is automaking. Yet, a parade of witnesses pointed out that while new powerplants for cars are developed with fair regularity, they never manage to appear on the production lines, which still install motors basically the same as Henry Ford's.

Yura A. Dantov is an engineer who worked in the development of the rotary internal combustion or Wankel engine, now being introduced by the small German auto builder, NSU. Despite the fact that the Wankel engine can be produced more cheaply, even in smaller numbers, with lower maintenance costs, he told the subcommittee, the big auto companies have refused to pick up the idea.

"Economic concentration," he said, "has a strong vested interest in existing technology."

Prof. Lloyd D. Orr of Indiana University, on the subject of electric cars, uses even stronger words.

Detroit, says Dr. Orr, looks on the electric car as a threat to the concentration of the industry, because it lasts a long time, can be produced efficiently in small numbers, and doesn't need the widespread dealer-maintenance network that only giant industries can finance.

So the industry may go out of its way to bring pressure against the development of the electric car as a replacement for the gasoline engine, he says. The car builders appear to see the electric as unmarketable because it can't create the necessary images of "aggressive independence, power and sex" which Detroit uses to sell cars, he contends.

The automobile turbine engine is another example of technological advance which hasn't left the laboratory. Chrysler Corp.'s Director of Research, George J. Huebner, describing his company's efforts to build a practical turbine auto, made it clear that the project had cost Chrysler a lot of development money.

But he also made it clear that turbine cars, with their low pollution qualities and other advantages, would have been produced before now except for the inviolable requirement that they not cost the company more to make than ordinary cars; the change over and retooling expenses would be prohibitive.

The steel industry is another field in which large size is a must for efficient production. But again, large size hasn't led to effective use of new technology, according to W. L. Sherwood, president of the Sherwood Co., of Vancouver, Canada.

Steel companies lost billions of dollars by not converting sooner to a new technique of refining, called the basic oxygen process, he said. The technique, developed in the 1930s but only gradually adopted 20 years later, consists of blowing oxygen down into the bath of molten iron to purify it, instead of bubbling the gas up through the metal as in the old open hearth technique.

Sherwood has developed a still newer process which he says could break the big-business hold on the industry and save billions of dollars as well.

He told the subcommittee, which is investigating the effects of new technologies on the concentration of industry and research, that his process for continuous steelmaking is most efficient in plants that put out 100,000 tons of steel a year—a tenth the size most steelmakers consider a minimum. It would permit smaller operators to enter big-steelmaking competitively, he says.

The Sherwood process combines two steps in steelmaking into a single operation. Conventionally, iron ore is melted, then cast into pig iron, which has many impurities. The pig iron is then re-melted, purified at high temperatures and strengthened with additives.

In the new continuous process, the ore is placed in a rotating furnace that gets hotter as the material moves along, finally reaching a refining zone of about 2,800 degrees F. where the finished steel is produced.

Because only one furnace is required, installation costs are cut, says Sherwood. The single furnace also saves reheating costs and reduces the amount of iron dust that escapes.

The huge investment required for conventional steel plants—$265 million for a million-ton-per-year capacity, according to Sherwood—has kept smaller firms from competing in the industry. Half the U.S. steel production comes from three giant companies, and five more account for another 25 percent.

Sherwood told the subcommittee he could build a 150,000-ton pilot plant for his process for $6 million and he has talked with steel producers about getting the money—without success. ◈