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L'ERGONOMIE ET LES LANGAGIERS

Through the MT Looking Glass: Warren Weaver – Machine Translation Pioneer and Literary Translation Enthusiast

In the year 2012, one can hardly imagine a professional translator working without the aid of some form of computer technology. But it was not so long ago that the idea of applying computers to the task of translation was considered avant-garde … not to mention sacrilegious. This revolutionary idea came from an unexpected source. The man who played a pivotal role in changing the face of translation was Warren Weaver (1894–1978), a philanthropist and scholar who worked tirelessly throughout his extraordinarily varied and productive career to promote the understanding of science, particularly among members of the general public.

Born in Reedsburg, Wisconsin, Warren Weaver studied mathematics and engineering at the University of Wisconsin, and then went on to teach mathematics at Throop College (now known as the California Institute of Technology or Caltech). He later returned to the University of Wisconsin, where he earned a PhD in 1921 and eventually became Chair of the Department of Mathematics (1928–1931).

In 1932, Weaver pursued a new opportunity when he was elected director of the Natural Sciences Division of the Rockefeller Foundation. He held various positions in this organization over the next 27 years, always with a view to helping to decide "how the well-being of mankind throughout the world could be best served through the support of science."

His work brought him into contact with other key innovators in the burgeoning field of computer technologies, such as Vannevar Bush, pioneer of the mechanical and electronic analogue calculator and proponent of the memex (precursor to hypertext and the World Wide Web); Claude Shannon, mathematician, engineer and cryptographer, known as the father of information theory; Norbert Wiener, the originator of cybernetics; and Andrew D. Booth, engineer and x-ray crystallographer who developed an early mechanized bilingual dictionary.

Impressed by the success of cryptanalysis during the Second World War, Weaver began contemplating the possibility of applying cryptographic techniques to the task of translation. Recognizing that translation was a task that was growing in both importance and magnitude around the world, he wrote to Norbert Wiener in 1947 to enquire about the possibility of using computer technology and cryptanalysis to develop "mechanical translation." Weaver's aims were modest: he fully acknowledged that such an approach could best be applied to technical translation and that the results would likely be inelegant, but he nonetheless thought it worthy of investigation. Wiener's response was not encouraging, noting that given the state of technology, attempts to mechanize translation seemed premature.
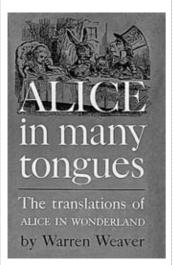

Warren Weaver in the 1960s

Weaver's Memorandum

Weaver continued to ponder the possibilities, however, and in July 1949, he issued a proposal entitled simply "Translation," in which he laid out his ideas for mechanical translation based on his knowledge of statistics, logic, information theory, and cryptography. Since that time, the field of translation has never been the same. This text, which became known as "Weaver's Memorandum," is generally credited as being the single most influential publication in the early days of machine translation. It was a major stimulus to research activity and, in 1951, it led directly to Yehoshua Bar-Hillel's appointment as the first full-time paid researcher in machine translation at the Massachusetts Institute of Technology (MIT). In 1952, Bar-Hillel organized the first-ever conference on machine translation at MIT, but Weaver, who had been so instrumental in setting machine translation research in motion, was notably absent. By then, Weaver had become involved with other important initiatives at the Rockefeller Foundation, but he made one final contribution to the field of machine translation by authoring the foreword to the proceedings from that conference, which were published in 1955 as part of a collection of essays edited by W.N. Locke and A.D. Booth. In this foreword, he states his optimism for the future of machine translation, "not to charm or delight, not to contribute to elegance or beauty; but to be of wide service in the work-a-day task of making available the essential

content of documents in languages that are foreign to the reader."

A fondness for words

Machine translation has long come under fire from professional translators, who are quick to point out its errors and shortcomings. However, it is worth noting that Weaver never suggested that translations produced by computers would be perfect. Rather, in looking for a constructive way to facilitate communication, he recognized that, in some contexts, even a word-for-word or otherwise imperfect translation could be useful—observations that have often been overlooked since. Moreover, he never intended for machine translation to be applied in all contexts, believing it should logically be applied to technical texts and never to more literary-oriented material.

What most translators today probably do not realize is that while he was a mathematician by training, Weaver was also a lover of words. Weaver's great facility in making scientific issues accessible to non-

scientists was related to his enjoyment of words and his skill in using them. He had a particular fondness for Lewis Carroll's classic work of children's literature *Alice in Wonderland*. Although Weaver had a demanding professional life, one of his hobbies was collecting copies of this work, and his collection contained 160 different translations in 42 languages. In 1964, his enthusiasm for the process of trying to translate a text that incorporates puns, play on words, jokes, and parody led him to write a book entitled *Alice in Many Tongues*, in which he explored these translation challenges and included a bibliography of translations based on his personal collection. Thus, far from being someone who did not appreciate the complexities of language and the intricacies of translation, Weaver had the utmost respect and admiration for translators of the human variety!

Coming full circle

It is ironic that the first 40 years of research in machine translation were dominated by rule-based approaches, in which computers were programmed to try to simulate the way that humans process language (e.g., by applying grammatical rules). In his early musings on the possibilities of machine translation, the humble Weaver began by noting that "the suggestions of the memorandum will surely be incomplete and naïve, and may well be patently silly to an expert in the field—for the author is certainly not such." Nevertheless, at the risk of appearing foolishly naïve, Weaver suggested, among other strategies, examining the statistical characteristics of the communication process. He also stressed the fundamentally

probabilistic nature of language in use. Interestingly, these are the principal tenets of much of the contemporary research that is being carried out in the subfields of example-based and statistical machine translation, and they are at the heart of popular and successful systems such as Google Translate.

Warren Weaver never intended for machine translation systems to replace human translators—indeed, even statistical machine translation systems such as Google Translate depend on having access to large volumes of high quality, human-translated text—but he did have a vision of a world where technology could support the act of communication for the betterment of mankind. And in this, he was correct. ✐

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