

## TACnology Corner

### Japan Report: Final Installment

This month's column winds up the report from Japan. In addition to participating in the International Forum on Translation Technology '89 and paying a call on Bravice International, Veronica Lawson and I visited Systran Corporation and the Japanese telephony project.

#### Systran

Systran Corporation is a Japanese company founded in 1980 which develops and markets mainframe machine translation, concentrating on the language combinations of Systran in which Japanese is either the source or target. It is a division of Iona Corporation, a major cosmetics manufacturer, and the president of both entities is Mr. Sadao Kawasaki. Systran Corporation cooperates with Systran Translation Systems, Inc., of La Jolla, California. Work on the English-Japanese (EJ) and Japanese-English (JE) systems began originally in La Jolla, where the two combinations were brought to an operational level with funding from Iona. In 1984 they were delivered to the firm in Japan for further development and marketing. Today JE is used by the U.S. Government and EJ by several clients including Arthur Andersen & Co. and a large translation center that processes tens of thousands of English pages each year.

The company has its headquarters in a beautifully appointed modern office building located on a narrow romantic old street in the heart of downtown Tokyo. On the afternoon of Monday, April 24, Veronica and I were most graciously received by Ms. Eriko Akazawa, manager and chief linguist, who began her association with Systran's Japanese combinations back

in La Jolla. Eriko introduced us to Mr. Nozumu Shinriki, manager, and members of the linguistic staff, of whom Ms. Ikuko Yachida was to be our delightful escort in Hakone a few days later. At this point Mr. Shoji Takahashi, a senior linguist on the EJ staff, began the demonstration. Veronica and I were pleased to learn that the texts were to be selected truly at random and would not be pre-prepared in any way. In the MT world this is a rare phenomenon indeed. We were asked to each suggest a pair of keywords which would be used to retrieve abstracts from the Japan Information Center for Science and Technology (JICST) Database. Veronica proposed "nuclear" + "disarmament," while my candidates were "AIDS" + "satellite." Several excerpts were retrieved on-line and then sent to the IBM mainframe for translation. While neither of us could read Japanese, we were amazed to see very few not-found words in the machine's output. There were none whatsoever in the passages on nuclear disarmament and satellites, and in the part on AIDS, only such show-stoppers as "vWf," "electroimmunoassay," "quantitation," "multimeric," and "manufactural" — while on the other hand "ELISA" and "oligomeric" were found.

The high percentage of words successfully matched against the dictionary is a tribute to years of intensive work. The company has set itself the goal of building up the JE and EJ dictionaries to a total of a million terms. In the biomedical fields alone it is incorporating 250,000 entries to meet the demand for translation in medicine, pharmaceuticals, and genetic engineering, and vocabulary is also being incorporated in economics, finance, and a broad range of other subject areas. We left Systran Corporation each of us with a bag of lovely cosmetics and a strong impression of patient commitment to a long-term goal.

#### Interpreting Telephony

Japanese initiative has gone beyond translation of the written word and is now reaching out to conquer the challenge of oral conversation. At IFTT'89

we had the good fortune to meet up with a group from the Advanced Telecommunications Research Institute, a think-tank that receives 70% of its funding from the Japanese Government and works on this and other challenges in the area of telecommunications. Since we were already planning a trip to Nara, our colleagues invited us to visit them. To get to ATR we had to change trains twice and then hire a taxi, which took us deep into the sparsely populated countryside. Suddenly, on a hillside overlooking the valley below, a noble granite colossus appeared. The building, dedicated only months earlier, houses the four branches of ATR, one of them being the Interpreting Telephony Research Laboratories, which alone employ a team of 44 scientists to work on the translation of natural conversation from Japanese into English and vice versa. Our host was Mr. Hitoshi Iida, senior researcher in the Natural Language Understanding Department.

Starting small, the project managers have decided to restrict themselves for now to the domain of questions and answers on the subject of registration for international conferences. The idea is that ultimately you will be able to arrange all the details of registering for a conference by telephone without the assistance of an interpreter. The seven-year project is now in its fourth year, and its researchers are already able to freely manipulate 700 words, which include a set of 279 phrases. The goal by 1992 is to be able to handle a total of 3,000 words and to extend coverage to include all forms of registration.

The project uses off-the-shelf speech recognition and speech synthesis technology. As of now, their speech recognition system is speaker-dependent, which means that its best performance is with the speaker it has been trained on. It can be trained to recognize more than one other speaker but not a lot of them at the same time. The goal, of course, will be to recognize the voices of both sexes and all types of speakers and accents.

For most current purposes, the

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task of recognizing speech in the same language does not require the depth of analysis that is needed for translation into another language, which is the job being addressed by ATR. We watched in amazement while the ATR analyzer "listened" to a chunk of Japanese input, checked out the phonemes one after another, formed them into syllables, tested different hypotheses, rejected the ones that seemed unlikely based on the surrounding context, and then came up with its best guess for an entire phrase. Some phonemes, apparently, are easier to identify than others: they had statistics showing success rates ranging from 100% for /ch/ and /ts/ to only 96.6% for /m/, /n/, and /N/. From the demonstration, one quickly saw that the process involves a constant checking back and forth of data at both the phonological and morphological levels. After the input speech string has been analyzed, then the translation component takes over and the usual problems of MT are addressed. Finally, the synthesis component generates an output in the target language. We saw a demonstration of the translation component with its syntactic and semantic analysis, based on unification grammar, and its target generation. This component, however, was not yet married to the analyzer—a step that was being saved for a public demonstration later on in May 1989.

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