Letters

Uncertainties of Scientific Exchange

I should like to warn members of the scientific community about the uncertainties and hazards that may be inherent in accepting invitations to participate in scientific exchange abroad in the absence of written agreements in hand before the arrangements are made.

In February 1971, I was contacted verbally by a U.S. Department of Agriculture representative on behalf of the government of Romania and asked to give a series of lectures to agricultural scientists in Romania. I accepted immediately, with the understanding that the Romanian government would pay my expenses and those of my wife, an offer which was part of their initial request for assistance. It was not until 27 May that I was able to obtain, through the U.S. Department of Agriculture, a list of the lecture topics that were expected of me; at no time did I ever receive written information regarding the audience, the lecture sites, and the kinds of interests that the audience would have. Even though I was scheduled to leave on 8 July it was not until 2 July that tickets were available in the office of the Czechoslovakian airline in New York for those individuals who had agreed to lecture. At that point I found that (i) no ticket had been issued for my wife, or for the wife of another professor, despite the earlier statement from the Romanians that this was to be taken care of, and (ii) no reservations had been made on the only airline upon which the tickets could be used. Of course, the flight was full for the date for which the ticket had been issued.

When I turned to the Romanian Embassy officials in the United States, I found that they had no authority to issue or change airline tickets; after 5 days of confusion and uncertainty, only 10 minutes before my departure for the airport, I was notified that no ticket would be forthcoming for my wife, inasmuch as the funds for a ticket were not available from the Ministry of Agriculture in Romania. Moreover, I was told that the Americans were expected to pay their own way from their home to New York and back, a considerable expense in some cases.

Because of this confusion I canceled my trip, and I expect that others scheduled to go last summer were forced to do likewise. Thus, I would like to warn other scientists who are approached verbally and asked to engage in such programs that to do so without formal written confirmation of all terms from the responsible government is likely to result in substantial uncertainty, confusion, and frustration and do little to advance the cause of international scientific exchange.

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Translation by Computer

There has long been an interest in language translation and, in particular, the prospects for automatic translation by computer. As a research psychologist who is concerned with both the translation process itself and with the quality of translations, I would like to add some recent observations.

In 1963, when we began our translation studies at the Institute for Defense Analyses, there was already considerable stirring among professional linguists and others about the efficacy of translation by computer or machine translation (MT). At that time we undertook the comparison of different modes of translation, that is, human translators versus different versions of MT. Recently we have been able to add to our observations from the output of the latest MT system that has become operational. Given the investment in the 1971 MT system and the shift to it from the earlier model, we can well ask, What have we gotten for our money? Has there been any qualitative improvement in MT as a result of recent developmental efforts?

In 1964, with the cooperation of the Air Force's Foreign Technology Division, we submitted a Russian paper for translation by the then operational MT system. However, no analysis of the output was done at that time, and the material has been dormant until now. The installation of a new MT system prompted us to have the same Russian paper translated again in 1971.

The translations were prepared from an English paper containing 1685 words. A professional translator provided a Russian text from the English text. The Russian was then retranslated into English by MT (1964) and remained unedited (just as it came out of the computer). Two human translations by professional linguists (working independently) were also made in 1964.

Two versions of the translation by MT (1971) were produced, one unedited and one edited (that is, corrected and revised by a bilingual editor). An additional human translation was made in 1971.

Two characteristics of MT output are (i) untranslated words and (ii) translated words that have two or more possible meanings in the target language (English in this case). Using each of these characteristics as a crude index of translation efficiency, differences between the 1964 and the 1971 MT systems were found to be slight and not consistently favoring one or the other system. The MT (1964) translation contained 1.2 percent untranslated words and 6.3 percent multiple meanings. The MT (1971) translation contained 2.3 percent untranslated words and 5.3 percent multiple meanings. None of the three translations by linguists contained either type of error.

An examination of the post-translation editing (available for the 1971 MT output only) showed that many changes had been made: each of the approximately 80 English sentences had had some editorial modifications, most of them extensive. About 35 percent of the English words printed by the computer had been altered by the editor.

In the case of the 1971 system, computer processing and print-out time was negligible, that is, only a few minutes. However, the rate of post-translation editing was slightly less than the rate of human translation. Manual translators worked at a rate of about 450 words per hour, and the bilingual editors worked with the computer printout at 400 words per hour.

It would be unwise to conclude on a less-than-optimistic note because of one set of observations. However, if our present data are at all indicative of the state of MT, it is apparent that little progress has been made during recent years. Moreover, I do not know of any demonstrated advantages of MT over

human translations. (Advocates of translation by computer will claim that the 1971 MT system is still developmental, but what computer-based process is not?) Other methods should be applied to determine the readability of translations. We are now collecting such data.

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AMA Membership

A statement in Robert J. Bazell's report on "health radicals" (News and Comment, 6 Aug., p. 506) about the membership of the American Medical Association (AMA) requires further clarification. Bazell writes, ". . . an AMA that now counts fewer than half of the nation's doctors in its membership." The AMA's Center for Health Services and Development (*1*) has compiled figures which indicate that

> Approximately 69% of the nation's physicians who were eligible to pay membership dues to the American Medical Association as of Dec. 31, 1970, did.
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> Of 243,438 eligible physicians as of that date, 167,272 paid AMA dues. . . .
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> Dues exempt or not eligible were 29,501 physicians in federal service and 11,687 physicians who were inactive and age 70 or over. Also excluded were non-federal interns (10,561) and residents (35,279), physicians whose addresses were unknown (3,204), and those not classified (358).

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Reference

1. *Amer. Med. News* **14**, 1 (9 Aug. 1971).

Acceptable Mass Transportation

Little attention has been paid to the psychological aspects of the ownership of automobiles and what can be done to incorporate some of their positive aspects in modes of mass transportation that would be acceptable to the public.

The average human being finds it very desirable to carry about with him his little bit of armored territory filled with his many "Linus blankets" of personal property. This bit of territory serves many purposes: it insulates him from the oppressive crowds of his fellowmen; it gives him a feeling of power and the ability to run away swiftly from dangerous adversaries (all of us are willing to drive in parts of the city where we would not venture on foot, particularly at night); it lets him lock out the rest of the world from his collection of personal belongings; it is a castle surrounded by a moat of space that cannot be crossed.

All these aspects of automobile ownership are very important to the average citizen, if only subconsciously; they stand as formidable blocks to the usual schemes for mass transportation. Can the average citizen be talked out of these psychologically desirable aspects, or will it be necessary to devise schemes that will include at least some of their features? Could something like this be achieved with small personal capsules that would be pulled about, at the selection of the individual?

It doesn't sound very practical at the moment to provide personal territory with mass transportation, but this may be the only solution that would be acceptable to human beings.

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Production of Services

Haggerty, in his editorial of 20 August (p. 679), emphasizes the shift in the United States from the production of goods to the production of services. His main points are well taken and important, but when he turns to agriculture for an illustration of the increased efficiency with which we are producing goods, he advances a popular, but mistaken, notion about U.S. food production.

Haggerty says, "We now produce far more food with less than 5 percent of our work force than we did in 1890 with more than 40 percent."

The 5 and 40 percent figures refer, of course, to the percentage of our work force on farms, and are correct. But Haggerty, and most others, forget that farmers are contributing proportionately much less to the production of our food supply today then they did 80 years ago. Farmers once produced the power units they used and all the inputs for those power units. They also performed most of the repairs on those units and disposed of them at the end of their useful life. Today farm power units are produced in factories, fed by gasoline and oil that has been delivered by the service sector, and repaired by machinery agencies. Similar changes have occurred in many other aspects of farming.

It is quite true that less than 5 percent of our work force is on farms, but it still takes more than 20 percent to do the things 40 percent did 80 years ago.

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Indigenous Cultures

Mina Rees recently (Editorial, 30 July, p. 381) appealed for ". . . alternatives that will be more responsive to man's concern for his fellow men." Permit me to associate myself with this profoundly human view, and to identify an area that can help bring it into activation.

The fate of indigenous and minority peoples throughout the world has been the subject of recent concern. The inroads made by alien wars into their traditional cultures have added further insult to the injuries they have long suffered from exterminations, enslavements, forced migrations, involuntary servitude, and industrialization. To their long history of genocide, new chapters of ethnocide, both legal and illegal, have been added.

The International Union of Anthropological and Ethnological Sciences is charged with applying all means to the arrest of these inhuman developments. At the last meeting of its Permanent Council, held in Copenhagen in May 1971, a special commission was established to look into cases of ethnocide and genocide that it may discover or that are called to its attention. Its task is not judicial, nor is it punitive; it is solely investigative.

Scientists throughout the world are asked to lend their moral support to the work of this commission. They are urged to provide information relative to its field of responsibility and to make financial donations.

Communication should be made directly to Fredrik Barth, chairman of the Special Commission for the Investigation of Ethnocide and Genocide of Indigenous Cultures, University of Bergen, Bergen, Norway.

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