Novel Annotations in Machine Translation Facilitate Foreign Language Acquisition: A Proof-of-Concept Study

Prisament, Elena (School: Ossining High School)

Language barriers cause limitations including isolation and scarcity of job opportunities. This study introduced a novel user interface (UI) prototype for a machine translator, intended to support a new method of passive language learning. The prototype provides syntactic and semantic annotations to decorate the input and output with the intention to quickly impart basic understanding of a foreign language. Participants in two treatment cohorts were asked to translate 20 pre-defined sentences from English into Japanese using the translator UI annotated via color-coding (n = 24) or tooltips (n = 15). A control cohort completed the same activity without access to either annotation, i.e., approximating a currently standard machine translation (MT) UI (n = 22). Next, participants completed an assessment of basic Japanese language proficiency. Results indicate that both styles of annotations significantly improved participants' language-learning process. Average assessment scores in both experimental groups were nearly double those of the control group ($p < .001$). To ensure robustness, a linear regression was run, taking possible confounding factors into account. Of these, only prior exposure to Japanese demonstrated significant exogenous correlation to assessment results; being in the experimental group retained significance ($p < .05$). The findings of this research suggest that this novel translator UI is efficacious. Including color-coding and tooltip annotations in MT can improve both the language-learning process as well as the accuracy of translated content. Making such annotations technically feasible beyond a prototype may be a worthy area of research for the fields of MT and natural language processing.

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