

Effect of highlighting head nouns in synchronous captioning on cognitive processing during remote simultaneous interpreting: a case study on handling varying dependency distances

Abstract

Technological progress, particularly in artificial intelligence (AI), has fostered the application of sophisticated natural language processing tools such as high-accuracy automatic speech recognition (ASR) in the field of interpreting (Fantinuoli, 2018). These innovations are not only redefining interpreting modalities, but also challenging traditional assumptions about cognitive processes and workload distribution in interpreting (Chen & Kruger, 2022). Despite the potential of these technologies to enhance the quality and efficiency of interpreting by optimizing cognitive resources, empirical evidence of their effectiveness remains scarce.

Against this backdrop, this research assesses the role of ASR technology in coordinating cognitive resources and aiding problem-solving during the ‘in-progress’ phase of the interpreting workflow (c.f. Fantinuoli, 2023) in remote simultaneous interpretation. Specifically, it aims to explore how trainee interpreters leverage synchronous captioning to tackle complex Chinese sentences that feature noun phrases (NPs) with varying dependency distances between the head noun and its dependents. To that end, two research questions are proposed: (1) How does synchronous captioning with highlighting features impact the cognitive effort of trainee interpreters when they handle varying dependency distances? (2) How does synchronous captioning with highlighting features affect trainee interpreters’ interpreting performance?

To answer these questions, an eye-tracking experiment was conducted and twenty-eight Chinese trainee interpreters were recruited to interpret a speech from Chinese to English. The speech was interspersed with sixteen experimental sentences featuring NPs with controlled dependency distances. In these sentences, the head nouns were highlighted in red in the synchronous -captioning. To provide a comparative baseline, the study incorporated sixteen control sentences where head nouns remained unhighlighted.

The interpreting output and eye-movements were recorded with Eyelink 1000 Plus eye-tracking system. Various eye-metrics, temporal measures, and interpreting products were analysed. Findings suggest that synchronous captioning with head nouns highlighted in colour helps trainee interpreters manage cognitive load, evidenced by increased run counts and reduced regression counts. For sentences with highlighted head nouns, trainee interpreters demonstrated shorter ear-voice span and eye-voice span, indicating a higher proficiency in integrating visual and auditory information. Additionally, the synchronous captioning augmented with a highlighting functionality also helped improve interpreting performance. This improvement was particularly pronounced in sentences exhibiting greater dependency distance. Overall, this study sheds light on the potential of synchronous captioning enhanced with highlighting features in managing cognitive load and improving interpreting performance, particularly in helping trainee interpreters handle word-order asymmetrical problems, supporting the future incorporation of such AI tools into interpreting training and practice.

Keywords: artificial intelligence, automatic speech recognition, word-order asymmetry, dependency distance, remote simultaneous interpreting

References

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