and 10-week full-time Russian courses which had been developed for government personnel by the Defense Language Institute and said the committee had been informed that the institute "would welcome the enrollment of students."

In its report the committee paid special attention to the human translation resources currently available in the United States. It concluded that there was no shortage of translators even in the more difficult languages, and that, in fact, "the supply of translators greatly exceeds the demand." The members thought that all the Soviet literature for which there was "any obvious demand" was already being translated, and they pointed out the extensive translation that is done by the Joint Publications Research Service (JPRS) for its government clients. The committee reported that the JPRS had the capacity to double its translation output immediately, that it guaranteed return of 50 pages of translation in 15 days, and that it charged $16 per thousand English words for translation from any language. The committee said it was puzzled to find a rationale for "spending substantial sums of money on the mechanization of a small and already economically depressed industry. . . ."

In its report the committee argued that the only thing that could justify the "regressive and unkind" use of unedited machine translation was a convincing demonstration that its use would effect substantial economic savings. Although the committee estimated that "raw" machine translation was substantially cheaper than human translation, it felt that such translation was of unsatisfactory quality and that the post-editing work required increased the cost beyond that of many satisfactory human translations.

Despite its great skepticism about the worth of machine translation, the committee did have some kind words to say about machines. It stated that machine aids might help improve human translation, and it cited two European-based translation operations in which machines are used to prepare specialized glossaries. One of the two major areas in which the committee recommended further expenditure was that of improving translation, in part through greater use of mechanical aids. The report stated that "all such studies should be aimed at increasing the speed and decreasing the cost of translations and at specifying degrees of acceptable quality."

While dismissing machine translation as of little present or future value, the committee argued that the work that has been done on machine translation has had a highly beneficial effect on linguistics. It urged further work in the "extremely important" area of computational linguistics and specified that "linguistics should be supported as science, and should not be judged by any immediate or foreseeable contribution to practical translation." Committee chairman John R. Pierce* of the Bell Telephone Laboratories said that NSF should provide $2.5 to $3 million annually for computational linguistics, to be spent at four or five centers.

The committee did somewhat qualify its pessimism about machine translation when it stated that "no one can guarantee, of course, that we will not suddenly or at least quickly attain machine translation, but we feel this is very unlikely." Not everyone agrees with the committee. In an interview with *Science*, R. Ross Macdonald, director of the Georgetown University Machine Translation Research Project, predicted that "freely usable machine translation will be available within 4 to 5 years, and perhaps earlier than that." Macdonald readily admits that exaggerated claims for machine translation in the past have had the effect of souring many people about the possibility of ever achieving such translation. (The report notes that the CIA gave $1,314,869 directly to the Georgetown University project, transferred $305,000 through NSF, and that NSF gave $106,600 of its own funds to the Georgetown project. Macdonald argued that this was one of the errors in the report, since it was known that all NSF money given to the Georgetown project came from the CIA.)

Macdonald said that members of the Georgetown Project were "vehement" on the subject of the Pierce Committee's report and faulted the committee for having failed to discuss the subject with members of their project. Macdonald argued that the committee should have more thoroughly studied those institutions which are currently making use of machine translation—the CIA, Euratom, the U.S. Air Force, and the Oak Ridge National Laboratory.

François Kertesz, assistant director of the Technical Information Division at Oak Ridge, reports that the scientists there who have used unedited machine translation from the Russian are satisfied, "although no one is raving about the grammatical beauty." In a telephone interview, Kertesz said that 16 to 20 scientists had made regular use of the service in the last 2 years, even though the service had not been widely publicized at Oak Ridge. Kertesz said that plans were being made for increasing use of mechanical translation. "The actual cost is not cheaper than human translation," Kertesz reported, but he added that the great advantage of mechanical translation is the fact that it can be supplied much more quickly than human translation at Oak Ridge, thus meeting the scientists' current needs and interests.

But such successes with the use of machine translation are relatively few. At least for the present, it seems that translators are in little danger of technologically induced unemployment.

—BRYCE NELSON

*The other committee members were Eric P. Hamp (University of Chicago), David G. Hays (RAND), Charles F. Hockett (Cornell), Alan Perlis (Carnegie Institute of Technology), and John B. Carroll and Anthony G. Oettinger (both from Harvard).

Sloan Foundation Program To Aid Science Foundation

Grant totaling $7.5 million designed to strengthen science education in 20 independent liberal arts colleges have been announced by the Alfred P. Sloan Foundation. Grants of $250,000 to $500,000, payable over a 5-year period, will be made to colleges in all parts of the country in the Foundation's new program announced this week.

The program, which represents the Foundation's largest appropriation for a single program in its 32-year history, will strengthen colleges' position in the sciences and will "demonstrate means by which other colleges may improve theirs." The participating colleges are Antioch College; Carleton College; Colgate University; Cornell College at Mount Vernon, Iowa; Davidson College; Grinnell College; Haverford College; Hope College; Kalamazoo College; Knox College; Middlebury College; Morehouse College; Mount Holyoke College; Oberlin College; Occidental College; Reed College; Smith College; Swarthmore College; Washington & Lee University; and Williams College.