

investigators consider herpes simplex to be a slow virus because people can harbor it for years in a dormant condition. Occasionally herpes simplex will flare up and produce the familiar cold sores. Recently, Albert Sabin, currently a Fogarty Fellow at the National Institutes of Health, Bethesda, Maryland, and Giulio Tarro of the University of Naples, Italy, proposed that herpes viruses are implicated in the etiology of several human cancers (*Science*, 11 May 1973, p. 572).

A conventional virus has also been isolated from the brains of patients

suffering from SSPE. The virus isolated by John Sever and his colleagues at the National Institute of Neurological Diseases and Stroke, Bethesda, Maryland, was measles virus. Special culture conditions were required for the isolation of the SSPE virus, which appeared to exist in a suppressed state in the brain cells. Not until the cells were cultivated together with another type of human cells was the infectious virus released.

The suppression of the measles virus, rather than its total elimination from the host, probably requires a deficiency in the immune system of the SSPE

victim. Sever, with J. T. Jabbour, of the University of Tennessee Medical units, Memphis, has studied the epidemiology of SSPE. They found that more than 50 percent of SSPE patients had had measles before the age of 2 years and that the average time from the measles infection to the development of SSPE symptoms was 6 years. (SSPE should not be confused with postinfectious encephalomyelitis, another neurological complication of measles that begins within a few days of the primary infection.) The high incidence of early measles infection in

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Speaking of Science

Artificial Intelligence: A Fascination with Robots

In early 1972 Sir James Lighthill of Cambridge University undertook to survey the field of artificial intelligence (AI) for the Science Research Council of Britain. His report was sufficiently controversial that the Council held up its release for over a year until last month, when a somewhat sanitized version was published (along with comments from several other scientists) in an AI newsletter edited at the University of Edinburgh. Ironically enough, funding for AI research at Edinburgh, heretofore the largest center in Britain, was also cut back last month—in part due to the criticisms leveled by the Lighthill report against AI research in general and against the Edinburgh project in particular.

The report questions whether artificial intelligence is a coherent field of research or whether it is really two diverging kinds of investigations linked in a makeshift way by a fascination with robots. The report is cautiously optimistic about the future of research on particular aspects of AI (automation and computer studies of neurobiological functions), but downgrades work on robots as having, at best, discouraging prospects.

Researchers in artificial intelligence, for their part, have been quick to criticize the report as betraying a lack of understanding as to what the field is all about. They dispute not only the report's assessment of prospects in AI but also the division of what they see as a coherent field into artificial and misleading categories.

The ABC's of artificial intelligence, as Lighthill styled them, amount to

► Advanced automation, including pattern recognition, speech recognition, and automation of industrial processes; the emphasis, according to Lighthill, is on practical problems and on efforts oriented toward new hardware.

► Building robots, including coordination of eye and hand functions, use of natural languages for communicating with computers, automated analysis of visual scenes or environments, and problem solving techniques; Lighthill describes this category of research as forming an imperfect bridge between the practical area of advanced

automation and the more basic research of category C.

► Computer-based research on the central nervous system, including associative recall, functioning of the cerebellum, psycholinguistic studies, and other theoretical (modeling) investigations related to neurobiology and psychology.

It is particularly the work on robots that Lighthill sees as having little future in itself and as being of marginal value to other areas of AI. He goes even further, suggesting that those who work on robots may be fulfilling "pseudomaternal" urges or catering to popular interest. Researchers on AI are understandably irked at these slurs on their motivations and, more substantively, do not see the rationale for Lighthill's ABC's. They believe that his description is limited and arbitrary, that it includes some subjects such as neurobiology which have little to do with AI, and that it excludes others central to the field. As one U.S. scientist put it, neither artificial intelligence nor neurophysiology is advanced enough to have anything to contribute to the other discipline.

Lighthill is a well-known scientist respected for his work in applied mathematics and hydrodynamics, and his criticisms, as one observer described them, "do not have the religious character" of earlier attacks on AI. But he is admittedly an outsider to AI research, and he qualifies his report as a "highly personal view." It is thus not impossible that his report, based on a 2-month survey, does misconstrue the field and that his view of its prospects is, as AI researchers claim, seriously misguided.

Lighthill's main criticism boils down to the claim that work on robots is not an intellectually important endeavor. Those working on artificial intelligence reply that robots are not their primary goal, but merely research tools. Marvin Minsky, of the Massachusetts Institute of Technology, believes that research on AI is important because it is really research on theories of intelligence, and that work with robots, with computer vision machines, and with other similar devices—whatever their practical applications—aims the unraveling of

