

Exploring Second Language Writers' Usage Behavior of Automatic Speech Recognition: A Focus on Lexical Diversity in Narrative Texts

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Abstract

Strategies are techniques for making tasks easier to complete. While strategy use in writing research has been widely investigated, little is known about the strategies that second language (L2) writers might employ when producing text using automatic speech recognition (ASR), and whether there is an association between the strategy used and the lexical diversity of the produced text. This study adopts an exploratory approach with a one-sample design involving 30 nonnative English writers to examine what strategies L2 writers adopt when producing narrative texts with ASR and how these strategies affect the diversity of lexical items in their texts. While the absence of a control group limits causal inferences, the study provides preliminary insights into the role of ASR in shaping L2 writing behaviors and lexical diversity, emphasizing the unique affordances of ASR technology for process-based writing. The findings reveal that L2 writers mostly used four general strategies when composing with ASR and that the exclusive use of ASR does not necessarily lead to a higher lexical diversity of narrative texts. Our discussion highlights the importance of these findings and proposes lines of inquiry for future research on the use of ASR-based writing strategies and their potential effect on lexical diversity in texts.

Keywords: Automatic speech recognition, writing strategies, narrative writing, lexical diversity, input modalities

1. Introduction

While speaking is a natural mode of communication that doesn't require external tools such as keyboards or pen and paper, writing, on the other hand, is an activity that relies on the use of external tools. Thus far, different input methods (e.g., typewriters, ballpoint pens, keyboards) have been developed for writing purposes. One of the technological innovations in the development of writing (the "voice evolution"; Enge, 2020) is automatic speech recognition (ASR), an accessible and ubiquitous technology that converts users' speech to text, which can be found in many current devices (e.g., laptops, smartphones) and in word-processing and communication software (e.g., Google Docs, Microsoft Office Suite, text messaging applications). As such, ASR has the potential to revolutionize the way individuals can effortlessly transform their spoken language into written form, expanding the possibilities of written communication (a more detailed discussion of ASR is provided under the 'ASR-Assisted Writing' section).

Despite the ongoing increase in the use of voice as an input tool in mobile human-computer interaction (Enge, 2020), as well as the extensive use of ASR in the second language (L2) pronunciation research, ASR-assisted writing has not received the attention it deserves. Although research shows the efficacy of ASR technology in improving L2 pronunciation (Liakin et al., 2015) and describes the

strategies that L2 learners adopt when practicing pronunciation with the technology (Dillon & Wells, 2021; Van Lieshout & Cardoso, 2022), the exploration of ASR-assisted writing remains relatively limited, with only a small number of studies delving into this area. Moreover, the majority of these studies have focused on individuals with learning difficulties (Leijten & van Waes, 2005; MacArthur, 1999). Importantly, very few studies have investigated (1) how writers interact with ASR to produce text, regarding their behaviors; and (2) whether there is a relationship between the writers' choice of behavior and the lexical diversity of their final text.

To address these research gaps, this study employed an exploratory sequential design to identify the behaviors that participants employ when writing narrative texts via ASR (e.g., exclusive use of ASR, combining keyboarding with ASR) and to provide a preliminary examination of the relationship between the behaviors used and the diversity of lexical items in their texts. An exploratory sequential design, a mixed methods research approach, involves initially collecting and analyzing qualitative data. The results then inform the development of subsequent quantitative research, allowing for a comprehensive and iterative understanding of research questions (Johnson & Onwuegbuzie, 2004). To contextualize and provide motivation for the study, the component skills in writing and the significance of learner